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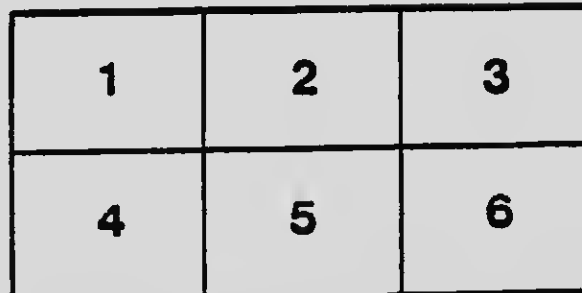
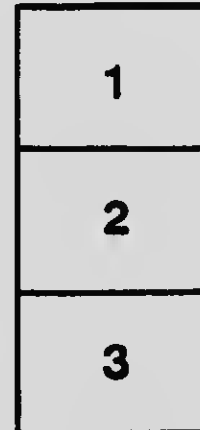
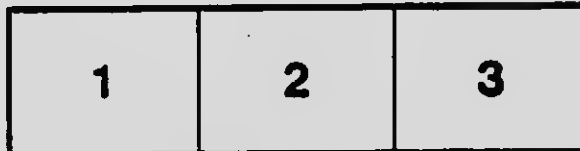
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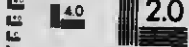
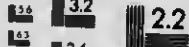
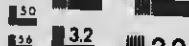
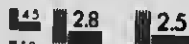
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Farmer's Manual Legal Adviser and Veterinary Guide

A Compendium of Useful Information on Stock Raising, Grain Growing, Home-made Devices, Farm Mechanics, Farm Well and Water Supply, Tanning Skins, Curing Meats, White washing, Painting, House work, Dairying, Poultry Keeping, Silos, Hitches, Knots, Colleges, Publications for Farmers, Eveners, Insects, and All Branches of Farming, with Rules, Tables and Formulae for Handy Daily Reference. The Only Book of its Kind Published Dealing Exclusively with Farm Problems of the Canadian West.



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THE NOR'-WEST FARMER, LIMITED
WINNIPEG, CANADA

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WINNIPEG, CANADA

INTRODUCTION

This Manual has been prepared to meet the demands of farmers for a book of ready reference. In our forty years experience publishing a farm paper we have found that certain kinds of information are constantly in demand. In the fall and winter we are asked over and over again for the rules for determining the number of tons of hay in a stack or the number of bushels of grain in a bin, remedies for ridding stock of lice, curing hens of roup, keeping pigs from crippling, or for the various diseases of live stock. In spring and summer come questions of another type—renting land and livestock on shares, fencing, killing weeds, controlling drifting soil, growing the various crops, combatting insects and hosts of inquiries along other lines too numerous to mention here. It was the handling of these inquiries covering practically every phase of farming, and live stock raising that gave us the idea of getting out this book. We wanted a book in which the matter would be condensed enough to permit of a great number of subjects being treated of and at the same time allow of each subject being discussed at sufficient length to cover the points essential to a thorough consideration of it.

The extent to which this end has been achieved the reader is left to judge. We have done our best to produce a book of reference that would be of daily use to practical farmers. In some particulars, no doubt, the work will fall short of your expectations and requirements; in many others, we hope, it will fill your wants and give you the information you need, briefly and clearly.

No one can carry about in his head all the rules, tables and formulae required in working out the problems of his own business. Heads are not for that purpose. They are for thinking and planning with; reference books must be the source of information for the thousand and one problems that come up for solution. No man except a freak can be a walking encyclopedia.

Most of the matter contained in this Manual has appeared in *The Nor'-West Farmer* since 1918. We do not claim that it is original, or that you have never read it anywhere else before. If you have been a reader of *The Nor'-West Farmer* during the past three years you have probably seen some of the material before. But that in no way detracts from its value. Rather, we think, it enhances the value of the material for has it not been read, tried and passed upon by many thousands of farmers, and having stood the test of actual practice is now printed and bound here in a book of convenient size, indexed so that every question can be quickly found and presented to the farmers of Western Canada as a contribution which this paper may make to the literature of agriculture.

So far as we know no book of this type has been available before. True there are any number of works of reference but a rare few of them contain much information of practical value to farmers. Twenty years ago *The Nor'-West Farmer* published a book of 112 pages entitled "Things Worth Knowing," which had wide circulation and since 1901 has been the only work of its kind available. Our former effort to bring together in book form some practical ideas, rules, recipes and formulae, was appreciated, apparently, by the people it was prepared for, since the book ran through three editions and many thousands were distributed. This Manual is a much more pretentious undertaking than the medest

booklet of 1901, contains several times the material is better illustrated and put together, and covers the hundred and one new phases and features of the farming business that have grown up during the past twenty years.

So we bespeak for this effort the same kindly appreciation accorded our earlier endeavors to produce a work of everyday value to practical farmers. We feel confident that you will find the Manual a reference that can be relied on and that within its pages you will find information not usually found in farm books. Our purpose has been to produce a book for practical, hard-working, day in and day out farmers; a book practical rather than scientific, condensed yet thorough enough to meet requirements, covering a wide field, yet touching in detail on a thousand and one questions of common interest. How well we have succeeded is left for the reader to judge.

And now, just one word more before we conclude this introduction. Should it happen that information you require,—a rule or table perhaps or a formula for working out something—cannot be found in the pages that follow your inquiry addressed Editor, The Nor'-West Farmer, Winnipeg, will receive immediate attention and the information you want will be supplied as quickly as it can be secured and mailed. The Nor'-West Farmer is published to promote good farming and to serve its readers in any way it can. It has been doing this since 1882 and no other policy will be followed so long as the paper continues to be published.

The promotion of good farming and service to an ever increasing number of readers,—at present seventy-five thousand—offer us as great an opportunity as we can hope to take advantage of in furthering the interests of our greatest industry and in being helpful to the finest body of men and women and boys and girls in the world—the farmers and their helpmeets of to-day, the farmers and farm women of tomorrow the men and women who are not only the workers and moral bulwark of the nation but, fortunately for the nation, the shapers of its destiny as well.

Winnipeg, October, 1920

EDITORIAL STAFF,
The Nor'-West Farmer

WHEAT

The best time to sow wheat is as early in the spring as it is possible to get on the land. Early seeding is desirable wherever early fall frosts are liable to occur. Late seeding may be successful in areas where fall frosts seldom damage the crops, also in light soils and on land containing little moisture. The quantity of wheat sown per acre varies from $\frac{1}{2}$ of a bushel to 2 bushels. The common practice is to seed about $1\frac{1}{2}$ bushels on light soils, and $1\frac{3}{4}$ on heavier soils. If the season is dry, lighter seeding gives best results. In a wet year heavier seeding will give a larger crop. Wheat, as a rule, is sown from 1.5 inches to 3 inches deep. The lighter the soil the deeper the seeding. Deep seeding is particularly desirable on stubble fields, or in soils deficient in moisture. Shallower seeding may be followed in soils where there is an abundance of moisture near the surface.

The best preparation for wheat is summer-fallow. Under ordinary conditions the best preparation would be a field either spring or fall plowed one year from summer-fallow. The least desirable condition for wheat is a stubble unprepared in any way. Land that has grown a cultivated crop, such as corn or potatoes the year before, gives excellent results with wheat.

Wheat is subject to a number of diseases, the worst being stem rust. There is no remedy for this disease. The only means of combating rust is to grow varieties of wheat that are immune to its attack. The Durum wheats, Kubanka especially, are less subject to rust than Marquis or Red Fife. Experiments in North Dakota in 1920 indicate that Kubanka wheat rusted to the extent of 7 per cent, while more than 60 per cent of the Marquis was affected.

The smuts of wheat, of which there are two, namely, stinking smut and loose smut, may be controlled by treating seed with the standard formaldehyde solution, namely, 1 pound of 40 per cent formaldehyde in 40 imperial gallons of water. Full directions for treating seed will be found elsewhere in this book.

OATS

The time to seed oats is immediately after the wheat is in. In a normal year this will be between the first and tenth of May. Where no wheat is grown it is customary to seed oats earlier than this, but ordinarily they are not sown as early as wheat. From 100 to three bushels of seed is sown per acre.

Less seed is used on light land in dry areas, and heavier seeding on heavy land in moist areas. About $2\frac{1}{2}$ bushels per acre is the customary seeding in most parts of the West. Oats are sown to about the same depth as wheat and the same considerations which guide one in determining the best depth to sow wheat, apply with respect to oats.

Since oats usually follow wheat or some other grain crop, the preparation of the soil usually consists of fall or spring plowing. Fall plowing gives relatively better results in areas of heavy rain fall. Spring plowing is a common practice in areas of lighter rainfalls and lighter soil. After plowing in the spring, it is well to seed as soon as possible, since moisture is lost very rapidly and the crop suffers thereby.

Smut is the chief disease of oats. It may be controlled by treating the seed with formaldehyde solution of the strength stated elsewhere in this book. Full directions will be found on another page for treating seed.

BARLEY

Barley is used in some sections as a cleaning crop, particularly where wild oats are prevalent. As a grain crop it is better adapted to northern than southern areas.

If barley is to be sown on heavy land, the best preparation would be plowing the fall before. Where this is not possible, early spring plowing gives best results. On lighter soils spring plowing is preferable. Spring plowing for barley or any other crop should be packed and harrowed immediately after plowing, and the seed sown as soon thereafter as possible. Barley is usually sown between the 5th and 20th of May. From general experience best results are had from seeding during the first three weeks in May.

The amount of seed to use varies from $1\frac{1}{2}$ to 2 bushels per acre. The common rate of seeding is about $1\frac{1}{2}$ bushels per acre. As with wheat or oats, heavier seeding may be practiced in moist areas, but in areas of light rain fall and light soil, the lighter seeding would give best results.

Barley is subject to two smut diseases, one known as covered smut and the other as loose smut. The covered smut may be controlled by treating the seed with formaldehyde solution, but the loose smut can be controlled only by the hot water treatment, which consists in soaking the seed in cold water for 12 hours and then submerging for 5 minutes in a cask or vat containing hot water held at a constant temperature of 130 degrees.

FIELD PEAS

Peas do best on soils of medium to heavy type containing plenty of moisture. Land intended for peas should have plenty of stored moisture, be free from weeds, and be well prepared. In areas where peas have never been grown it would be advisable to inoculate the soil. Inoculation is effected by scattering, on the field to be seeded, about 200 pounds per acre of soil from a field where peas have been previously grown.

Peas are usually sown about the end of April at the rate of about 2 bushels per acre of the small seeded sorts, $2\frac{1}{2}$ bushels of medium sized, and 3 bushels of the larger seeded sorts. These amounts should be decreased half a bushel each in humid areas. The seed should be put well down in the soil.

Peas are harvested by pulling with a horse rake, or by means of a special harvester that attaches to the cutting bar of the mower. Pulling with the horse rake is not advisable as there is considerable loss from shelling. Peas should be threshed carefully to prevent splitting. The regular concaves in the separator should be removed and blank concaves put in their place. By limiting the number of teeth in the concave and by reducing the speed of the machine, peas may be threshed with very small loss in splitting. Where peas are grown in mixture with oats, one bushel of peas to two of oats is commonly recommended.

WINTER RYE

Winter rye should be sown the latter half of August. The seed should be sown with an ordinary grain drill, being planted from 2 $\frac{1}{2}$ inches to 3 inches deep. When sown on well prepared summer-fallow one bushel per acre is ample. (This amount will be sown if the drill is set to sow one bushel of wheat.) Heavy seeding is apt to result in stunting the crop before the usual June rain arrives. It is perfectly safe to sow seed from a crop that has just been harvested. Late seeding or too thick seeding should be avoided. Ordinarily not less than three-quarters nor more than one bushel of seed should be used. If intended primarily for fall pasture the rye should be sown early in August or late July.

Under ordinary conditions winter rye is ready to cut by the first week in August of the year following that in which it is sown. In a dry year it will be ready somewhat earlier, probably from July 15 to 30, depending on location, tillage, rainfall, thickness of seeding, etc. It should be cut with a grain binder and handled exactly like wheat. Care must be taken, however, to have the grain thoroughly dry when it is threshed, as rye seems to become musty more readily than other grains. Stooking is best done, with least shelling, on the same day as cut.

CORN

Corn is usually planted between the 20th and the end of May. Rich, loamy, warm soil is best. Corn is a warm land crop. It may be planted either in drills or hills. Planting in drills gives more for less but does not control weeds so well. When sown in drills 36 to 42 inches apart, 20 to 30 pounds of seed is necessary. If planted in hills, 15 to 20 pounds is sufficient.

Until the plants are 6 to 8 inches high, surface cultivation with light drag harrows should be practiced in order to keep down weeds and maintain a soil mulch. Intertillage either with the one or two horse

cultivator is, of course, necessary thereafter until the plants are high enough to thoroughly shade the ground. Such tillage serves to maintain a good mulch after rains and to lessen evaporation during the warm dry season.

If the crop is to be used for silage it is usually harvested with a corn harvester and drawn as soon as possible to the ensilage cutter; if used for dry fodder, it is usually stooked in the field or near the buildings; when used for colling it is, of course, cut green and fed in the green state.

In any case it is desirable that the crop be harvested before it is frosted. Very green corn should be allowed to wilt before being hauled to the silo, since an excess of water in the silage tends to make it sour. The harvesting is usually done the last few days of August or the first week of September.

POINTERS ON FLAX GROWING

The variety of flax most commonly grown is Premcoet. It is one of the heaviest yielding varieties and does well in most parts of the northwest.

The common rate of seeding on either old or new land is from 20 to 30 pounds per acre. The recommended depth of seeding is from 1 to 1½ inches.

Flax is occasionally sown on stubble fields without any preparation. The practice is very much of a gamble. Results depend entirely on the weather and the freedom of the field from weeds. The practice has the same disadvantages as sowing wheat on stubble.

Flax is not a good crop with which to fight weeds, consequently it should be sown on land reasonably free from weeds. Neither should it be sown on land that has produced a crop of flax affected by wilt. Wilt is a disease of flax that causes the plants to die off at different stages of growth. The spores of the disease will remain in the soil for from four to seven years.

Where flax is sown on summerfallow or fall plowing the usual course of soil preparation is just enough cultivation to cover the seed and prevent undue evaporation. Where flax is sown on spring plowing on old land, the plowing should not be deep, it should be done early so as to start the weeds and cultivated to compact the soil. Flax needs a firm seed bed. The use of the packer before seeding is advisable if the soil is loose.

On new land the preparation consists of plowing 4 or 5 inches deep, packing, discing and floating. The object in this is to press the furrow slice back on to the subsoil ensuring contact with the subsoil moisture. Prepare a seed bed on the surface by using the disc harrow, cutting the soil an inch and a half or two inches deep. The seed bed requires to be well pulverized and the seed sown into well packed soil. Seed so placed will start to grow immediately.

In Manitoba the favored season for sowing flax is from May 10 to June 1. Flax will not withstand spring frosts as well as the grain crops, but is not quite so easily injured by frost in the fall. At the university at Saskatoon seeding between May 10 and 20 has given the heaviest yields over a period of years. Seeding during the fourth week in May is a common practice when the seed is sown on spring breaking. In Alberta the seed should be sown about the same time as in Saskatchewan. Professor Cutler advises seeding from May 10 to 15.

Professor Braeken of Saskatchewan advises the following method for growing flax on breaking done the same season:—The breaking should be done as carefully as possible 3 or 4 inches deep during the second or third week in May, and the land packed or planked and seeded as soon after plowing as possible. On some soils the land is often disc and harrowed before seeding and packed afterwards. This additional work usually increases the yield on soils that work up easily, but it is not in general practice, particularly in the drier parts, possibly because the whole method is a gamble and the less expense one puts into it the less one will lose. In the more humid areas the prospect of success is greater and the extra tillage work is therefore more often given.

Professor Bolley of North Dakota gives the following directions for growing flax on new breaking:—Break

the sod as deeply as can be done and yet have the furrow slices lie flat. The plow should be followed immediately by a heavy roller or some similar soil packing tool. The large corrugated type of metal rollers or disc crushers do a splendid sort of work on new breaking, tending to loosen the dirt from the masses of grass roots. A good roller for such work can be made at home by the use of concrete. The roller should be followed by a peg toothed harrow, drawn parallel with the furrow slices, the harrowing being done to further loosen the dirt sufficiently to fill the spaces between the furrows and to furnish cover for the seed. The drill should immediately follow the plow, roller and the harrow, placing the seed into the moist, firm seed-bed thus prepared. Follow the drill immediately by a heavily weighted flat or stone boat or roller, drawn over the surface to level, firm down the soil and cover the seed.

MILLET

Millets are annuals. That is to say, the seed is sown in the spring and the crop cut the same year as is the case with wheat, oats or barley. They are quick growers, large yielders, drought resistant, and very sensitive to low temperatures. They grow slowly in the cool soil of early spring and are easily killed by fall frosts. They are not popular, for the reason that they are annuals and "warm climate" crops. They are used as "catch crops" or crops to substitute for other forage that promises partial failure. The annual yield of fodder is about equal to that of oats.

There are three types commonly grown—the foxtail millets, the barnyard millets and the broom corn or proso millets. The first is earlier and therefore better suited to Western conditions. The leading varieties of foxtail millet are Hungarian, Siberian and Kurak. The seed is usually sown with a grain drill at from 20 to 30 pounds per acre late in May or early in June. The crop may either be pastured off or cured as hay. Being very leafy, curing is sometimes difficult. The hay is quite suitable for all classes of stock, but is fed mostly to cattle. If left too long before cutting, the forage is said to have an undesirable action on the kidneys of horses. When well cured it is rich in feeding value and nutritious.

SWEET CLOVER

Sweet clover is a biennial. It does best sown in summer fallowed land in June, clipped to kill weeds about the first of August, later growth being left for winter covering. It yields hay or pasture the following year and if not allowed to go to seed, dies out. Although long regarded as a weed it has been found to have many qualities that commend it as a farm crop.

Among the redeeming qualities of sweet clover are, first, its suitability to the climate; second, its high productiveness; third, its biennial character; fourth, it is a "legume," fifth, it may be grown as an intertilled crop, and sixth, it does well on light soils that are inclined to drift and where other forage crops often do very poorly.

Sweet clover grows nearly a month before corn is up and generally remains green for a month after corn freezes in the fall. It is seldom seriously injured by spring or fall frosts. It is a crop peculiarly suited to the short growing season and the severe temperature conditions of Western Canada.

In most seasons the crop will grow from 1 to 3 feet high the first year. This may be either pastured off or cut for hay as desired. The following year the first crop is generally ready to cut the latter part of June, and the second crop the latter part of July. From 4 to 15 pounds of seed, depending upon the width apart of the rows, should be used per acre.

It should not be forgotten, however, (1) that sweet clover is bitter, particularly in the later stage of its development, (2) that it is coarse in texture and therefore unpalatable, and in the mature condition relatively indigestible, (3) that it is hard to cure on account of its large moisture content, (4) that it may become an undesirable plant in alfalfa seed growing centres, and (5) that much more information must be obtained concerning it before it can be either rejected as being worthless or as being more harmful than beneficial, or accepted as a forage crop suitable for general use.

Growing Grain and Field Crops

7

GROWING THE GRASSES

Grass and Clover Mixtures

To obtain larger yields per acre and better balanced fodder it is sometimes advisable to sow grasses and clovers in mixtures. The following mixtures might be used to good advantage:

For hay in the dry districts: Alfalfa, 8 pounds western rye, 8 pounds.

For hay in the moister districts: Western rye, 6 pounds; red clover, 6 pounds; timothy, 4 pounds.

For pasture in the dry districts: Brome, 8 pounds; western rye, 4 pounds; alfalfa, 4 pounds.

For pasture in the moister districts: English blue grass, 8 pounds; red clover, 6 pounds, timothy, 4 pounds.

Other mixtures are as follows:

1. Western rye 8 lbs., brome 6 lbs.
2. Western rye 10 lbs., Kentucky blue 6 lbs.
3. Western rye 10 lbs., timothy 3 lbs.
4. Western rye 10 lbs., alfalfa 3 lbs.
5. Brome 8 lbs., alfalfa 5 lbs.
6. Timothy 5 lbs., alfalfa 5 lbs.
7. Western rye 8 lbs., Kentucky blue 4 lbs., alfalfa 3 lbs.
8. Western rye 5 lbs., brome 3 lbs., timothy 2 lbs., alfalfa 3 lbs.
9. Western rye or brome 8 lbs., red top 4 lbs., alsike clover 3 lbs.

Those containing alfalfa will be found most productive, but when used for hay two cuttings may be necessary in order to secure the greatest yield. The mixture containing brome grass or brome and alfalfa are likely to give the best pasturage.

For districts of reasonable rain fall the mixture in which western rye predominates will be found best for hay, while those containing western rye and either alfalfa or Kentucky blue grass will be found best for pasture. On some suitable soils in such area timothy may replace a part of all of the western rye.

Mixture No. 9 is recommended for low lying soils that are subject to flooding. It should also be found useful for slightly alkali areas. Where the alsike is found to kill out the amount of the other crops should be increased and the alsike omitted.

Under favored conditions $\frac{1}{2}$ lb. each of red clover, alsike, alfalfa, and perhaps white clover might replace an equal weight of the other seeds. While the clovers mentioned are not considered commercially successful in many parts of the West, it is probable that some of them may find a suitable environment in parts where they have not yet been tried. They are likely to do best on heavy soils and in the moister areas.

ALFALFA

Owing to its high feeding value, especially for young stock and dairy cows, alfalfa is an extremely valuable forage crop. It is adapted to a wide variety of soils, growing equally well on heavy clay and sandy loam. The ideal soil is probably a fairly heavy soil with a gravelly subsoil giving good natural drainage. Alfalfa should not be sown, however, on land that is under water for any length of time or where the water level in the soil is close to the surface. It apparently cannot stand wet feet. Alfalfa is well adapted to mixing with other grasses and clovers and should be included in most of our mixtures sown for hay or pasture.

Before going into the growing and handling of the crop it would, perhaps, be well to state briefly the precautions which must be taken if success is to be obtained. Northern grown seed of the Grimm, Turkestan or Baltic varieties must be used, Grimm being hardier than either of the other two. Before sowing the land or the seed must be inoculated with alfalfa nitro-culture unless the land has grown alfalfa or sweet clover previously. Of the two methods inoculation of the seed is usually easier, and gives good results. If these two precautions are taken, the first steps necessary to success are assured.

The seed may be sown with a nurse crop in the parts of the province with a good rainfall if the seeding down is done on land that is not more than one crop from having been summerfallowed. A light seeding of about a bushel of barley or a bushel and a peck of oats per acre is heavy enough seeding for a nurse crop. In the drier sections of the West and on land

that has not been summerfallowed recently in the wetter sections, seeding without a nurse crop will give much better results. When seeding with a nurse crop, the alfalfa should be sown at the same time as the nurse crop. When seeding alfalfa alone the land, if in summerfallow or boed crop the previous year, should be top worked until about the first of June, and may then be seeded. Stubble should be fall plowed and top worked in the spring until June and then seeded. Twelve pounds per acre is the usual rate of seeding when sown broadcast.

Alfalfa should never be pastured the year it is sown no matter how much growth is obtained. When seeded alone it is sometimes necessary to run the mower over it to keep down the weeds, but no attempt should be made to get a crop of hay the first year. After the first winter is successfully passed the crop is much more able to look after itself but it is never desirable to cut or pasture alfalfa late in the fall as the crop will then go into the winter without enough top to hold the soow and will be badly winter killed. If properly handled the loss from winter killing should be very small. Except in very unusual seasons two crops of hay are obtained each year, the first in June and the second in August. To make the best quality hay, alfalfa should be cut when coming into bloom. If left until the plants are in full bloom more of the leaves are lost in handling and the stems become woody.

If the crop is very heavy it may be necessary to tend it before raking in order to wilt it evenly. Alfalfa should be raked into windrows while still slightly tough and put into small coils allowing the hay to cure in the coil. By bending in this way the loss of the leaves, which are the most nutritious part of the plant, is largely avoided. Unlike most clovers, alfalfa once well coiled sheds the rain and, except for the bleaching, is not much spoiled by weathering.

As a feed alfalfa is unquestionably our best hay and is eaten readily by all classes of stock including pigs and chickens. When horses are fed on alfalfa it must be remembered that it is much more nutritious than ordinary hay and care should be taken not to over feed. A little over half the usual quantity should be fed and if more bulk is required straw should be fed to make up the deficiency. For young stock of all kinds it is unexcelled as it seems to contain the proper elements for the development of bone and flesh.

POTATOES

Potatoes generally do best on land broken the previous year, or on land that has been fall or spring plowed stubble. If manure is used it is best applied the fall previous and plowed under. Potato seed should be treated for the control of potato disease. Scab may be prevented by immersing the potatoes for two hours in a solution formed of one pound of formaldehyde to 30 gallons of water.

The usual season for planting is between the 10th and 24th of May. Experience proves that it pays to cut the potato seed into sets weighing about one ounce each, planting these to a depth of about 4 inches in rows 36 inches apart, the sets being from 12 to 18 inches apart in the rows. From 12 to 20 bushels of potatoes are needed to plant an acre.

After planting, the common practice is to harrow the land at intervals until the plants are up. Cultivating between the rows will then keep down the weeds and any weeds growing in the rows may be cut down by hand.

About the only insect of the potato is the potato bug. It may be controlled by spraying the plants with a solution made of 1 pound of Paris green, 1 pound of air slaked lime to 80 gallons of water. Potato diseases are commonly controlled by using the Bordeaux mixture. Elsewhere directions are given for the preparation of this mixture.

Potatoes should be dug soon after the tops are wilted down in the fall, and stored either in pits or cellars. They keep best at a temperature a few degrees above freezing.

USING FORMALDEHYDE

Formaldehyde is the chemical name of the 40 per cent. gas solution used in treating seed for smut. Formalin is a trade name for formaldehyde. One pound (16 ounces) of formaldehyde, stirred in 40

imperial gallons of water, gives the proper strength for treating grain.

Formaldehyde that has been frozen, or has stood too long, should not be used. It is impossible to know the strength of such a solution. It may be too weak or too strong. Better procure fresh stock and be sure of the strength.

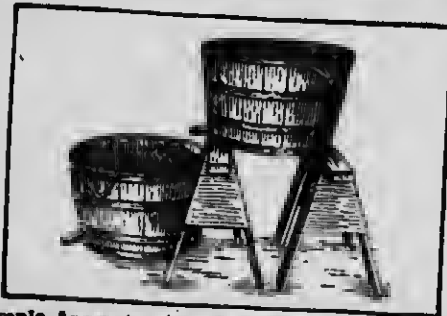
The trouble experienced with formalin in damaging seed is not due to the strength of the solution, but to



A Home-made Pickler for small farms. The bunt balls and light seeds can easily be skimmed off and the formaldehyde drained into a tub or barrel.

the time of covering the treated seed. It is the action of the free gas upon the moist grain that is effective and not the soaking of the solution. Formalin can be used three or four times the recommended strength without damage to the seed if not covered over two hours. In fact, there is a quick method of using formalin full strength and spraying it on the seed with an atomiser but this method is not recommended as there should be no great hurry in treating seed, and the soaking of the seed undoubtedly quickens germination.

The best smut machines treat the seed very efficiently. For treating large amounts of seed their use is recommended, as the seed grain is continuously fed through the solution, thoroughly mixed in the solution so that the bunt balls and light seeds can float to the top where they are skimmed off, and as the grain is elevated out of the tank it is partly dried and thoroughly mixed. It should then be covered from two to six hours, but no longer. The automatic picklers may do for oats and barley, but the objection to them for treating wheat is that they have no method of floating off the bunt balls or light seeds. Home-made pickling devices, such as those illustrated, are easily and quickly made. For the tub method one can use the halves of a barrel cut in two, placing one on a stand above the other, so that the solution can be drained from one or the other. The bunt balls are skimmed off before draining. The long shallow box illustrated has an advantage over the tubs in its increased surface which permits more smut balls and light seeds to float in the top.



Simple Apparatus for the Formalin Treatment, consisting of two half-barrel tube. Fitted with pine plug and rope handles and two saw-horses.

The treated seed may be covered two to six hours, and, if then uncovered and spread out to dry there is not the slightest danger of any damage and the seed may be sown at any time afterwards, even a week after, but if covered overnight it should be sown the following day. Properly treated, there will be no damage to the seed but rather a quickening of germina-

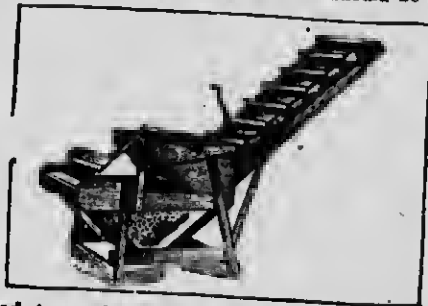
tion owing to the soaking which it gets. Over-treatment or too long covering of the treated seed delays germination rather than kills the germ.

Formaldehyde prevents tagged grain, wheat bunt, barley smut, oat smut and wilt in flax. It is safer and cheaper than bluestone.

If smut machines or the home-made devices shown are not used, the seed may be dipped or sprinkled. If dipped it should not be left more than four or five minutes in the solution before being removed and spread out to dry. If sprinkled about one gallon per bushel of the formaldehyde and water solution is required, the grain being turned over with the shovel as it is sprinkled. After sprinkling and turning until every kernel is thoroughly wet the grain should be heaped in a pile and covered with bags or blankets for about three hours, in order to insure that every part of every kernel has been subjected to the escaping vapor of the formaldehyde.

In treating flax the same strength of solution is used. The sprinkling system is best for flax. A very fine spray is preferred, and the seed should be continuously stirred during treatment.

Wilt is the disease flax seed is treated for. Wilt may be carried over from year to year in the seed or in the soil. Its presence is usually detected by the scaly covering found on some of the seeds. If a sample of seed shows any considerable percentage of such grains it should either be discarded for seed purposes or treated with formalin solution. The formalin solution is made up to the same strength as for wheat or oats, namely, 1 pound of formalin to 40 gallons of water. Before being treated the seed should be well



Good type of Pickling Machine for smuts. It feeds continuously, skims off the floating bunt balls and light seeds, and mixes and dries the seed on the elevator.

cleaned to remove all inert matter, as pieces of straw, etc., only add to the difficulties of treating. The fanning mill will also remove many of the scaly wilted seeds.

Spread the seed out in a thin layer in a tight wagon box or floor and apply the solution. This can best be done with a small force pump sprayer. If a sprayer is not available, a fine-rose watering can may be used. About one-quarter gallon of solution is used per bushel of seed. This will dampen the seed thoroughly, if the flax is well raked over while the solution is being applied. An ordinary garden rake does very well for mixing or stirring the seed during treatment for wilt prevention. It is well to keep the flax stirred for some time after spraying until the moisture is well absorbed, after which it may be put in a pile and covered with sacks or a blanket and left for two hours. It should then be shovelled over to dry, taking care to break up any lumps that may have matted together.

The treating of flax seed is much more difficult than for the cereals, but it must be borne in mind that the quantity to be treated for each acre unit is only one-quarter to one-third of that for wheat, oats or barley.

In using formaldehyde the following precautions should be observed: (1) The formaldehyde used should be standard, 40 per cent. solution. (2) The seed should not be allowed to freeze hard while wet nor to remain damp for a long period before using. Seed grain should not be treated very long before it is sown, the longer it is left unsown after being treated the less vigorous the germination is likely to be. (3)

Growing Grain and Field Crops

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The treated seed should not be re-infected by being covered with or handled in smut-infected bags. (4) Treating seed increases its bulk from 5 to 25 per cent. Allowance for this must be made when sowing.

DISC VERSUS CULTIVATOR

The disc harrow is the usual implement used in preparing stubble land for seed in the spring. Cultivators are more commonly used on weedy summer fallows or in working land, in the spring or in any season, that is infested with weeds. Two strokes of the disc, if the disc is set at a good angle, should be more effective than one stroke of the cultivator in preparing stubble land in the spring. It will depend, somewhat however, on the type of soil. The purpose of both implements is to stir the soil. The cultivator will do this better than the disc in stony or in heavy ground. It has better penetration and can be used more effectively in very hard ground. But the cultivator does not adapt itself to as many different conditions as does the disc. If only one implement for cultivating is to be bought, the disc would be preferred. There is not much difference in cultivators. Any one of the recognised standard kinds is about as good as another. In using a cultivator more care is necessary than in using a disc. On stubble land in the spring it may not work as well as the disc, or on light land it may be necessary to work it at a greater depth than it is desirable the soil should be worked in order to make the teeth clear and not drag the weeds or stubble. For handling a summer fallow where the plow is not used the duck-foot cultivator is the best implement, very much better than the disc, since it cuts off the weeds. In many parts of Manitoba, and to a lesser extent in other sections, farmers are not plowing their summer fallows, finding the cultivator may be used to better advantage than the plow in killing the weeds and conserving moisture. In using the cultivator care should be taken to see that the teeth are all set to work on the same level and run as nearly flat as possible. Before starting in the field put the cultivator on a board floor, raise the tongue to the height it will be when the horses are attached and set the teeth to run flat, not with the point digging in and the back sticking up, but all teeth set to the same level and flat.

TO STOP SOIL DRIFTING

There is just one way of permanently correcting a soil that blows, namely, to put fiber into it. Unfortunately it is not possible to immediately make use of this method if one's field starts moving over to the neighbors. Consequently it is in methods for controlling drifting by prompt action that your readers will be interested rather than in correcting the condition by the other means we have in mind; so we will first outline some of the methods that have been found useful in checking the tendency to blow. These are not set out here in order of importance or general usefulness. Whichever method seems most practicable to any one individual is probably the best for him to use. Some are adapted to one condition of soil and crop, some to others.

Using Manure and Spreading Straw

Wet, rotted manure, spread lightly immediately after seeding helps a lot in holding a light soil. The manure adds fiber, helps to check the soil particles when they start to move before the wind. Manure so applied serves three purposes: it holds the soil; checks evaporation, and adds fertility.

Straw spread over a field immediately after it is seeded is advocated by some as the best makeshift remedy for soil drifting. Old wet straw is better than light dry straw, as the latter is inclined to blow with the wind. However, experience has been that a light dressing of straw, especially on light land, will effectively help in holding the soil. A manure spreader may be used for spreading the straw. One of the special straw spreaders now on the market will handle straw much better than the manure spreader. In the absence of equipment for spreading the straw, it may be put on by spreading from the wagon.

Using Furrows for Wind-Breaks

An expedient useful in critical cases, where the wind threatens to completely destroy the crop, unless its

effect can be reduced, is to go into the field with the plow and throw up three or four furrows, making the furrows about two feet apart and running them crosswise of the direction of the wind. Two furrows thrown towards each other, as one would start a land, serve best. The idea is to throw up a wind-break. The distance between the furrow strips should not be more than four rods. If the wind is bad it may be necessary to throw up fresh furrows several times during the season. The furrows thus thrown up break the wind and catch what soil is raised in the strip to the windward of them, keeping it from blowing over and cutting off the crop.

Seeding Strips to Fall Grains

Where one can do so, the seeding of the field in alternate strips of, say, fall rye and spring grain makes a pretty effective control. The strips should be about two breadths of the drill in width and not more than four rods apart. Fall rye is a good crop to sow for this purpose, since it will have made a pretty good growth in the spring before the windy season occurs. It is understood, of course, that the strips of fall rye must be put in the summer before, between the middle of August and the 1st of September. This remedy, therefore, can be used only on summer fallow since it is not possible to get the rye sown in time on land that produced a crop the season before.

Seeding Spring Grain on Summer Fallow

A North Dakota farmer of long experience with drifting soils says that the following is an effective way of stopping drifting. It is useful, of course, on summer fallows only. He says: "Work the summer fallow as usual until a couple of weeks before harvest. Then seed it with oats at the rate of from three pecks to one bushel per acre. The oats will grow to eight inches high before they are frozen down. Next spring this growth will protect the surface from wind but will not be enough to retard the drill in any way." In this country it would be advisable to seed the oats the first week in August.

Cropping the land so that it will come regularly into grass is the only method for permanently correcting this condition.

BEST TIME TO PLOW SUMMERFALLOW

The best time to plow the summerfallow depends on the purpose of the fallow and the average precipitation in the district. The sooner the summerfallow is plowed after the first of June, the more moisture it will conserve, the more it will cost to control the later growth of weeds and the more luxuriant the subsequent crop of grain will be. Where the chief function of the fallow is to control weeds, surface cultivation or very shallow plowing, either in fall or spring should precede the fallow, in which case the plowing for the latter may be delayed without seriously decreasing the yield. At Saskatoon on clean soil each week's delay in plowing after the first of June decreased the yield approximately one bushel of wheat per acre.

HANDLING FARM MANURE

The best system generally for applying manure is to rot it and plow it under. Straw manure is likely to leave the soil too open and may do more harm than good. Professor T. J. Harrison, of the Manitoba Agricultural College, recommends the following methods for making use of farmyard manure:

(1) Drawing direct from the barn and spreading on the land; (2) putting in small piles on the land; (3) putting in a heap and allowing to rot before applying.

The first method has certain advantages, one being that you secure all the fertilising elements in the manure. Experiments show that one ton of fresh manure is equal to one ton of rotted manure, and it usually takes two tons of fresh manure to make one ton of rotted manure. It is also a cheaper method of handling, because one loading is all that is required. It has of course, some disadvantages, and also, if weeds are bad, it is a means of spreading them. Then if the straw in the manure is plowed under, it often holds the land so open that it will dry out. In districts where wild oats or other noxious weeds are prevalent, it is a better plan to adopt the third method. The

second method has very few, if any, advantages, and all the disadvantages of the first method.

About the best plan for handling manure in this country is to put the manure in a heap in the farmyard where the stock will tramp it down. Where the manure is usually composed of a large amount of straw and the season is comparatively dry, it is difficult to get it to rot thoroughly if piled loose. If it cannot be arranged to pile the manure near the barn, then draw it out with a stone boat, sleigh or wagon, and pile it near the field on which it is to be used. In building the pile allow the team to drive over it, always unloading on the top. In this way the manure will get well packed down. A good manure pile should be built on an impervious piece of soil. The land about the pile should be level, so that the soluble substances will not leach out and run off. The wall of the pile should be low in comparison with the surface, and the top should be kept almost level, so as to take up sufficient moisture to carry on decomposition. After the manure has been piled until sufficiently rotted, it should be spread directly on the land and either plowed or disced in before it has dried out, and since manure spreaders cannot be used all winter this is the only method where this implement can be utilized in the spreading of the manure, and as it spreads thinner and even more than any other method it is the only way of spreading manure on the farms in the West.

TREATING POTATOES FOR SCAB

There are several diseases of the potato which are carried over from one crop to another by planting diseased seed. Common scab is one of these diseases. Scab has become very prevalent in the West of late years, particularly in the older sections of Manitoba. It is not an easy disease to control since it carries over in the soil and on the tubers. The first point in controlling it is to plant the potatoes on land that has not produced potatoes for several years. The second precaution to observe is to treat the potato seed whether it is affected with scab or not. Corrosive sublimate and formaldehyde are the best disinfectants to use in combating scab or freeing the potato tubers of any diseases that may affect them. On account of its being the most convenient formaldehyde is most generally used. In treating potatoes make up a solution formed of one pound of standard formaldehyde to 30 gallons of water. Dip the bags of potatoes in this solution, allowing them to remain immersed for two hours. Then take out, spread out to dry, cut for seed and plant. Formaldehyde will kill the potato scab and treated seed will not produce scabby potatoes unless planted in infected soil. Corrosive sublimate and formaldehyde give practically the same results in checking potato diseases. Formaldehyde is cheaper and more convenient to use.

However, if the corrosive sublimate is preferred the tubers may be treated with it as follows: Dip the uncut seed in a solution, made by mixing four ounces of corrosive sublimate in a quart of water in a glass jar. This, after dissolving, should be mixed with thirty gallons of water. Do not use metal containers for this work, since it corrodes metals; barrels, wooden tubs or concrete vats should be used. This solution is a deadly poison, but will not injure the hands. Treated seed should not be eaten or fed to stock.

Place the uncut tubers in this solution one-half hour. Remove and allow to dry slightly in the wind after which they may be cut. Since the solution grows weaker from use, it becomes necessary to add one ounce of dissolved corrosive sublimate to each harrel, together with enough water to bring the solution up to its original volume, after each batch of potatoes has been treated. After this has been done four or five times, it is better to throw the entire solution away and prepare a new one.

TREES FOR HEDGE

There are quite a number of hedge plants which are quite satisfactory for our climate. The choice depends to quite an extent on the likes of the person making the choice. Probably the best all-round hedge plant for any part of the West is the caragana. It is perfectly hardy, grows quickly, and makes a very handsome hedge. White spruce makes an even more handsome hedge under favorable conditions, but does not grow

so quickly and is not so well suited to an exposed place where it would be rubbed against or exposed to dust. Laurel willow also makes a good hedge.

For ornamental trees for lawn planting, the following are among the most beautiful: White birch, mountain ash, blue spruce, Scotch pine and lilac. For information regarding the free distribution of trees write to the Superintendent of Forestry Station, Indian Head, Sask.

BORDEAUX MIXTURE

This is the standard remedy for most plant diseases. It is particularly useful in controlling potato diseases. The following is the formula usually followed:

Copper sulphate	4 lb.
Unslaked lime	4 lbs.
Water	40 gals.

Dissolve the bluestone by placing in a sack and suspending in a harrel or tub containing 10 or 12 gallons of water, preferably warm water. Slake the lime in another vessel and after straining add sufficient water so that along with the water in which the copper sulphate has been dissolved there will be sufficient to make up the quantity called for by the formula. Pour into the copper sulphate solution and stir thoroughly, after which it is ready for use.

DESTROYING RATS AND MICE

The methods recommended are trapping, poisoning and killing by terriers, cats and ferrets. In destroying rats and mice in houses the use of poison, not only on account of its danger, but the occurrence of the inaccessible corpses of these animals is likely to prove objectionable. Barium carbonate is a cheap, tasteless, and odorless poison. It may be mixed in a dough composed of four parts of meal or flour and one part of the poison, or a stiff dough of eight parts of oatmeal and one of poison. The poisoned dough should be placed in the runways of the animals. Strychnine is a well-known and rapid poison, usually used in the form of strychnine sulphate. The dry crystals of this chemical are inserted in baits, such as meat or cheese. With oatmeal or grain, such as wheat or corn, it is used in the form of a syrup which is made by dissolving half an ounce of strychnine sulphate in a pint of boiling water; a pint of thick syrup is added, and the whole mixture is stirred thoroughly. Oatmeal should be moistened with the syrup, and grain should be soaked overnight. Arsenic is used in most rat poisons. It may be fed in the form of powdered white arsenic used as described above. A good bait is prepared by thoroughly mixing a pound of oatmeal, a pound of coarse brown sugar, and a spoonful of arsenic. This is placed in the runs of the animals. Phosphorus is a common ingredient of rat and other animal poisons, but owing to the danger involved in mixing it and in the subsequent use of the home-made or commercial preparations on account of its very great inflammability, its use as a rodent poison is not recommended.

WHERE TO SET THE ROLLING COULTER

There is no exact place to set a rolling coultter on a plow. To obtain best results, a change of adjustment is generally necessary to meet various conditions, such as loose or hard ground, hard scouring or easy scouring soil, clear or trashy fields, deep or shallow plowing, old ground or sod land. Ordinarily best results are obtained when the coultter is set to cut about 3 inches deep; when the ground is very loose, or when plowing sod 4 inches deep; and in very hard ground or hard scouring soils, as shallow as 2 inches. The main thing to keep in mind is that the coultter should be set just deep enough to cut up the trash, or, when plowing sod, to cut the roots. For most plowing set the coultter a way from the landside about $\frac{1}{2}$ inch. In deep plowing or sod plowing set it about $\frac{3}{4}$ inch away from the landside. In shallow plowing or hard scouring conditions, it may be set a way from the landside as far as one inch for best results. Try to secure a furrow slice full enough to keep the shin of the mold-board covered with dirt and to have an unbroken furrow wall. For average conditions the middle of the coultter should be about 3 inches back of the point of the share, in difficult scouring soils or very hard ground about 4 inches, and in very loose soil or trashy ground only 1 inch or 2 inches back of the point of the share.

Eradicating Farm Weeds

Weeds offer the most serious problem with which the Western farmer has to contend. Knowledge of the dangerous weeds and of the means for controlling them is necessary if one desires to keep weeds in check. Whenever you find a weed you do not know, send a specimen of it, roots, stem, leaves and flowers—the whole plant—to your provincial agricultural college, and be advised by experts as to the name of this weed and the best means for controlling them.

There are three classes of weeds, Annuals, Biennials, and Perennials.

Annual weeds are not hard to exterminate. Any system of germinating and then destroying by cultivation should soon clean the land of such weeds. Harrowing after the crop is up, from two to three inches high, will give good results.

Winter annuals can be eradicated to a great extent by following the system mentioned for annual plants, with the exception that late fall cultivation is necessary, also the thorough working with a wide-shear cultivator followed by the harrow in the spring. This should be done as early as possible and again just before seeding.

Biennial plants can be destroyed best by plowing. Cutting these weeds two or three times during the season will commonly prove effective. They should be cut as close to the ground as possible. In this way the crown of the plant may be destroyed, which results in the plant dying immediately. If cut above the crown it will likely shoot up extra branches, hence the necessity of cutting often. In badly infested fields summer-fallowing is recommended.

Perennial weeds are the most difficult of all weeds to destroy. Improper cultivation will only tend to increase the number of plants. It is with this kind of weed that careful consideration of climatic and soil conditions must be given. It is almost impossible to eradicate perennial plants in a wet season, because there are only two ways of destroying them, viz.: to surface cultivate, which will prevent the plant from producing the leaves whereby its life is sustained, or to cultivate the running rootstocks to the surface where they will be killed by the sun, or where they can be raked up and burned. This being the case, it is necessary to select, if possible, a dry and hot period in which to do the work.

It should be noted that continuous plowing of land that is infested with perennial plants is not advisable. The plow carries the underground rootstocks from one part of the field to the other, often infecting clean parts, as these roots will start to grow immediately. Harrowing frequently has the same effect. A disc likewise only cuts the roots into small pieces, which in a short time produce new plants.

Once the ground is plowed it should not be plowed again for some time, but should be cultivated at intervals with a spring-tooth, duck-foot cultivator until the weed is sufficiently destroyed to make the land fit for a crop. The crop should be of some green feed nature, as early cutting is desirable. For deep-rooted perennials the plowing ought to be as deep as possible, while on the other hand for shallow rooted perennials it should be just deep enough to get below the running roots.

To control perennial plants growing in sod or prairie land, it is advisable to cut them as close to the ground as possible, and about the time the plant is producing its first flower, as this is its weakest stage.

CANADA THISTLE

There are several methods of eradicating Canada thistle, and the one best suited to the conditions prevailing must be adopted. Different soil conditions necessitate different methods of treatment. In some soils it is more persistent than in others. The system of farming followed, where the thistle occurs, also enters the problem, that is, as to whether or not smother crops or cultivated crops, for instance, are to be used, or as to which ones can be used to advantage. The conditions should be well understood, and all the factors concerned taken into consideration, as far as possible. The underground rootstock of the weed is its food-storage organ and it must be killed outright or starved out by preventing growth of the leaves, which manufacture the food for the plant. The methods of

eradication fall naturally into two classes according to the occurrence and abundance of the weed, whether in small scattered patches or abundant over large areas.

In case of small patches one of the following three methods may be used, but must be thoroughly and persistently carried out:—

(1)—Keep the thistles thoroughly cut with a hoe, every few days throughout the growing season. It may take two seasons to complete this work, but if properly done there will be little further trouble.

(2)—Thoroughly grub out and remove all underground rootstocks with a spade or shovel. One or two operations is usually sufficient. Keep close watch for straggling plants at intervals and treat them in the same way.

(3)—To smother by placing good, strong tar-paper over them. In using this method the paper should overlap well, and be held down by stones, dry soil, or pieces of timber.

In cases where whole fields are infested, the above mentioned methods are impracticable. The eradication of this weed then means that its underground roots must either be grubbed out and gathered, or such surface cultivation employed as will result in the starvation of the roots. With this object in view the following two methods are given:—

(1)—To plow shallow immediately after harvest. Work with the wide-shear cultivator at intervals until late in the fall, then plow deep, turning as many of the roots up as possible, which should be left in this state over winter, whereby they will be killed by the hard frosts. In the spring continue this cultivation with the same implement until June, then plow again deep, work well and seed thickly to barley. If this system of cultivation is carried out thoroughly for two years it will practically eliminate this pest.

(2)—To cultivate early for summer-fallow with the wide-shear spring-tooth cultivator, and then plow shallow. Continue cultivation until July, when it should be plowed deeply. At this time of the year the sun is hottest, therefore roots brought to the surface will be killed by the heat. It can then be either cultivated during the remainder of the season or prepared extra well and then seeded to either rye or winter wheat, rye being preferred.

In using the cultivator see that the teeth are always kept clean, and do not attempt to work the land when wet. This will only serve to distribute the pest by its underground rootstocks to greater areas, and in addition will be injurious to the physical condition of the soil itself. It is also well to work infested areas separately to avoid spreading the pest by distributing pieces of the rootstocks to clean parts of the field. It cannot be hoped to keep this weed in check if stray plants are allowed to go to seed. These should be cut with a mower or scythe previous to producing their seed, or when they first appear.

COCK GRASS

A good many methods are recommended for the eradication of couch grass, which when tried out under actual conditions fall down. One of the reasons for this no doubt is that under different soil and climatic conditions different methods must be used. Another cause for methods failing is that there are two different kinds of so-called couch grass. It frequently happens that farmers from Saskatchewan state that the grass is not very difficult to get rid of, in fact, plowing it twice during the summer often has this effect. The quack they are referring to is what is commonly called western quack (*agropyron glaucum*), which is a native of the western prairies. The eastern quack (*agropyron repens*) is much more difficult to control. The method, however, that will eradicate the eastern one will also take care of the western, but the method that will often completely dispose of the western will not be successfully used on the eastern one.

One of the methods that has proven most satisfactory has been to plow the land during the month of June, just sufficiently deep to get below the roots. Let this land lie as loose as possible, shaking the soil out from the roots by the use of a disc harrow. If the sod is not too solid a narrow tooth cultivator may be used

to bring more of the roots to the surface. After they are brought to the surface they can be gathered up into rolls by the use of a chain harrow. After the roots have become thoroughly dry and dead they may be raked off and burned.

About this time the roots which have sufficient hold of the ground will have again started to grow. The land should be cross plowed, using a sharp rolling coultter. If the grass is badly matted after being allowed to dry out again, the soil should again be shaken from the roots by means of the disc and the narrow tooth cultivator again used to bring the roots to the surface.

If the season happens to be a dry one this means should practically clean out the couch in one season, the only difficulty being that if the soil is subject to drifting it has been put in an ideal condition for this to happen. Under these circumstances a man has to choose the lesser of two evils. If the season happens to be wet little progress can be made by this method. The land should then be plowed in the following spring about May 15, and sown immediately with barley, putting in about 3 bushels of seed per acre, and the land packed immediately after seeding. The crop should germinate quickly and start before the grass, then the thick seeding should make the barley of a sufficiently heavy stand to smother out the remaining plants.

FALSE FLAX

Hand-pull when practicable. For spring grain plow if possible in the spring just before seeding. This should not be undertaken until good warm weather is assured. After the crop is up a couple of inches it should be harrowed, which will kill many of the seedlings. Land infested with this weed should always be cultivated after harvest, and at intervals until winter sets in. Flax or fall wheat should not be sown on land infested with this weed.

GREAT RAGWEED

Owing to the size of the seed of this plant being nearly as large as wheat or barley and having a rough spiked surface it is very difficult to separate from many cereals. Thus it is important to sow clean seed. When hand-pulling is possible this weed should be got rid of in this way, as it will not only clear the land of weeds, but will also pay for the work by the extra yield of the crop in one year. It is one of the heaviest feeders of all the noxious weeds. In bad cases summer-fallow thoroughly. Keep the edges of the grain fields, pastures and plots cut with the mower.

HARLEY'S EAR MUSTARD

Cultivate immediately after the crop is harvested. Plow early the following spring, and work surface, then allow to stand until June 1st. By this time all the weed seeds will have germinated. Cultivate well with a duck-foot cultivator, seed thickly to harley. After harley is harvested cultivate again, follow by plowing late that fall or early in spring, when it can be seeded to either oats or wheat. Do not sow too thickly, and seed to timothy. It should be left in this crop for two or three years. In its early stages this plant makes a very succulent food for sheep, and will be relished by them almost as much as rape.

LAMB'S QUARTERS

This weed will not give a great deal of trouble in well cultivated land. A good summer-fallowing every two or three years will have a good effect. Harrowing the crop after it is up two or three inches, from one to three times, is one of the best methods of controlling this weed. Crop rotation including seeding to grass for a year or two will practically exterminate it. As this weed is generally found around yards, gardens, and stack bottoms, a scythe should be used frequently so as not to allow any plant to produce seed.

PRAIRIE ROSE

The prairie rose sometimes proves troublesome on land which has not been properly broken. In this case the land should be summer-fallowed, plowing fairly deep and using a sharp share. Cultivate thoroughly throughout the season with a spring-tooth cul-

tivator. This method followed by plowing the land put into crop each year will thoroughly eradicate this plant.

PERENNIAL SOW THISTLE

As the habits of this weed are practically identical with those of the Canada thistle, the method of eradication should also be the same, except that as the perennial sow thistle is a much more vigorous grower, the method of eradication should be correspondingly thorough. This weed has most of the bad qualities that a bad weed can have. It is a rank grower and so exhausts moisture and fertility, shuts out the sun and crowds the crops. It propagates both seed and rootstocks. The rootstocks spread rapidly and are hard to get out, and the seed is easily distributed and is produced in abundance.

POVERTY WEED

If in small patches, plow deep and plant to potatoes, which should be cultivated and hoed once every week during the growing season. In cases of large areas summer-fallowing is the best remedy. This should be done by plowing deep and cultivating at intervals with the broad-share, duck-foot cultivator, and if possible when the ground is dry and the sun hottest. Do not use the disc to eradicate this weed.

RED ROOT OR FIGWEED

Hand-pull stray plants. To avoid them is very effective because if cut below the crown they will die. In spring grain, cultivate the land immediately after harvest and plow late that fall. In spring, work early, well and reasonably late, then seed to barley or oats and cut for green feed. The life of redroot seed is not more than from three to five years, therefore, if a good crop rotation for that length of time is undertaken, there will be little further trouble with this seed. This plant only spreads by seed, hence the necessity of cutting all plants around the fields, buildings, etc. If this is done for three consecutive years, few plants will make their appearance thereafter.

RUSSIAN THISTLE

The control of Russian thistles is a problem that is very, very difficult to solve. Under the conditions in question three things should be kept in mind. (1) the necessity of getting these weeds off the land, (2) the desirability of preventing the spread of the seeds they contain, and (3) to kill all young thistles that may start before or at seeding time. There have been many devices tried for removing the thistles in the spring. We have made no survey to determine which of these is to be preferred, but many farmers are using the harrows to loosen up the thistles and to gather them into bunches or windrows, after which they may be either burned or removed. The objection to this practice is that the weed seeds from the ripe plants are scattered broadcast and these will, of course, grow when favorable conditions are provided. It is desirable on such land that a good seed bed be prepared and that weeds that have started be killed. To accomplish this purpose tillage is necessary. Such tillage, while accomplishing the end referred to, results in covering up many of the Russian thistle seeds which will, of course, grow at the first favorable opportunity.

SHEPHERD'S PURSE

Around plots, gardens, waste places, etc.; use the mower and scythe frequently. This will keep it from seeding and eventually it will disappear. In cases where the grain fields are badly infested, a thorough good summer-fallow will give the best results. Cultivating the land with a wide-share cultivator late during the fall will give good results as many of the plants that would live over winter will be destroyed. Such cultivation as recommended for the eradication of tumbling mustard will give good results in the eradication of shepherd's purse.

SKUNK GRASS

This weed grows mostly in low lying land, and around the edges of sloughs, or in wet places anywhere. Any furrow system of cultivation will exterminate this

weed in a short time. In places where it is growing in hay meadows or pastures, it should be cut before seeding and raked up and burned. It may be necessary to do this twice during the season, but if done at the proper time it will practically eradicate the pest. If the grass is growing in land that is too wet to be out over before the grass goes to seed, we do not think that any other means will be found for eradicating it. Land of this type rarely is of much use for anything anyway. The best means for getting rid of the grass is simply to keep it from going to seed. Plowing the land and giving it a thorough summer cultivation also will be found successful in getting rid of it.

STINKWEED

On land that is so badly infested that hand-pulling is impossible, one of the following methods of cultivation may be employed:

(a) Cultivate immediately after the binder, so that the surface seed may germinate. In wet seasons it may be necessary to cultivate again before the winter sets in. The following spring plow shallow and work down each day that which is plowed. Let this stand until more seeds germinate, then cultivate well and seed thickly to oats or barley. Harrow the grain when two inches high from one to three times at intervals. This will destroy the young weeds and also reduce the grain crop to a proper stand. Barley in this instance is much preferred, as the broad leaf of the barley has greater effect in smothering than oats have. If there is still considerable stinkweed in the crop, it can be out early for green feed. This system of cultivation can be carried out for three years except that the land should be seeded to oats the second year, and to spring wheat the third. When seeding the wheat sow reasonably thin and seed down to timothy, brome or western rye grass. Leave in hay or pasture for a period of years.

(b) Start cultivation early as above mentioned, but plow shallow late in the fall if possible and work down. The following spring after weeds are well started, plow slightly deeper than at the previous plowing, work down to the same surface, allow it to remain until more weeds germinate, then plow again, still deeper, bringing up more seeds to be germinated and destroyed by surface cultivation. This work should be completed by the latter part of July, when the land should be seeded to fall rye, which can be pastured that fall and during the following spring and summer.

(c) Summer-fallow for one year; this should consist of at least two plowings, three will give better results. Following this year's summer-fallow it should be worked late the next spring, then seeded reasonably thin to oats, harrowed when the grain is up two inches, and then seeded to timothy, brome or western rye grass. Cut this crop for green feed if there are any matured stinkweeds.

The above methods of eradication may appear to suggest a great deal of labor and expense, but unless one is prepared to undertake such, it cannot be hoped to eradicate this pest.

The seed of this weed will lie in the ground for twenty years, and will grow when it comes to within one inch and a half of the surface. Again investigations show that land badly infested with this weed will contain from ten to twenty seeds per pound of soil. This being the case, the necessity to plow often cannot be overlooked. Plow shallow at first, and then keep getting an inch or so deeper each time. This will eventually bring all seeds to the surface where they will germinate and can be destroyed by surface cultivation.

In cases where the entire farm is infested, it is recommended that a large proportion of the farm be seeded to grass or other hay crop, so that the remainder of the farm may be thoroughly cultivated. In seeding down to hay crop land that is infested with this weed, the owner should cut the hay two or three times the first year, after that the grass will control the weed fairly well.

TUMBLING MUSTARD

Where land is only slightly infested, harrow when the grain is up a few inches, as the mustard is then weak and tender, and will easily pull out by the teeth of the harrow. Follow this by hand-pulling at the time the mustard is coming into flower. Land that is badly

infested should be summer-fallowed with as late cultivation in the fall as possible. Then in the spring seed thickly to some spring crop, harrow and hand-pull as already mentioned.

Never allow the plants to get so large that the harrow will not completely destroy them. Cultivation in the fall immediately after the crop is harvested is strongly recommended. Burn all screenings both from fanning-mill and thresher, also burn straw if badly infested, so that stock cannot eat it and distribute the seeds about the farm. Be careful of the feed of the working-horse. This mustard seed is objectionable to farm stock, with the exception of sheep, therefore no benefit is derived feeding it.

Give attention to all old stack bottoms, edges of fields, road-sides etc. Pasturing land badly infested with this weed with sheep, especially when the plant is young, has been found to be a sure remedy.

WILD BARLEY

There should be no difficulty in keeping land under cultivation clear of this weed. Any thorough system of cultivation and crop rotation will exterminate the plant in a short time. In cases where it is growing in hay meadows or pastures, it should be cut before seeding, raked up and burned. It may be necessary to do this twice during the season, but if done at the proper time once it will practically eradicate this pest. Before breaking land infested with this weed it is advisable to burn it over the previous fall.

WILD BUCKWHEAT

Sow clean seed. Cultivate the land immediately after harvesting, so as to encourage the germination of the seeds on the surface. The young plants will be killed by the frost. Harrowing the grain after it is up will kill the seedling plants. Thorough summer-fallowing, plowing before the plants go to seed, and cultivating with a duck-foot cultivator at intervals throughout the summer will rid a field of this pest.

WILD MUSTARD

When fields are overrun with the weed, either of the following methods of eradication is recommended:

(a) After the crop is harvested, cultivate well with a disc or spring-tooth cultivator, or plow shallow and work down to a fairly fine surface. This will allow the seed to germinate if there is any moisture at all in the soil. Before germinated the plants will be killed by the fall frosts. In the spring cultivate as early as possible. Let more seed germinate and grow until about June 1st, then plow deep and seed to barley or oats, barley preferred, as the broad leaf of the barley is more effective in smothering the weed out. After the barley is harvested, cultivate immediately, and follow the same procedure the next year. In cases where this method has been carefully followed and there still remains a great deal of mustard, cut the barley for green feed. In this way no plants are allowed to ripen, hence no aw seeds are left in the ground.

(b) Cultivate after the crop is harvested, then summer-fallow thoroughly the following year. The spring following, work well and sow oats reasonably thick and as early as possible. After the crop is up about two inches high, harrow once or twice and then seed to timothy, if possible just before a shower and just before harrowing. Seeding with oats is preferable to seeding with barley, as it allows more air for the young timothy.

WILD OATS

Wild oats being an annual plant, its eradication then consists of such a method of cultivation as will germinate the seed, then destroy the growth before it produces its seed. With this in view the following two suggestions are given:

1. To plow shallow or cultivate immediately after the infested crop is harvested. The purpose of this is to make a mulch to germinate the surface seed, which, if not frozen before going to seed, can be destroyed by cultivation. In the spring as soon as a good growth has started it should be plowed again about four inches deep. This will bring a supply of seeds near the surface to germinate and to be destroyed as previously. Then about July 15th it should be plowed deep as

possible, worked well and seeded to winter rye, which can be pastured the same fall and following spring.

2. Start cultivation as stated in (1) but plow deep reasonably early the following spring. Work this well until June, then seed thickly to barley and oats. Cut for green feed. After green feed is harvested, cultivate or plow shallow. Leave in that state until spring, then work well until assured of good, warm growing weather, then seed reasonably thin to oats, also to timothy. Cut oats for green feed, and leave the land in timothy from two to five years.

If the whole farm is infested with this pest do not undertake to clean it all in one year. Take what it is considered can be well done, and make sure that the work is carried out systematically.

Grain that is grown on an infested farm should never be used for seed grain. Sell it and buy clean seed. The difference between what feed grain sells for, and the price of seed grain is not a large amount. Make sure that the manure has been well rotted before applying to the land. There is no use cleaning land of wild oats by cultivation if you allow other agencies to infest it again.

In working land infested with this weed, keep all the live stock possible pasturing on the area worked, as they will eat all the new growths, as well as pack the soil and so encourage germination.

Look after the screenings and the plants growing around the edges of fields, roadsides and waste places.

PROFIT IN SEED GROWING

Farmers in Southern Alberta are becoming more interested in seed growing and there is no doubt but that within the next few years the industry will show enormous development. Seed-growing is one proposition, that is to say, it is a business well adapted to small farms and does not require much labor to handle. It is a business, too, that fits well into irrigation farming—small acreage is required, the crop is the easiest to irrigate, the returns are large as should be the case from high-priced land.

A farm of 160 acres would be quite large enough for a business of this kind, and a man might well start with one half the size and be better off until he found out how to produce seed successfully. On a 160-acre farm the cropping system would be about as follows: Alfalfa 80 acres, alsike 20 acres, mammoth red clover 20 acres, grain 40 acres.

From alfalfa seed can be secured only in the dry years. Experience so far in Alberta indicates that in wet years alfalfa will not produce seed. In those years the crop would have to be cut for hay but in dry years a return of at least five bushels per acre could be looked for which at prevailing prices for seed would produce at the rate of \$150 per acre. In wet years the hay crop would amount to at least three tons per acre which at only \$10 per ton would make a cash return of \$30 from an acre. Ten dollars per ton for alfalfa, as most readers are aware, is just about one third the price that has been realized for alfalfa hay during the past two or three years. Alfalfa does not require irrigation for seed.

Alsike differs from alfalfa in nature and in method of handling. It is a biennial while alfalfa is perennial, hence needs seeding every year. It must be irrigated for seed, the water being applied as required up until about the first of August.

Alsike is seeded on clean land in June at the rate of about eight pounds per acre. If the land is dry, which is normally the case, it must be irrigated after seeding to start growth. An irrigation one week after seeding is usually given to start the crop.

Mammoth red clover has proved perfectly hardy in Alberta. The system recommended for handling it is to seed in June at the rate of from 8 to 12 pounds per acre, clip the same year to catch any weeds that may come up and cut the first for seed the following year. Experience with red clover in Alberta indicates that its habits here differ from those shown by this crop in Ontario and other sections in the East and South where it is grown for seed. The seed forms in the first crop which is let stand until the seed is ripe, usually about the first of September. The reason for this probably is that in other sections the humblebee is not present until after the first crop is cut. Here

the humblebee is not a factor at all and the blossoms have to be fertilized without him. Experience shows that only in the first crop is seed formed.

SUGGESTED ROTATION FOR A DRY FARM

Experience suggests the use of one of the three following rotations on a grain farm in the dry belt where grain is the main cash crop produced. The rotations are for three, five and seven years respectively.

Three year rotation—First year, corn or oats or other grain in cultivated rows; second year, wheat; third year, oats. After the oats the corn again or the grain in cultivated rows, in lieu of summerfallow.

Five year rotation—First year, corn or grain in cultivated rows; second year, wheat; third year, oats; fourth year, corn or grain in cultivated rows; fifth year, wheat. After the wheat in the fifth year the rotation starts again as in the first year with corn or grain in cultivated rows.

Seven year rotation—First year, corn or grain in cultivated rows; second year, wheat; third year, sweet clover; fourth year, millet in rows or other grain in rows; fifth year, oats and barley; sixth year, corn, potatoes or grain in rows; seventh year, flax, wheat or other grain as in field crop. After the seventh crop the rotation begins again as in the first year.

Dry farm tillage methods can be summed up briefly as follows:

1. Prepare the seed-bed properly by thorough plowing followed by surface cultivation with disc and harrow after seeding. Clean, cultivated ground requires surface cultivation only to prepare it for grain.
2. Bend all efforts to keep the cultivated crops free from weeds, thus keeping the farm clean and conserving moisture.

STORING CORN FODDER

Corn fodder cured in the stack makes a satisfactory feed for cattle. Stook in the field, and when dry haul to the feed yard and set up in large stooks where it will be convenient for getting at in winter, or leave in the field until required for feeding.

Another way of handling corn fodder is to stack like sheaves but with this precaution: Between each layer of corn sheaves spread a layer of straw—a pretty generous layer, too, as corn, however dry it may seem, easily heats and spoils if stacked alone. The straw between the layers of sheaves is much improved in palatability by what it takes out of the corn. This is a satisfactory way of stacking corn, but care must be taken to put plenty of straw between the layers of corn. A foot or more of straw should be put between each layer of corn sheaves. Corn may be stored in the mow in the same way but it is more usual to stack it outside.

PREPARING SHEAF GRAIN FOR SHOW

The first consideration in preparing a sheaf of grain for exhibit is to carefully hand pick the straw, selecting slightly immature straw, as it will be found to be less brittle and easier to handle. The straw should be spread in thin layers in the sun to dry; the sun will bleach the straw as well as dry it. Use only straight, uniform straws to make one sheaf; two or three sheaves should be collected in the field to allow for waste.

The majority of persons have the idea that all the straws should be the same length and the heads all placed on the same level. This would give us the square head in which, when tied, the majority of the straws would break off below the head. The ideal sheaf has a rounded head with a gradual curve. This rounded head is procured by allowing the central straws to stand a little higher than the surrounding straws, and each layer of heads that are added, to gradually slope away from the centre. The large sheaf may be conveniently formed by first making a number of small sheaves and then, placing them together as though they were individual heads, gradually sloping them off in the same manner. To finish the sheaf a layer of individual heads should be placed around the whole, producing a finished exhibit sheaf. All the loose leaves should be plucked off the outside of the sheaf with a jack-knife leaving only the white, shining straws, and all heads that do not conform to the symmetry of the head may be cut off, leaving a perfect sheaf. Colored ribben about $\frac{1}{2}$ to $\frac{3}{4}$ inches wide may be used with good effect to cover the hiding strings.

The breeds of the draft horse most common in this country are the Clydesdale, Belgian and Percheron, the Shire and Suffolk occupying a place but as yet not being widely bred. Of late years the Belgian and Percheron have increased greatly in numbers and quality. The Clydesdale has been bred most widely and more farm horses probably carry Clydesdale blood than any other. The following is a brief history of each breed with its characteristics:

THE PERCHERON

The Percheron is of French origin and has been developed from a foundation of medium sized, strong constitutioned, durable horses. As yet breeders have not improved any upon the best specimens of the breed that have been imported from France, nor for that matter have they improved on the best imported representative specimens of any of the other draft horses.



Percheron Stallion

Typical stallions of the Percheron breed weigh, when mature, 1,800 to 2,400 pounds and typical mares, 1,700 to 2,100 pounds. The prevailing colors are black and steel grey, though bays and chestnuts are occasionally found. In appearance the Percheron is medium in length of leg, asymmetrical, massive appearing, heavily muscled throughout and moves with a long even, straight away stride, showing good flexion of knee and hock at the trot. The head is short and broad, the face straight with a broad muzzle and large, somewhat distended nostril. The eye prominent, the ears short, fine, pointed and placed close together. The neck of medium length, slightly arched and the shoulder sloping and laid in close. The back and loin are short, broad, heavily muscled and strong, the croup nicely rounded and the tail attached high. The Percheron is a deep bodied horse with large heart girth and a deep hind flank, giving him a strong constitution and easy keeping capacity. The forelegs are set squarely under the shoulders and when viewed from the side are straight and strong, and when viewed from the front are clean cut and flat appearing. The pasterns are of medium length and sloping, the fetlocks strong, the feet large, deep, wide at the heel and the hoof tough and wavy appearing. The hind legs should set straight and strong with clean cut hocks, cannons and fetlocks.

In selecting Percherons care must be taken especially to avoid horses with straight open shoulders, straight pasterns, long backs, steep, long sloping croups, light constitutions, high hind flanks and thick crooked hind legs.

THE BELGIAN

The Belgian breed originating in the small, fertile country of Belgium has had the advantage of being developed within a small area in which practically no other type of horse was kept. This, together with the government supervision and financial aid, has led to the greatest possible use being made of the very best sires produced by the breed, and the production of a

well fixed type and efficient breed in its home country.

Typical stallions of the breed weigh from 1,800 to 2,400 pounds when mature, and typical mares, from 1,700 to 2,200 pounds. The prevailing colors are bay, chestnut and strawberry roan with occasionally a steel grey, brown or black.

In appearance the Belgian is medium to short in length of legs, very broad, massive, heavily muscled, deep throughout the middle and short in the back and loin. In action the stride is of medium length and medium in flexion of knees and hocks, but straight and strong. The head is short and broad, the face straight with a broad muzzle, the eye prominent, the ears short, fine, pointed and placed close together. The neck of medium length, well arched and the shoulders broad, but well laid in and sloping. The back and loin are especially short, broad and thickly muscled, the croup of medium length and nicely rounded and the tail attached high. Great size of heart girth and depth of hind flank go to make the Belgian an especially easy feeding, quick growing type of horse. The forelegs are set squarely under the shoulders and are straight, strong and clean cut with strong, though moderately short pasterns. The feet are large, deep, wide at the heel and the hoof is tough and wavy appearing. The hind legs should set straight and strong with clean cut hocks, cannons and fetlocks.

In selecting Belgians, care must be taken to avoid horses with very short necks, straight open shoulders, steep croups, and a tendency to lightness of bone and thickness in the skin and joints of the legs, as well as horses with narrow contracted feet.



Belgian Stallion

THE CLYDESDALE

Originating in the valley of the Clyde River in Scotland, the Clydesdale horse has, by selection and good feeding, been developed into one of the best and most admired of the draft breeds. The Scotchman is very devoted to his native breed of draft horse and Scotch people immigrating to America are responsible for the introduction of Clydesdales to that country and for their wide distribution throughout Canada. The characteristic Clydesdale stallion weighs from 1,700 to 2,200 pounds when mature, and the mare from 1,600 to 2,000 pounds. The prevailing color is bay with white stripe in the face and four white legs from just below the knees and hocks down. Black and strawberry roans with the same markings are frequent, and occasionally chestnuts and grays will be found. In appearance the Clyde is medium to upstanding in length of leg, very symmetrical and stylish appearing, but lacking the massiveness of the Percheron or Belgian.

In action the Clyde is leader of the breeds. A long, bold, strong, springy, snappy stride at both walk and trot are noted characteristics of the breed. The head is medium in length and width, the face slightly Roman, eyes not prominent and ears short, pointed and placed close together. The neck is of good length slightly arched, shoulders sloping and especially well laid in. The back is medium in length and well muscled, the



Clydesdale Stallion

loins broad and strong and the croup especially smooth turned. A deep body with strong constitution and deep hind flank is characteristic. The legs are set squarely under the body, straight, strong and especially fat and wide when viewed from the side. The pasterns are long and sloping, the feet especially broad and wide at the heel, the hoof being tough and waxy appearing. A growth of long hair from the backs of the cannons and fetlocks commonly spoken of as "feather" is a characteristic of the breed. This can characteristic in the Clydesdale has been criticised more than any other and in some respects has retarded the spread of the breed. The tendency is toward the selection of Clydesdales with a little less of this feather.

In selecting Clydesdale care should be taken to avoid horses with long, low heels, light muscling, shallow bodies and nervous dispositions.

THE SHIRE

The Shire is England's contribution to the list of draft breeds. It is the most massive of them all. Mature stallions weighing 1,900 to 2,500 pounds and mature mares 1,700 to 2,300 pounds. There are fewer Shires in Canada than any other breed. Although the Shire is a massive, powerful horse its characteristic of a heavy growth of long coarse hair or feather from the cannons and fetlocks has led the farmer to go slow in taking up with it. The prevailing colors are brown or black with a narrow white stripe or star in the face and usually one or two white stockings, though sometimes all four legs are white from the knees and hocks down. Occasionally chestnuts and greys are found also.

In appearance the Shire is medium in length of leg, very broad and heavily muscled. In action the stride is of medium length and medium in flexion but straight, bold and strong. A strong, deep middle and very



Shire Stallion

large, flat, strong bone in the legs with a pastern of medium length and slope and a rather short, broad foot are distinguishing characteristics.

In selecting Shires care should be taken to avoid horses with slow, awkward action, sluggish disposition, coarse skin and bone in the legs, short straight pasterns and shallow feet of poor quality.

SUFFOLK PUNCH

The Suffolk Punch comes from the county of Suffolk, England, where he has been bred in his present form for more than 200 years. Chestnut or sorrel is the only color allowed. The Suffolk stands 15 to 16½ hands high, weighs 1,500 to 1,900 pounds and is rounder in conformation than the Clydesdale or Shire. The back is broad and short, the legs clean but rather small. The Suffolk keeps easily and is well adapted for working purposes under ordinary farm conditions. Importations of Suffolks have been made to Western Canada but the breed as yet is not widely distributed.

BREEDS OF LIGHT HORSES

The following is a brief history of each breed of light horses with something of the characteristics of each. Some of these breeds are unknown in this country but all occupy or have occupied an important place in the development of horse breeding.

ARABIAN

The oldest breed of horses generally recognized at the present time and the fountainhead of all our other light breeds was developed in the desert country of Arabia, from which it derives its name. The Arabian horse has been developed to perform his work practically altogether under saddle, and he possesses the general characteristics desired in a saddle horse—viz., good carriage of head and neck, deep, well-sloped shoulders, a short back with proportionately long underline, short, strong loin, tail attached high, compactness of middle, and superior quality of conformation without any tendency to appear lanky.

Generally the Arabian horse in action shows only the walk, trot, and canter. The usual height is from 14 to 15½ hands, and the weight varies from 900 pounds to 1,100 pounds. Bay, brown, and chestnut are the predominant colors, with occasional grays and blacks. While Arabian horses frequently have white marks on the head and legs, they seldom or never are spotted or piebald as is commonly supposed. This false impression evidently gained prominence because spotted circus horses are sometimes called Arabians.

Crossed on light farm mares, Arabian stallions have produced excellent saddle horses, but they frequently lack also when measured by our present-day market standards. However, admirers of the Arab are very enthusiastic about his suitability for cavalry use, claiming that his speed, even temperament, and especially his ability to withstand hard-hips such as scanty feed and extremes of heat, make him useful for this purpose.

THOROUGHBRED

The name "Thoroughbred" is applied properly only to the breed of running race horses produced originally in England. Three Arabian stallions are credited with having laid the foundation for this breed, their names being, Byerly Turk, The Darley Arabian, and Godolphin Arabian, and they produced the three famous racing families, Herod, Eclipse, and Matchem, respectively. The Thoroughbred has many features of the Arabian, most notable of which is the general refinement of "breediness" of appearance. As a running race horse the Thoroughbred is without a peer. The canter is his best utility gait. Many specimens have a splendid walk, and the trot, while not showing extreme speed or knee action, is nevertheless often desirable for saddle use. Thoroughbreds are bay, brown, chestnut, black, and, less frequently, gray in color. Irregular and conspicuous white marks are not uncommon.

STANDARD-BRED

The Standardbred is an American breed developed primarily for extreme speed at the trot and pace. The imported Thoroughbred stallions Messenger and Bell-founder founded this breed by leaving descendants that showed speed at the trot. Horses of this breed do not show so much quality as the Thoroughbred, but



Standardbred

usually have more substance, being heavier in proportion to their height. The ears, head, and bone particularly are coarser, and the hind legs are not quite so straight as in the Thoroughbred. In weight the Standardbred ranges from 900 to 1,300 pounds and in height from 15 to 16 hands, but the best specimens are often around 15.2 and weigh about 1,100 pounds in good driving condition.

MORGAN

The Morgans have sometimes been considered a family of the Standardbred, but as these horses have been bred more for their utility qualities than for speed, and as their characteristics are well established and perpetuated with marked regularity, it is proper to consider them as a distinct breed. The early development of the Morgans took place in the New England States, thus giving this country the credit of founding three light breeds. The foundation of the Morgan breed is attributed to a single stallion named Justin Morgan, a horse of remarkable prepotency. Little is definitely known concerning Justin Morgan's ancestry but the late Joseph Battell ascribes into his ancestry indicate that he carried considerable Thoroughbred blood.

Morgans are generally chestnut, brown, bay, or black in color, white marks not being common. Fifteen hands might be given as the average height, with the average weight around 1,000 pounds, but, as in all breeds considerable variation may be found, 16 hands in height, with 1,200 pounds in weight, occasionally being obtained. This breed has always been noted for smooth lines, good style, easy keeping qualities, endurance, and docility, the latter not, however, being obtained at a sacrifice of ambition and courage. Small ears, good eyes, with great width between them, crested necks, well-sprung ribs, with the last one close to the point of the hip, deep barrels, fairly level croups, full quarters, and enduring legs and feet are the qualities that have made Morgan horses popular for nearly a century. They have good natural knee action, with considerable speed at the trot, some families having contributed materially to the upbuilding of the Standardbred.

HACKNEY

The first driving horses used in England of which much is known were the Norfolk trotters, they being the result largely of breeding Norfolk mares to Thoroughbred stallions, thus giving the foundation for the Hackney breed.

This breed, judging from its best individuals, present a striking illustration of the high quality of the horse-breeding art may be carried on, for many of them are wonderful specimens of horse flesh, combining extremely high all-round trotting and a fair speed with abundant substance and quality. For use in heavy harness the Hackney is without a peer, most of the show horses of this class at the present time belong-

ing to this breed. Pure-bred and grade Hackneys also furnished many of the utility carriage horses when this type was in demand. Crossed with trotting-bred mares, Hackney stallions have sired many high-class carriage horses in this country. Most of the demand at present for heavy-harness horses is for show purposes, and to meet this Hackneys are usually bred pure.

Chestnut and brown are the most common colors found in the Hackney breed, although bays and blacks are seen. Regular white marks are rather common in the show ring and also for distinctive carriage use, Hackneys are usually docked and have their manes pulled. In size the Hackney varies more than any other light breed. The small Hackney pony, 14.2 hands and under, and the 16-hand Hackney horse are both registered in the same studbook. Hackneys are heavy in proportion to their height when compared with other light breeds, their deep chests, well-sprung ribs, low flanks, and heavy croups and quarters all producing weight. The large Hackney sometimes is lacking in general quality, but this is not true of the best specimens, and certainly would not be a just criticism of those standing around 14.2 to 15 hands.



Hackney

FRENCH COACH

The term French Coach is used in this country to designate horses produced in France largely by government aid and with the special object of obtaining animals especially well suited for military purposes. Such horses are not known as French Coach in their native country, but are termed Demi-Sang (half-bred). In this country the term half-bred is applied to horses of half or more Thoroughbred blood, and as the French use the term in a similar sense an idea of the ancestry of this breed is furnished, it being the result largely of crossing Thoroughbred stallions on mares of desirable conformation, their breeding being of minor consideration.

While the French Coach horse is not as large on an average as the German Coach, many of the specimens stand around 15.3 to 16 hands and weigh 1,100 to 1,300 pounds, but fairly broad variations from these figures are to be noted. In color these horses are generally bay or brown, but chestnuts and blacks are seen. White marks are not common and are rarely extensive.

GERMAN COACH

Germany, with the object of producing a large, strong, and active horse that would be especially well adapted to carrying the German soldier and his heavy equipment and to hauling artillery, established the breed of horses known as the German Coach.

The German Coach horse is said to have an infusion of Thoroughbred blood, but the present-day types do not show much of it. He lacks quality and is the most phlegmatic of the light breeds, and is also the heaviest, often weighing over 1,400 pounds and standing over 16 hands high. But few specimens of this breed show a tendency to trappy action, and practically

an attempt has been made to produce a fast trot. In color this breed is all that could be desired, most of the specimens being beautiful rich bays and browns, with some blacks. White marks are seldom conspicuous and often are absent altogether. As a general-purpose farm horse and as a heavy-harness horse, the German Coach at one time gained considerable popularity, but in general the stallions do not "nick" well with our sires.

CLEVELAND BAY

Although little is definitely known concerning the foundation of the Cleveland Bay breed, it is generally conceded that Thoroughbred blood played an important part in giving the Cleveland Bay many of its desirable characteristics. The early development of horses of this type, which were selected for bay color with practically no white, took place largely on the pastured Cleveland hills of Yorkshire County, England, the breed sought and the locality being responsible for the color name. In England the Yorkshire Coach is considered a separate breed from the Cleveland Bay, but in this country they are registered in the studbook.

Members of this breed are always bay in color. A small star and a few white hairs on the heels are permitted, but more conspicuous white marks are considered objectionable. The mane, tail, and legs are black. This is probably the tallest of the coach breeds, some specimens standing 16.3 hands high. The tendency to be upstanding or leggy is apparent, and a lack of quality has been a common criticism. The Cleveland Bay has a powerful trotting stride, with fair road speed.

WELSH AND SHETLAND PONIES

These two types of ponies are recognized as distinct breeds of horses. They are, of course, useful primarily as playmates for children. A few men will make a success of breeding them, although the demand is rather limited.



Shetland Pony

The Shetland pony originated on a group of rocky islands about 200 miles north of Scotland. The ancestry of the breed is uncertain but it is supposed to be the descendant of the prehistoric horse. In type the Shetland is a miniature draft horse. Choice specimens stand from 36 to 44 inches high and weigh about 350 pounds. The breed tends to increase in height and weight when bred outside the Shetland Islands. The head is rather coarse, the neck short, body strong and fairly full, legs short and strong, the feet excellent in quality and the hair long and shaggy. The color is quite variable but black bay and brown are most common. The Shetland is used in the country almost exclusively for children.

The Welsh pony ranges from 12½ to 14½ hands high. They have more style and action than the Shetland and are used for work rather than as pets. Welsh ponies find favor for polo playing on account of their activity and endurance. The breed originated in Wales and has been improved by Arab and Thoroughbred blood.

Other ponies are the Exmoor, originating in Devonshire, England; the Dartmoor known for centuries in South England; the Arab pony and the Indian ponies or mustangs. The later are descendants of horses brought to America by the early Spanish conquerors.

CLEANING AND OILING HARNESS

The harness on the farm is rarely given the care that everyone knows it should receive. There are many good reasons and reasons for neglecting the harness. To begin with, the average person has no place for cleaning and oiling unless it is the kitchen or cellar in the wintertime; besides, harness that hangs behind the horses for any length of time—and most farm harness does—is in sorry shape to do much of anything with. The ammonia from the manure and the moisture in the stable causes the leather to mold and soon rot.

However, though it is not always convenient to have a harness room, it is a good plan to have a room separate from the stable where harness not in use may be hung. Valuable harness should be kept in airtight boxes in a room where there is some artificial heat, if one wants to take the best possible care of it. Harness used on show horses should be kept this way.

In these days of high prices for harness a little care pays. Harness costs twice what it formerly did and if it paid in years gone by to look after the harness, cleaning and oiling it occasionally, it surely pays twice over now. It is not a long or difficult job to take a harness apart, wash it clean and apply dressing. Some day when there is no work you can do outside just go over the harness and put it into shape.

At least once a year all work harness should be entirely taken apart (particular attention being paid to the straps at the buckles) and then cleaned and oiled. At these times, all needed repairs should be made. In cleaning harness, as little water as possible should be used; warm, soft water is best, but hard water may be used if a handful or two of soda is added to each tubful. Some harness is so dirty that sponging alone will not remove the dirt; in this case it should be soaked for 15 minutes, then scrubbed with soap and a brush, rinsed, wiped with a rag or chamois, and hung on a wooden horse to dry in a warm place but away from the stove. As soon as it is dry, apply neat-foot oil (diluted one-half with kerosene) with a rag or a piece of sponge. Several are generally needed, and it will pay to rub it well into the leather with the hands. Neat-foot oil, when used straight, is likely to cause the work harness to become too stretchy. It may be made black by adding a tablespoonful of lamp black per pint. When the leather shows up very red after washing, give it a coat of edge blacking before oiling. Under no circumstances is it advisable to use a drying oil, such as linseed oil. Low grade vaseline is useful for smearing over a harness which is to be stored for a considerable length of time. After the oil has soaked in, sponge the straps with a good grade of castile soap.

When a brilliant black finish to the harness is desired, it becomes necessary to use some one of the standard harness "compositions," which are quite similar to the best paste used for polishing black shoes. There is, in fact, no objection to using shoe polish, except for the extra expense entailed in purchasing it in small boxes at retail stores. The paste should be evenly applied to the harness with a dauber, then polished with an ordinary hickory brush, and finally with a flannel rag.

For cleaning the metal mountings, one may use most any of the liquid or paste brands of metal polish on the market. We find the paste to be more economical because it does not evaporate nearly as readily as do the liquid polishes. Steel bits are cleaned by washing with soap and water, then smearing over with a cake of soap and polishing with silver sand. The soap film makes the sand stick. The fingers are of most service in rubbing the sand on the bits; a soft pine stick can be used in parts too small for the fingers. After sanding, rinse the bit, dry with a cloth, and burnish with a small steel burnisher. Forged steel bits are the strongest and also the best looking if they are kept clean. Careful drying and wiping with an oily rag after using will prevent their rusting.

The average harness would last twice as long if it were taken care of—washed and oiled at least once a year and hung in a room separate from the stable. It may be impractical to have a separate harness room but it is not impossible to clean and oil once annually. A few days in winter can be taken for washing, repairing and oiling the harness. A warm cellar or the kitchen, if there is room may be used for the work. Soap, warm water, and oil are all the materials needed.

Breaking and Training Colts

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It is a great advantage to begin the education of the colt as early as possible. The plan generally followed is to break the colt in being led and handled before it is weaned, and to break in harness between the ages of 2 and 3 years. Colts should not do heavy work until they are 4 years old, and should be accustomed to it gradually.

Before a colt is broken in being led it should be taught to stand tied; this applies to unbroken horses of all ages. To do this, put a strong halter on the colt; then take a rope about 14 feet long, double it, putting the loop under the horse's tail as a crupper, twist the two ropes together about three times, then let one rope come forward on each side of the horse, and tie the ends together in front against the chest just tight enough so that it will not drop down; then run a surcingle loosely around the horse behind the withers, tying into it the crupper rope at both sides. Have an additional rope about 12 feet long, run it through the halter ring, and tie it at the breast to the rope that forms the crupper. Tie the other end of the rope to a solid post, allowing about 3 feet of slack. Leave the colt tied for an hour. Another method is to have a loop in one end of the rope, run the lead strap through this loop, and tie it with a little slack to the rope that forms the crupper, the other end of the additional rope, of course, being tied to a solid post.

Gentling the Colt

While tied the colt should be gentled and accustomed to being handled on both sides, on the hind parts, and on the legs. To do this, hold the headstall in one hand and with the other hand gentle (that is, pet and rub) the colt, first on the neck and head, then on the back and sides, and last on the legs.

To gentle the hind parts take a stick about 4 feet long, wrap a gunny sack around one end, and tie it. Allow the colt to examine it with his nose. Then rub it all over his body.

With this arrangement the colt's hind legs may be rubbed without placing one's self in danger of his heels. If he kicks at it do not hit him, but allow him to examine it again, and proceed as before. This lesson should continue until the colt will stand being approached from either side and rubbed all over. The second day he may be tied up again and further gentled with axes, blankets, and noises until he has no fear of them around him, under him, or upon him.

Another method of gentling a horse is to tie the halter rope to the tail, forcing the head slightly to one side. This forces him to go in a circle. When he gives in and stands quietly he may be harnessed, saddled, mounted, accustomed to strange sights and sounds, and handled with safety. This is one of the best aids in use in gaining a horse's submission.

Breaking To Lead

The horse is now ready to lead. Loosen the rope from the post, step off from the horse, and tell him to "come," following the command with a pull on the rope. As soon as the horse advances pet him, then step away and repeat. He will soon follow without the pull on the rope. Half an hour's leading and this lesson is over.

The next day the crupper should be put on at the beginning of the lesson, but should be discarded after a short work-out and the halter alone used so that the colt will not depend on the crupper rope. These lessons should be continued until the colt leads satisfactorily. If a colt is still running with his mother, it is a good idea, as soon as he is broken to lead, to tie his halter rope to the mother's trace if she is being worked. The tie should be made at about the union of the backband and the trace and short enough to prevent the colt from getting in front of the team. This will acquaint him with the general conditions and noises pertaining to work, and on account of the mother being so near he will soon become familiar with such surroundings and lose his fear of them.

To break to lead without crupper ropes use a strong halter with a lead rope. Step back about 8 feet from the colt, opposite his shoulders, cluck to him, and pull on the rope. The colt will be forced to take a couple

of steps; reward him; cross in front in a similar position on the other side and repeat the command with a pull. Continue the lesson until the colt follows. Never pull straight ahead on the colt; he can outpull you. Use diplomacy rather than force.

Breaking to Drive

After the colt has been broken to lead he may be accustomed to harness and trained to rein. A horse should never be hitched to a wagon or ridden before he is broken to drive in harness; that is, trained to go at command, stop when he hears "whoa," rein to the right and left, and to back up.

To familiarize the colt with bit and harness the "bitting harness," consisting of an open bridle with snaffle bit, check and side reins, and surcingle with crupper, may be used.

Put the rigging on the colt, leaving the side and check reins comparatively loose, and turn him loose in a small paddock for an hour. On the second lesson the reins may be tightened somewhat, but not left on for over an hour. The third day driving lines may be put on. Let the assistant lead the colt till he is not frightened at the driver walking behind. Dismiss the assistant as soon as possible, and drive the colt for half an hour in a quiet paddock or lane where he will not see other horses. All that should be taught in this lesson is to go ahead. Cluck to the colt, or tell him "get up," and use the whip to let him know what is meant.

It is essential to train both sides of a colt. He may become accustomed to objects seen on the near side with the near eye, but when the same objects are viewed for the first time on the other side with the off eye he may be badly frightened. Driving in a right and left circle will facilitate this training.

To Stop a Horse—"Whoa"

The next lesson should be a short review of the previous work and in addition the meaning of "whoa." "Whoa" in horse training is the big word. It doesn't mean back or steady, but stop. Train the horse so that when he hears "whoa" he will stop and stay stopped no matter what is happening.

To stop a horse say "whoa" so that he hears you plainly, and immediately follow the command with a pull on the reins. The most effective use of the reins is to hold one rein just tight and give a good reef or pull on the other one, then relax the pressure. If the horse doesn't stop, repeat the command and pull. Soon he will stop at the word, and the pull may be eliminated.

To Back a Horse—"Back"

The next lesson should review "get up" and "whoa," and the horse should be taught to back. As a horse should be trained to stop on command, so should he back on the word, and lugging on the lines should be unnecessary.

Drive the horse a few steps to get his attention, stop him, then give the command "back," following it with a good reef on the reins. If he yields a step, pet him, and then repeat the command with the pull on the reins. Do not exert a continuous pressure, for if this is done the horse will take the bit and forge ahead. Do not make the lesson too long. Repeat again the next day, and continue lessons until the horse will back on command.

After the horse goes satisfactorily in biting rig, the work harness with breeching should be substituted. The traces and breeching should be joined loosely together and gradually tightened as the work progresses. This will familiarize the colt with the sensation of wearing collar and breeching. As soon as he goes well with the harness he is ready to be hitched to the wagon or cart, single or double.

Driving Double

To drive double use a broken gentle horse for a team mate, preferably one that the colt knows. Hitch them together and drive around without the wagon, stopping, starting, and backing the team. Thirty minutes should suffice for this lesson.

At the next lesson familiarize the colt with the wagon; lead him up to it, allowing him to smell it.

Then rattle the wagon and lead him around it; lead the gentle horse to its place at the tongue, bring the colt traces. Hitch the two together. The assistant may now take the colt's lead rope. Drive a few steps and stop, using the brake rope. Drive a few steps and running up on the team. Let the assistant pet the colt until he quiets down, then start again, going a little farther. As soon as the colt gets over his fear drive around in a circle a few times. Stop occasionally and always quiet the colt. Circle in the opposite direction. When the colt goes quietly the assistant may get in the wagon. Have a short stay chain on the old horse so that if necessary he may start the wagon alone. After the colt goes well a short drive may be taken. Always stop when the colt shows fear of something. Always look it over and examine it; never whip him or rush by anything at which he is frightened; otherwise a shying horse will result. The daily drive may be increased in length until the colt is broken.

Driving Single

Put single harness on the colt, using an open bridle. Lead him to the rig and allow him to examine it. A two-wheeled breaking cart with long shafts is usually used. Let the assistant draw the rig around the colt a few times, or until the colt does not shy at it; then raise the shafts and draw the rig into place. If the colt is one that you think may kick or try to run, put on the trip ropes.

Some horses are confirmed kickers, runaways, or otherwise unsafe to handle with the ordinary appliances. With trip ropes such horses may be handled with safety and cured of many bad habits. To put on trip ropes a strong aurcingle, four 2-inch iron rings, two long are needed. Fasten two 2-inch rings to the under-side of the aurcingle and put straps with rings on front through ring on near foot, up and through off side on the rope when the horse steps will bring him to his knees. This appliance may also be used to teach a horse the meaning of "whoa." Always use knee pads or have the horse on soft ground, where he will not injure his knees.

When the colt is hitched the driver should get in the rig and have the assistant lead the colt. Start him quietly, drive a few steps, stop and pet him. Repeat until he starts and stops the rig without becoming frightened. Dismiss your assistant as soon as possible so that the colt's attention may not be divided between two authorities. Before the colt is driven on busy highways he should be "city broke."

Breaking to Ride

When a horse is to be used for riding it is well first to break him to drive single and double. This will make him quiet to ride.

Horses usually huck through fear. In breaking one to ride, take plenty of time and do not frighten him. Put on the saddle and lead him around until he becomes accustomed to it. Do not have the girth too tight. The horse may be tied up for a time and later turned into a paddock with the saddle on.

Next accustom the horse to being mounted, getting on and off a number of times. The assistant should have a lead rope tied around the horse's neck and run through the rings of a snaffle bit. If the horse attempts to play up, punish him with a jerk on the bit. Let the assistant lead the horse with rider around until the horse is familiar with the weight on his back, then dismiss the assistant. If the horse becomes rebellious, pull his head sharply to one side; do not let him get it down. The first few rides should be in a small inclosure.

The gaits should be taught separately. The first few rides should be the walk; next teach the trot, and then the canter. Spurs should not be used until the horse is well broken. Most saddle horses can be taught to rack. To teach a horse to rack, he should be shod with light shoes or none at all in front and heavy shoes behind. Sitting well back in the saddle, just force the horse out of a walk and he will soon rack. Keep him at it for only a short distance at a

time, as it is a slow gait to him and tiresome at first. After the gait is learned the duration of the lesson may be gradually lengthened.

Suggestions

In the preceding instructions principal emphasis has been laid on kindness to the horse. In reality the will is of equal importance with kindness. To be submissive to a man's will, the horse must fear the consequences of disobedience. There will be clashes, but the horse must be convinced that man is his master. Always, if the horse can not do or be made to do what is asked of him, make him do something else. As long as he is not allowed to do what he himself chooses he will consider man his superior and master.

Never work a colt after he is tired. By heeding this precaution you prevent obstinacy and render him a willing and obedient pupil.

Training should be given in a quiet place, where the colt's attention will not be distracted from the work in hand by other horses or strange surroundings.

Whenever two people are working with a horse they should be on the same side. The horse's attention is then undivided, and if he plunges or kicks he may be controlled with less danger to the trainers.

To harness or saddle a horse it is customary to approach his near or left side, also to mount from the left side.

Never approach a horse without first gaining his attention. Always speak to him before attempting to walk into a stall with him.

Balkiness

The most common cause of balkiness among horses is punishment to make them do something that they can not do or that they do not understand how to do. Another common cause is the forcing of horses to draw heavy loads without allowing them to stop occasionally to rest and regain their breath. The use of the whip or spur in such instances should be avoided, as the pain inflicted will be very likely to provoke further and more stubborn rebellion. If a horse balks the bearing of the harness should be examined to see if it is hurting him. If a heavy load is being drawn and the horse is not allowed to rest and regain his breath and strength he may become sulky and refuse to pull. Give him a short rest, and while he is resting rub his nose, pick up a front foot and tap the hoof a few times, or adjust the harness, and he may forget his grievance. Take the lines and give the command to go ahead, turning slightly to the right or left to start. If the horse does not start it is either a case of overload or a chronic halter. If the load is so heavy it can not be drawn, unload. If the horse is a chronic balker a course of training will be necessary to overcome the habit.

In older horses where the habit of halking is fixed the horse should be trained to obey all commands with promptness without being hitched to the wagon. First put on the double trip ropes and use them until the horse stops and stands when he hears "whoa." Next put on the guy line, which should be managed by an assistant, while you drive and attend the trip ropes. The guy line is a rope fastened around the horse's neck and a half hitch over the lower jaw. It is very severe and should not be used to excess. If the horse shows any tendency to balk, give the command "whoa" before he stops of his own accord. When ready to start, the assistant should take a position in front of the horse and smartly jerk him forward with the guy line at the same time you give the command "get up." Repeat the process of stopping and starting until the horse shows no signs of self-will. Use the guy line and use it severely, on the slightest intimation that the horse is going to balk. After a few of these lessons the horse may be hitched to the wagon. The trip ropes and guy line should be kept on until he is well broken of the habit.

Kicking

A horse that kicks when something touches his heels is dangerous to drive. To overcome the habit, put on the harness and the trip ropes. Take a stick and pole over him all over, as described under "Breaking to lead." After he becomes submissive to the pole, tie sacks of

Breaking and Training Colts

...tiresome at first.
...of the lesson may

...ay in the traces and breeching, and continue the lesson until he pays no attention to them.

Fasten a long pole on either side with one end to drag on the ground, the other end to be fastened to the shaft carrier. Drive him around with these, and if he attempts to kick command "steady" and pull him to his knees. The lessons should be continued until he submits to the poles dragging between his legs and all round him. This is a good lesson to give before driving single.

FEEDING AND CARE OF WORK HORSES

There are several kinds of grain available in Western Canada for horse-feed, but it has been incontestably proven that oats are the most valuable. Barley, wheat and rye are useful but none of these grains should constitute more than 25 per cent of the average grain ration, especially during the working season, and as a rule should be mixed with oats up to this percentage by weight.

Bran is a valuable adjunct and may be fed up to 50 per cent by volume of the grain ration. It helps to keep the bowels free and the animal in good condition. Horses not accustomed to bran should have the amount fed increased gradually to the above proportion. For idle horses the percentage of bran in the grain ration may be greatly increased, but the total amount of feed should be cut down. Horses that are not accustomed to barley should be fed a small amount at first, especially if it be crushed. As a general rule, crushing is profitable, especially in the case of the older horses, but horses with heaves or broken wind are better on whole feed. The harder a horse is working, the better it will pay to cut the roughage and crush the grain. This is especially true in the case of aged animals. The amount of grain fed will vary with the size of the animal, the quality of the feed, the class of work done, and the speed at which it is performed. On an average, a horse at hard work weighing 1,500 or over, should receive six quarts of good oats or the equivalent at each meal, and lighter or heavier horses in proportion. Always reduce the grain ration of the horse that is idle for any length of time.

Dry Roughage

Dusty or mouldy hay, straw or fodders should be avoided. Lung troubles such as bronchitis and heaves may result, and if present, are aggravated. Digestive troubles are often traceable to this cause and abortion has frequently resulted from the accidental feeding of ergot in poor hay. Of what are known as "tame" grasses—western rye grass, timothy and red top are the most valuable and palatable for horses. Western rye or timothy should not be allowed to get too ripe and woody ere being cut. The greatest recommendation for western rye and timothy hay is that it is clean and not so liable to mould, must or spoil as other hay. The quality of red top also depends on the time of cutting and the after care received. It is more difficult to cure than timothy. In feeding prairie hay, if possible, feed the hay from the higher land to horses.

Straw

Most straw, wheat straw and barley straw under the same conditions, have feeding value in the order named. There is a great deal of misconception as to the amount of hay or straw a horse should receive. It is not good policy to stuff the manger full at every opportunity. In feeding both grain and roughage, horses should never be given any more than they will clean up at the one meal. The amount fed will depend upon the quality of the roughage, the size of the horse and the kind and duration of work the animal has to perform. Generally speaking, about one-quarter the daily roughage ration should be fed in the morning, about one-quarter at noon and the balance at night. Roots may be profitably fed during the winter months. When fed idle horses, a few pounds per day were found to give satisfaction, aiding in the digestion and rendering the retion more palatable. From two pounds to six pounds per day has been found to be the correct amount.

Three good rules in connection with feeding horses are:—1. Feed regularly.
2. Vary the feed as much as possible.
3. Never feed more than they will clean up.

Watering

Regularity of watering at a set period is important. The general consensus of opinion is that watering immediately after meals is injurious. As a general principle the most desirable method is to water before feeding. Horses that are extremely hot should receive very little water and no grain, until they have cooled off for a short time. Horses should be watered as frequently as possible, especially during hot weather. Horses working hard in mid-summer and watered only three times a day, drink too much at a time and will not thrive. Horses should be watered the first thing in the morning and the last thing at night, though not immediately after receiving their grain feed.

Many horses stand all night with a manger full of dry hay before them, simply because they are too dry to eat. This applies to the winter as well as the summer. The stomach of the horse will only hold from sixteen to nineteen quarts, and as a thirsty horse will drink from five to ten gallons at a time, it is an undoubted fact that when horses are watered immediately after a meal, about three-quarters of the food in the stomach is washed into the intestines (which have great capacity) without giving the stomach juices time to perform their share of the digestive function. As a general rule, about two hours is necessary to digest the majority of the materials contained in the stomach. The main thing to remember is to water as frequently as possible, and, if at all practicable, at least two hours after the evening feed has been given. Horses will not drink sufficient water in very cold or windy weather, if forced to stand at an open unsheltered trough. Surrounding temperature, nature of work, and feed, together with the individuality of the animal, all influence the amount of water a horse consumes.

Grooming

Work horses should be thoroughly groomed every night. If this is done a brisk brushing in the morning is all that is necessary for the major portion of the body. A horse needs and likes a grooming just the same as a man needs and likes a washing—namely, when tired and dirty. Try this out and see. In grooming, only use the curry comb where absolutely necessary, and remember that the shoulder-face, back bene and limbs, especially the joints, besides all the more tender portions of the body, should never know the touch of the comb. Put yourself in the horse's place. Many a sore shoulder has been started by injudicious use of the curry comb. See that the collar seat is well cleaned every morning.

Road and Field Management

A good average gait on good roads with a load is two and three-quarter miles an hour; horses on the land plowing or doing equally heavy work, should not exceed an average of two miles per hour. A few moments rest at the end is beneficial on the half mile stretch. A long rest tends to stiffen the animals. Start a team easily first thing until the shoulders get warmed up. Ease the collars once in a while, especially in the early part of the season, and hate the shoulders at night with salt and cold water.

The average hauling power, walking, of a 1,200 pound horse, is about 108 pounds for an entire day's work (9 hours) or about one-eleventh of the weight of the animal. This may be increased if the length of time is reduced.

HALTER-BREAKING THE COLT

A few minutes' work while the colt is still running with the mare will suffice better than the same number of hours when the colt is two or three years of age for breaking him to the halter. The chief advantage of halter-breaking early in life is not so much that it is accomplished with less effort, but that the colt may be handled in any way desired. If such is the case, he will receive better treatment and better care. If halter-broken, his feet may be properly cared for and crooked legs and deformed feet prevented. Usually no trouble will be experienced in getting the colt to lead, but if somewhat stubborn, a rope may be passed back through the halter ring, and a loop dropped over the rump and placed so that it will bind the colt in the thighs. If this is pulled upon rather than the halter, the colt will usually walk up without any great trouble. Use gentle methods in teaching the colt.

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HEREDITARY UNSOUNDNESS IN STALLIONS

There are certain diseases of the horse which constitute what is known as hereditary unsoundness. Stallions affected with any of the diseases described below should not be used for breeding purposes since these unsoundnesses are likely to appear in the offspring. In all the provinces laws are in force requiring that stallions shall be examined at regular intervals and animals found to be affected with any of the disqualifying diseases may not be stood or travelled for public service or if he may be lawfully used for breeding purposes the certificate of enrolment issued by the government must show the class or grade into which the condition of the animal puts him. If affected with unsoundness that fact must be stated on the certificate.

To accomplish the desired purpose the enrolment requirements are designed so as to eliminate as far as possible from public service stallions of undesirable type and poor conformation and to discourage the use of unsound sires likely to transmit their defects. The disqualifying forms of unsoundness are those considered to be of a hereditary nature and likely to be transmitted to the progeny, thus interfering with their usefulness and lessening their value.

In general experience it is found that an unsoundness present in a horse with structural weakness and poor conformation is very likely to be hereditary. In examining stallions for enrolment the following described diseases or defects should be thoroughly understood and carefully considered.

Bone Spavin or Jack Spavin

This is a bony deposit forming an enlargement which is noticeable usually at the inner and lower part of the hock. A spavin is always an unsoundness as it may cause lameness at any time.

Certain formations of hock are predisposed, particularly those which are small and weakly supported. The hereditary tendency to bone spavin is beyond doubt and it is therefore always considered as a disqualifying unsoundness in stallions.

Bog Spavin

Bog spavin is a soft swelling or puffy enlargement occurring on the front and inner part of the hock. It is due to the capsule of the joint being over-distended with the synovial fluid or joint oil. It does not always cause lameness but is an unsightly defect in any case. In some strains of horses there is a decided tendency to bog spavin. It should be considered as a disqualifying unsoundness when present in stallions with short, weak hocks, or those which are bent or otherwise faulty in shape. Slight puffa on well formed hocks, occurring only after considerable use at service or work and after the age of eight years may not be an hereditary tendency.

Thoroughpin

This name, thoroughpin, is given to a puffy swelling at the upper and back part of the hock. It is due to an over-distension of the tendon sheath with fluid and can be pressed through from side to side of the hock, hence the term thoroughpin. It does not always cause lameness and is most liable to occur in short "beefy" upright hocks. Thoroughpin is frequently associated with bog spavin. They are regarded as hereditary unsightly defects to the same degree as bog spavin.

Curb

This term is applied to a swelling or thickening on the back border of the hock about six inches below its point. This thickened condition of the ligament or tendon is noticeable in the deviation from the straight line that extends downwards from the back of the hock. Long, narrow, bent, or sickle shaped hocks are known as "curby hocks" and are very liable to spring a curb. Legs of this kind affected with curb constitute an unsoundness liable to be transmitted to the progeny and a stallion so affected should be disqualified. A slight curb on a strong, well-formed hock need not always prevent qualification.

Stringhalt

This is also termed "chorea" and is manifested by a peculiar spasmodic jerking upwards of one or both hind legs. The peculiar jerking movement may be slight

or decidedly noticeable when the horse is either walking, trotting, turning or backing up. Some horses only show it when first exercised and after a time drive out of it on becoming warmed up, while in other cases it persists irrespective of the amount of exercise. The true cause of stringhalt is not known. To detect stringhalt often requires careful examination and close observation of the horse in all its movements. Stringhalt is a form of unsoundness with a decided tendency towards being manifested in the progeny.

Ring-Bone

A ring-bone is a bony growth forming an enlargement extending around the pastern. It may affect either the front or hind pasterns and frequently causes lameness which persists. Faulty pasterns are a predisposing cause and in this regard very long weak pasterns and very short upright pasterns are both inclined to the occurrence of ring-bone. It is one of the most serious forms of unsoundness and the hereditary tendency is acknowledged so that stallions affected with ring-bone should be disqualified.

Sida Bone

This name is given to a hardened condition or ossification of the lateral cartilages which are thin plates of gristle situated on each side of the foot to permit expansion at the sides of the hoof head. When they become hardened their flexibility is destroyed, thus preventing expansion and causing lameness in many cases. There is a decided hereditary tendency to the formation of side bone, particularly in some of the heavy breeds, especially those with coarse legs or which have low weak heels and flat spreading feet.

The hereditary predisposition is confirmed by the occurrence of side bone in a large percentage of the progeny from certain sires and its appearance in young horses before they have commenced to work. Side bones generally affect the front feet and are very liable to cause lameness in horses when used for work on paved streets and hard roads.

In examining for side bone each side of the foot should be pressed firmly with the fingers and if the cartilages are sound they will be small and pliable. When side bones are present the cartilages are enlarged and hard and do not yield to pressure. Side bone is considered as an hereditary unsoundness in stallions.

Periodic Ophthalmia

This is a disease of the eyes and is commonly known as moon-blindness. When the eyes become affected with this disease periodical inflammation occurs which finally results in the horse becoming blind. When the eye is first affected it becomes inflamed and sensitive with an abundant secretion of tears and watery discharge. With succeeding attacks the eyeball becomes cloudy and the sight is gradually destroyed. When this takes place the eyeball gets smaller and appears sunken and the upper eyelid is very much wrinkled. The exact cause of this disease is not definitely known but the hereditary predisposition is accepted and as a result in many countries stallions affected with this trouble are disqualified for public service. In France they are particularly strict in the examination of the eyes of stallions for periodic ophthalmia and cataract. Recent investigations tend to support the belief that periodic ophthalmia has an infectious origin and may be transmitted or carried from horse to horse, direct or through indirect agencies.

Roaring

The term roaring is applied to horses which breathe with a loud unnatural sound when they are exercised. As a rule the sound is only produced when the horse is sharply exercised and subsides while the animal is at rest or moving slowly. Owing to the differences of sound made by horses "affected in their wind" the following distinguishing terms are used:

Grunter—This term is applied to a horse which grunts when struck or threatened as by a jab on the lower ribs and is always very suggestive of a possible roarer. Such a horse should be carefully examined for roaring.

Whooser—This term is applied to the wheezy sound which is generally made by horses when they are affected with heaves or broke wind.

Whistler or Piper—This term is applied to a shrill blowing noise which is made by horses when they are affected with some constriction of the nasal air passages.

High Blower—This term is applied to a blowing noise made by some horses when in high fettle and from an acquired habit or playful flapping of the false nostril. This sound should not be confounded with true roaring. The difference is that the noise of a high blower always disappears when the animal is put to the top of his speed while in cases of true roaring the sound would be increased and the breathing further aggravated with increased exertion.

In cases of true roaring the sound is produced as a result of an obstruction or narrowing of the laryngeal passage or "throat" at the upper end of the wind pipe, which interferes with the free passage of air for rapid breathing. In testing a horse for roaring he should first be tried for grunting by jabbing him on the ribs. He should then be exercised at top speed for ten or fifteen minutes and then suddenly brought to a standstill close to the examiner so that he can listen to the breathing. If the horse is a roarer there will be a distinct noise heard in the breathing and the nostrils will appear dilated or wide open. On allowing the animal to stand quietly the noise gradually subsides and the nostrils become smaller. Roaring is always an unsoundness, but its hereditary nature is now being disputed. This is owing to the fact that in many cases roaring occurs after an attack of influenza and strangles causing an enlarged condition of certain glands which by pressing on a nerve known as the left recurrent laryngeal nerve results in paralysis of the vocal cords. In some cases roaring follows an attack of sore throat causing a thickening of the vocal cords. Another thing to be considered is that many cases of roaring can be relieved by an operation on the larynx and as a result the horse may then be apparently sound in that the breathing is normal. The view is becoming more generally accepted that roaring is in many cases a secondary condition following attacks of infectious febrile diseases such as influenza and strangles rather than a primary disease of itself. The fact that many horses can be relieved of roaring by an operation has also some significance. For example, suppose two stallions of equal merit are affected with roaring. One of them is operated on and relieved of roaring and is classed as sound for breeding purposes. The other one is not operated on and continues roaring and is classed as having a hereditary disease and disqualified for breeding purposes.

In so far as hereditary phase is concerned both horses are still unsound, the only difference being that in one case the sound is removed through the relief afforded by an operation while in the other case the sound remained because relief through an operation is withheld. To carry the point still further reverse the process; that is to say, afford relief by an operation to the other one and withhold the operation to give relief in the other case. The result would be that the operation in either case removed the abnormal sound in the breathing but the hereditary phase in its relationship to each remains unchanged. The logical deduction is that the hereditary phase if acknowledged must still prevail in both cases to an equal degree. In view of these considerations many good authorities now question the justification for considering roaring as an essentially hereditary disease particularly in draft stallions of good type and conformation. It must be clearly understood however that roaring is an unsoundness and that it is only the hereditary phase which is not universally accepted and is still an open question.

CARE AND FEEDING OF THE STALLION

The feeds needed by a stallion during the breeding season correspond closely to those needed by a growing animal or the brood mare that is suckling a foal or developing a foetus. In view of the large amount of albumen that is in the semen, together with the nervous strain of the breeding season, foods are needed that contain a considerable amount of protein, and in order that the stallion's system keep in good physical bloom these feeds should have a cooling effect. Feeds which meet these requirements especially well are oats and

bran. The bran will tend to keep his bowels open, and therefore make him less likely to have trouble with leg or skin diseases. Roots, when they are available, form a very valuable addition to the ration if fed in limited quantities. Fresh-cut grasses or pasture are also valuable as either roots or grasses tend to keep the bowels in good condition and the horse healthy. For hay, a mixture of timothy and clover is very good. If this is not available use nice bright native hay. The amount of grain that the stallion requires will be from one to one and one-fourth pounds a 100 pounds of live weight, with about a similar amount of hay. In order to keep the stallion doing well, he will need to have considerable work of one kind or another, as it is impossible to feed the horse heavily and keep him in good condition without exercise.

Care and Feed in the Breeding Season

In the breeding season many stallions are peddled—that is, taken from one barn to another where the mares are to be bred. In a circuit of ten miles or thereabouts the horse will receive plenty of exercise in this way. Some breeders lead their horses with a saddle pony, while others drive them to a cart, or in some instances ride them. The saddle pony is the more convenient and saves much hitching and unhitching, but, of course, it means the maintenance of an extra horse. When the stallion is kept at home during the breeding season and mares brought to him, the question of exercise is more serious. It will be necessary to give the horse at least a five mile walk each day, either hitched to a cart or led with a saddle horse. This is a disagreeable task, but must be done if the horse is to be a sure foal-getter. If at any time he shows signs of being slow in serving or uncertain, he should be given still more exercise. Some horses have to be worked hard before they are sure breeders. One should not use drugs or dope of any sort. The horse should be given plenty of good feed and exercise and kept clean. If he becomes sick, a veterinarian must be called. One should not try to treat a good stallion one's self, as he is too valuable an animal.

The grooming of a stallion presents problems that are not common with other classes of horses. In addition to tending to his coat, it is necessary to take good care of the sexual organs, as they will become filthy and require washing and cleaning. Two general methods are advocated for this, and either is quite satisfactory. One is to take a bucket of warm water and ivory or castile soap, and thoroughly cleanse the sheath and adjacent regions. The other method is to use wet bran and pack in the sheath and let it gradually work out. It will carry out a large part of the dirt and filth with it. Some persons advise using a mild antiseptic on the penis after the serving of each mare. This tends to cleanse the organ, but one cannot expect this to prevent the horse from becoming diseased if the mare is diseased, on account of the large number of wrinkles which will not be thoroughly cleansed. The only way to keep the horse free from disease is to watch the mares and keep the stallion off the mares that are questionable.

Handling the Stallion in Service

A reliable man is a good investment in handling the service stallion. There are several reasons for this, the most important of which is that a good horse represents a large investment, and therefore must be handled carefully, and second, the patrons who use the horse are largely influenced to do so by the personality of the stallion keeper. One reason why the grade and mongrel stallions have made such inroads on the business of pure-bred horse is because of the methods of selesmanship which some of the owners have used. The inroad is not entirely dependent on the difference of service fee, but that is usually a strong point. The service stallion is a business proposition and as such should be handled as a business. The patrons will appreciate the horse better if he is in good physical shape, well groomed and properly cared for. They will also appreciate courteous treatment and will be especially pleased if the stallion man keeps a close check on the time the mares are to be bred or served. Stallion men are notoriously slipshod in their business dealings and a change from such methods is good business.

The young stallion at two years of age should not breed more than eight or ten mares during the season,

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and the mare should not come oftener than four or five days apart. Well developed three-year-old stallions may cover twenty to thirty mares a season without injuring themselves, but should not be bred oftener than three times a week. Forty to fifty mares may be bred by a four-year-old. One mare a day, or perhaps three in two days is all that he can cover. A mature stallion may make two covers a day. If bred oftener, the semen frequently contains very few spermatozoa and the stallion is sure to be a better breeder if not used so often. The number of mares that the mature stallion may breed will, therefore, depend largely on the length of the season.

CARE BETWEEN BREEDING SEASONS

The best system of management for the stallion out of season is that given to the gelding. That is, three fairly heavy feeds a day and a good day's work six times a week and rest and light feed on Sunday. The feed need not be as heavy as during the breeding season, and three-fourths of a pound of oats for 100 pounds of live weight is sufficient grain unless the stallion is doing extremely heavy work. The stallion should not be in a condition so that he would need to be reduced in flesh, as many stallion men practise. If he is exercised regularly with some form of work, and fed in the way the gelding should be fed, he will be in the best possible physical bloom. More stallions are injured in the winter through lack of exercise and heavy feeding than by anything else.

TROWING A HORSE

This picture shows clearly how to cast a horse. Secure a short rope about five or six feet long, tie a large loop to slip over the horse's head, and down to the shoulders. Buckle straps around the hind pasterns. Tie a rope around each fore pastern, pass the free ends back and through rings at the hind pastern, then up and through the loop on the shoulder, on either side, and then backward.

This hitch requires three men, two to pull the rope (one at either end) and one at the head. When ready have the men pull strongly on the ropes which pull the horse's fore and hind feet together, and he goes down. The man at the head should hold it flat. Each rope can now be given a couple of loops around the pasterns on each side, holding them together, and the ends tied snugly over the horse's back. This

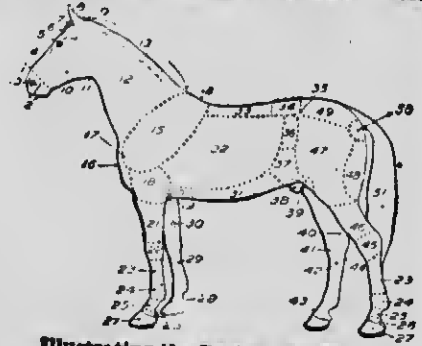


Showing Arrangement of Ropes for Casting a Horse

system has the advantage over the common method, that there is no danger of burning the horse's pasterns with the ropes.

REGIONS OF THE HORSE

Before one can speak intelligently of the horse or follow easily a discussion of the horse where the speaker refers to certain parts or regions of the animal, he must know the location of the parts. The illustration herewith shows the regions of the horse. Look the



Illustrating the Regions of a Horse

cut over carefully and get to know just where and what each part of the horse is. Then look over a live horse, locate the regions on him and you will know a lot more about horses than you ever did before. Refer to the numbers. The different parts are as follows:

- (1) muzzle, (2) lips, (3) nostril, (4) face, (5) eye, (6) forehead, (7) ear top, (8) ear, (9) poll, (10) jaw, (11) throatlatch, (12) neck, (13) crest, (14) withers, (15) shoulders, (16) breast, (17) point of shoulder, (18) arm, (19) elbow, (20) foreflank, (21) forearm, (22) knee, (23) cannon, (24) fetlock point, (25) pastern, (26) coronet, (27) hoof, (28) seat of sidebone, (29) seat of splint, (30) sheathnut, (31) abdomen, (32) ribs, (33) back, (34) loin, (35) point of hip, (36) coupling, (37) hind flank, (38) sheath, (39) stifle joint, (40) seat of thoroughpin, (41) seat of bog spavin, (42) seat of bone spavin, (43) seat of ringbone, (44) seat of curb, (45) lock, (46) gaskin, (47) thigh, (48) quarter, (49) croup, (50) point of buttock, (51) tail.

Study the cut shown above and you will be surprised how quickly you will learn about the different parts of a horse.

TRAINING A BALKY HORSE

The causes which excite the horse to balking are many and varied, chief of which are sore mouth, due to a poorly fitting bit or bridle; sore shoulders and neck, due to dirty or improperly fitting collar, to excessive weight on the collar or to backing; sore back, due to poorly fitting harness; sore tail due to dirty or improperly fitting crupper; overloading; exhaustion, and in discontent with the treatment of the driver.

As balking seems to be largely a nervous trouble, it is useless to punish the horse; in fact, such treatment only increases the difficulty. First of all, we must divert the animal's attention from his fixed determination not to obey. In mild cases this can be accomplished by quietly arranging the collar or bridle by giving a bite of feed, or by picking up one front foot, and gently tapping the shoe as if there were something wrong, which serves to attract the animal's attention, when he will move on without further trouble.

The confirmed balker, however, must be put through a more strenuous course, as he is not to be out-generaled in any such manner. If the horse is perfectly acquainted with commands, such as "whoa," "get up," and the like, harness him, and with a guy rope attached as shown in the illustration, hitch him to a vehicle. Have an assistant manage the guy rope while you drive. If he shows any tendency to balk, such as laying back his ears, looking to the rear and the like, give the command "whoa" at once, and before he has time to stop of his own accord. This will serve to put him off his guard. In starting, the assistant should quickly take a position in front of the horse and smartly jerk him forward with the guy rope at the same instant you give the command "get up."



Arrangement of Guy Rope

As a signal you should snap the whip to the right, but without touching the animal as the command is given. In a similar manner repeat the process of stopping and starting three or four times. Do not wait until the horse gets stubborn, but use the guy rope and use it severely on the slightest intimation that the animal does not want to go when commanded. Continue this work for half an hour each day for three or more consecutive days, unless the horse shows by his submission that he is willing to do as you wish.

If the horse is rather game and fights the guy rope, unhitch him and put on a double safety made as follows:

It consists of two short straps each fitted with a D-shaped ring, a sureingle, and a long rope. The straps are buckled around the front the pasterns and the sureingle around the body. One end of the rope is tied into the ring in the strap that goes around the pastern of the left or rear front foot. The free end is then passed through a ring on the underside of the sureingle and down through the ring at the other pastern. Then the rope end is brought up and passed through a ring tied about half way down the right or off side of the sureingle. As before, the attendant can manage the guy rope while you drive and tend

to the double safety. If he refuses to go, pull on the double safety rope, bringing him to his knees. While down, snap the whip to the right and left over his body, but do not touch him. After he becomes submissive, let him up and proceed as before.

During this training process rely less and less on the appliance and more and more on the lines, whip and voice. The object should be to dispense with the guy rope and double safety as soon as possible. This can be accomplished gradually by attaching the guy rope to the bit, and lastly by removing it altogether. It is a good plan, however, to carry the appliance for some time. Should he refuse to go upon arriving at a special place or circumstance that formerly caused him to balk, give him a severe lesson. After a few such lessons there should be no further trouble. If at any time the horse seems confused, stop him at once by the command "whoa." Then as you give the demand "get up," snap the whip at his right. This serves to remind him of his former lessons in subjection and he will obey.

Occasionally one meets with a very stubborn horse that lies down and refuses to get up. In such a case something must be done to attract the animal's attention. Some persons advise violently blowing the breath into his ear and at the same time striking him a severe blow across the hindquarters with the whip. This seems to nonplus the horse and he leaps to his feet at once. Another plan is to pour a pint of water into the animal's nose while you hold his nose up. Such treatment diverts his attention and he bounds to his feet.

WEANING THE FOAL

At from four to six months of age, depending on conditions, the foal should be weaned. When the mare is bred soon after foaling, or if for any reason the dam and foal are not doing well, it is best to wean comparatively early. On the other hand, if the mother has a good milk flow, and her services are not needed, the foal may well be allowed to suckle six months. If the foal has been fed increasing quantities of grain as it developed, the weaning process will not be difficult for the quantity of milk consumed will have been gradually decreased. Complete separation will then cause little, if any, setback to either dam or foal. In parting the dam and foal, keep them well separated, else all must be done over again. Weanlings should be placed in quarters where they can not injure themselves while fretting for their mothers. At such time the grain ration of the mare should be reduced till she dries up.

SELECTING HARNESS

When choosing harness, there are so many items to be taken into account that the task is often a difficult one. When we visit the harness store or examine the harness sale catalogue, we are rather bewildered by the great variety of styles—black leather, polished leather, russet leather and woven web, cut into all imaginable shapes and styles. No attempt is made to go into the matter in detail; only a few of the general difficulties are noted. The purchaser should first consider the kind of service to which the harness is to be put—whether it is intended for light driving, heavy driving, light work, heavy work or for fancy and fashionable turnouts.

In choosing useful harness, the fewer trimmings the better. While white rings, brass trimmings and extra fixtures may add much to the appearance of the turnout and serve as an advertisement, especially if they are kept clean and shining, they do not add to the usefulness of the harness. Extra fixtures hanging here and there annoy horses and in warm weather often prove to be uncomfortable. Further, these brass trimmings require much work to keep them presentable. This extra time might more profitably be utilized in grooming the horse. Nothing is so inappropriate as well-polished harness on poorly groomed horses. In choosing work harness, therefore, discard the extra fixtures, trimmings and the like. On the other hand, in choosing harness for fancy or fashionable turnouts, for display, for advertisement and the like, the more trimmings and the more fixtures it contains the better it serves the purpose intended.

HORSE-BREEDING SUGGESTIONS**Control of Sex**

No one thing interests breeders so much as the control of sex, and yet it is of little value to them. If one was to announce that he had a plan by which sex could be controlled, he would have no difficulty in securing an audience, however absurd the plan.

Some of the early authorities held that the ovaries controlled the sex, one ovary developing eggs of one sex, the other ovary developing eggs of the other sex. In the early 90's I removed the right ovary from 10 mares and the left ovary from 10 others. At the end of three years all but one of them had given birth to foals of both sexes.

Others held that sex originated in the testicles of the stallion. In 1895 I removed the right testicle from an eight-year-old imported Percheron stallion in October. That spring he was mated with 23 mares, resulting in 16 foals, 9 of which were fillies. The spring of 1896 he was mated with 29 mares (having one testicle only), resulting in 19 foals, 11 of which were fillies. In October of the year 1896 I removed the left testicle from a Standard bred stallion. The spring of that year he was mated with 17 mares, resulting in 13 foals, of which 3 were colts. During the season of 1897 this stallion was mated with 21 mares resulting in 15 foals, of which 8 were colts. So far as these two stallions were concerned but little difference was to be observed whether they had one testicle or two.

One of the old theories, and it is still living, is that of mating early in the heat periods for fillies and late for colts. Of 207 foals, the result of mating at the earliest possible time, 111 were colts and 96 only were fillies. Of 341 foals, the result of mating the last of the heat period, 191 were fillies and 150 only were colts. Of 198 foals the result of mating out of season, that is between heat periods, 101 were fillies and 97 were colts.

Another theory which has been given much prominence by many breeders and a few writers, is that of the alternation of sex. If a mare were to produce a colt one year, and mated with a stallion again at the first heat period following parturition, the next year she would produce a filly, but if mated at the second period the foal would again be a colt. To put it in another way, mating at the odd heat periods will produce the opposite sex when compared with the last foal, while mating at even heat periods the foal would be the same.

In 1895 I had 17 mares producing foals. These were all mated with a stallion at the first heat period, 14 of them producing foals from the first mating, and two of the others from the second mating. These all produced sexes in accordance with this theory, and I believed for the time that I had solved the mystery of sex control. The next season these same mares were handled in the same manner, and records kept of the matings, and with one exception the reverse of this theory proved true. Here again is evidence of the fallacy of short time experiments.

Several other theories, some quite well known, while others were not so well known, have ended this way. Some of them would make a very fair showing for one year, only to go wrong the next. Among these theories were such as moon influence, watering before and after service, the stallion hanging his head at the right or left of the mare during copulation, as well as scores of others equally as absurd.

One Service a Day

In the handling of stallions for service, no one thing has been the cause of more failures or more instrumental in causing a low per cent. of foals, than the practice of making two or three services per day. Very careful and attended experiments with draft stallions, by the use of the microscope at every service have demonstrated the fact that from 10 to 13 hours are required for a draft stallion to secrete semen containing spermatozoa, providing the stallion is given regular daily service. Less time is required by warm bred, than by draft stallions.

Many years ago I was handling an imported Percheron stallion. The foals resulting from his first year's service were so good that I was forced to make two and three services daily during his second season. Well along into the season, I observed he would sometimes impregnate a shy breeder, but fail to settle a regular breeder bred the same day. I blamed the horse rather than the mare. This led to my microscopical

examination of the semen at every service. I carried this work on for three seasons, using different stallions every season. As the results were practically the same with all stallions tested, I will give a complete record of one during a season of 84 days. This stallion began the season with one service daily, which was continued for 21 days, working in double harness in the field five hours each day throughout the entire season. The second 21 days he made three services daily, no two occurring nearer than five hours apart. From the 63 services made during this period, spermatozoa were present in only 39 of them. The next 21 days he made two services daily, no two occurring nearer than eight hours apart. In the 43 services of this 21 day period, spermatozoa were present in only 31 of them. During the last 21 day period he made only one service daily, and spermatozoa were present in all of them. Here it will be observed that at the end of a strenuous season of 84 days, with only one service per day, every service gave results, while during the first half of the season, with three services per day, only a little more than half of them gave results. During the 21 day period when the stallion was making three services per day, I was just as likely to find the third service a good one as the first or second. I had a large number of mares of my own, so that by occasionally serving the same mares twice I had no difficulty in making all services in the time.

The Stallion in a State of Nature

In handling a stallion the best results will be had by following the natural instincts of the horse, so far as domestication will permit. In the aggregate I have spent several months both day and night upon the range with a stallion and his mares, for the purpose of studying the breeding habits of both stallions and mares. Much information of value to breeding I have gathered in that manner. It was thus I learned a mare is never served by the stallion until she is well advanced in her heat period, not until she is in perfect breeding condition. The stallion will make frequent visits to the mare, in some cases for three or four days before mating with her, and she is in readiness for him all the time. In one instance I recorded 26 such visits before the stallion mated with the mare. Nor does the stallion abuse himself, as most men suppose, when running with mares upon the range. I have a record of one instance where a watch was kept for nine days and nights, with mares in readiness at all times, and yet the stallion made eight services only in 9 days.

Another fact worth remembering is that 90 per cent. of all services made under natural conditions are made between sunset and dark, usually just at twilight. My own statistics of farm mares bred show this to be the most favorable time for breeding them. This time of breeding with reference to farm mares is favorable because of giving the mare an opportunity to rest after the service.

Mare's Heat Period

The duration of heat period in mares is from four to nine days in the case of all normal mares. About 85 per cent. go from five to eight days. We have learned that the ovum is not discharged until after the heat period is passed. Because of this, the later a mare is bred the more certain she will be of conceiving. If she could be bred about the second day after the heat period is passed, she would be almost certain to conceive. It is safe to say that 75 per cent. of all mares are bred too early in the heat period for best results. As soon as owners notice anything out of the ordinary with their mares they will rush them off to the stallion. This in many instances necessitates their returning them. It is not always convenient for the owner of the mare to take her to the stallion for service upon a certain day. Yet he should aim to do so as late in her heat period as possible. It should be his purpose to work for foals when he has his mares bred. If he will co-operate with the stallion owner in this direction many more foals would be the result. The duration of the heat period in a few mares is but a few hours.

Nervous Breeders Produce Few Foals

The temperament and habits of mere owners have much to do with the success of capsule or any other manner of breeding. Those men who are nervous, who are always in a hurry, or who can never get

anything done soon enough to ault them, are men who produce but few foals. If a man wants foals, he must not be in a hurry, either before or immediately after breeding his mares. When I see men driving away with their mares after securing service for them, as if they had but a few minutes in which to reach their homes, I quite expect to do that work over again 21 days later. The men who own breeding mares are men who are willing to devote a little time in having their mares bred, to the end that foals may be obtained. Such men are never in a hurry when they are having their mares bred. Nor do such men hurry their mares at any time. We have learned that nature has provided that no rushing of matters be done at mating time. We have learned that many visits to the mare are made by the stallion before they mate. We have further learned that mating is delayed until the best period is well advanced. It will be for all interested in the subject of foals to remember these things. Give the mare abundance of time to reach the stallion. Give her ample time after the service in reaching home, and do not breed her until the heat period is well advanced, or even past.

Age a Factor in Fecundity

The breeding condition of the mare is the first thing to learn when mares are brought to you to be bred. With reference to this the most essential thing is her age. The following table is for a period of 29 years. The stallions used were all pure-bred stallions. Some of the mares were bred several times. The average per cent. of foals resulting is given in the nearest whole number. This has reference to live foals only. The age given was that of mares at the time they were bred.

No. of mares	Age of mares	No. of foals	Per cent. of foals
189	2	81	42
203	3	94	46
391	4	157	40
462	5	240	52
676	6	434	64
901	7	658	73
973	8	779	80
1219	9	1001	82
1082	10	837	77
994	11	667	67
831	12	501	61
752	13	393	52
636	14	299	47
598	15	170	28
423	16	103	23
380	17	65	16
272	18	43	15
201	19	25	12
122	20	14	11
97	20	9	9

This table shows that it does not pay the owner of a stallion to breed mares after they are 14 years of age, unless the fee is paid at the time of service. A little better than 90 per cent. of these old mares producing foals were those with foal at foot. As long as one keeps an old mare breeding and in reasonably good physical condition, she is likely to continue a breeder. If she is not bred for a year or so she rarely will again.

The poor showing made by the two-year-old fillies is only because of poor feeding and poor development. Well-fed and reasonably well-developed fillies of this age breed as readily as mares of any age, while fillies that have not been well fed do not mature an ovum of sufficient vitality to be capable of fertilization. In my experiments with artificial fertilization I was never able to fertilize the ovum of a undeveloped filly but two years old, while an ovum from a filly of the same age but well developed would always become fertilized. In my breeding fillies of this age have increased in fecundity in recent years as a result of the better care being given them.

The three and four-year-old mares make a poor showing because of trouble at this age with their teeth. Dentition at this time causes a somewhat congested condition, which is antagonistic to breeding. Even the five-year-old mares do not make as good a showing as those of more mature years. This table teaches us that by far the largest part of the foals are produced by mares from seven to eleven years of age. The nine-year-old mares lead them all, while those eight years of age are a close second. The mares from the

ages of 7 to 11 inclusive averaged better than 75 per cent., while for the entire number it was only 57 per cent. The most valuable information which this table contains is in showing how rapidly one can lower his per cent. of foals by breeding mares of a doubtful fecundity. This necessarily means a shrinking of profits to the stallion owner.

Manner of Taking Mares to Stallion

How the mare is taken to the stallion has something to do regarding the number of foals resulting. A record kept of mares, used only for work upon the farm, and taken to the stallion in various ways gives us the following:

No. of Mares Bred	How taken to the stallion	No. of Foals	Per cent. of Foals
983	Driven double to wagon.....	631	64
819	Driven double to buggy.....	477	58
427	Led by halter.....	299	69
166	Ridden.....	69	41
2395		1478	61

Again these mares were selected because of the uniform condition under which they were kept when at home. They were all grade draft mares. The average age of each class was less than one year in difference. The class showing the largest number of mares was those driven in hitched double to farm wagon. Those produced 64 per cent. of foals. The next largest number of mares were those driven double to buggy. These produced 58 per cent. of foals. At first thought one would be inclined to believe the buggy would be the easier and better hitch. But the tendency or desire to drive fast when so hitched cannot be overcome. It is the faster driving which produces the lower per cent. of foals. Those led in produced 69 per cent. of foals, the best showing made by any, while those brought in to be bred by riding them made a very poor showing when the quality and condition of the mares are considered. It will be well for owners of stallions to advise their patrons to adopt any other plan of bringing in their mares.

Occupation of Mares

Mueb depends upon the occupation or general use to which mares are put, in the way of producing foals successfully. I have classified them according to their occupation, into farm work, where they never left the farm; combination farm work and driving; driving with no other occupation; and saddle work. This does not include so many as the former table, because of not always knowing how to classify some mares; besides there are a few mares apparently used for several purposes. In this table mares were used only as specified.

Class	No. of mares bred	Average age	No. of foals	Per cent.
Farm work.....	2361	9.4	1605	68
Farm working and driving.....	2417	9.1	1305	54
Driving.....	1683	8.9	690	41
Saddle.....	264	7.9	76	29
Average.....	6725	9.0	3676	54

Here we learn that the occupation of the mare has much to do with her as a producer. The above table teaches us that if a mare must work her work should be something she can do at a slow pace. Where the occupation was farm work alone, the mare produced 68 per cent. of foals; while farm work with driving gave only 54 per cent. Driving gave still less, with a showing of 41 per cent. The saddle mares did not produce enough foals to justify a stallion in breeding them, unless the fee be paid in advance. The pace they are required to make, coupled with the extra weight upon the back is fatal to breeding. While in the South during the winter of 1903 I met a breeder of saddle horses, and he told me his per cent. of foals was so small as to make his business unprofitable. When I learned that his mares were being used under the saddle much of the year, I suggested that his brood mares be ridden at no time, not for any purpose. Three years later this breeder wrote me his foal crop had more than doubled since he began using his brood mares for breeding only.

CATTLE: BREEDS AND MANAGEMENT

BEEF CATTLE

The breeds of beef cattle are the Shorthorn (sometimes called Durham), Polled Durham, Hereford, Aberdeen-Angus, and Galloway. Each of these breeds has been carefully developed for a long period of years, with the result that individuals transmit their characters very readily when bred to native or scrub cattle.

SHORTHORN

The Shorthorn has a great range of adaptability and do well everywhere. The milking qualities, combined with the high standard as a beef animal and the gentle disposition, have caused the Shorthorn cow to be termed "the farmer's sow." The merit of the breed has been proved on the ranges of the West, where the bulls have been used for grading up the scrub cattle of the plains. The Shorthorn crosses well with other breeds or with the scrub cattle, producing from scrub cows calves which develop into fairly desirable beef cattle. The grazing ability of the Shorthorn is not so good as that of some of the other breeds, but where



Shorthorn

grasses are abundant and feeds are plentiful there is no breed which will surpass it for beef production. The large milk flow insures a good calf. However, the cows have been criticized to a certain extent by western ranchmen because the large milk flow causes many of them to lose a teat or a portion of the udder, as the calves can not always take all of the milk. The Shorthorn is early maturing, growthy, and fattens readily. The steers sell readily as feeders, and although they have not won as readily as the Aberdeen-Angus in the show ring, they produce very high-class beef, with the thick loin and full hind quarter which furnish profitable cuts.

The three important strains of Shorthorn cattle have been the Booth, the Bates, and the Scotch tribes. The Booth and Scotch strains represent the true beef type of Shorthorns, while the Bates approaches the dual-purpose type. The Shorthorn is the largest breed of beef cattle. The bulls attain a weight of 1,800 to 2,200 pounds or more, while the mature cows usually weigh from 1,300 to 1,600 pounds when raised under favorable conditions. Greater weight in both cows and bulls is not rare, but extremely heavy animals are not especially desired.

The color of this breed may be red, red and white, pure white, or roan. No other breed of cattle has the roan color, therefore this color in any other cattle usually signifies the presence of some Shorthorn blood.

POLLED DURHAM

The Polled Durham is a polled Shorthorn. This breed is similar to the Shorthorn in every way except that it is hornless. It is a comparatively new breed of cattle, and has not become so popular as the older breeds, but it is increasing in popularity. They will do well under the same conditions which favor the production of good Shorthorns. Some breeders have developed the dual-purpose qualities in the animals with the result that there is considerable variation in type.

HEREFORD

The Hereford ranks next to the Shorthorn in numbers. Their popularity is constantly increasing, especially where cattle are raised under range or adverse conditions. As a "rustler" the Hereford is surpassed by no breed of beef cattle, and they excel the Shorthorns in this respect. They have been recognized as a breed which responds readily to a favorable environment as well as being able to thrive under adverse conditions where other breeds would not do well. On scant pastures and on the ranges where water holes are far apart the Hereford has shown its merit. The bulls are active, vigorous, prepotent, and very sure breeders.

The weight of Hereford cattle is practically the same as that of the Shorthorn. Mature bulls weigh from 1,800 to 2,200 pounds or more, while good cows weigh from 1,200 to 1,600 pounds. It is not unusual for mature animals of either sex to weigh more than this.

In color the Hereford is red with white markings. The white markings usually consist of a white face and head, the white extending along the top of the neck and



Hereford

shoulders, a white throat and dewlap, and white on the underline. Frequently, however, no white is found on the neck or top of shoulders. White is sometimes found on other parts of the body; and, while it is permissible, it is not desirable. A pure-white face is usually preferred, although many pure-bred animals show spots about the face and especially some red around the eyes. The red color of the body varies from a light red approaching yellow in color to a very dark red approaching black. Neither the light-red nor the blackish-red color is desirable, a rich deep red being the most popular. The hair is usually of medium length with a curly tendency, although short-haired animals are common.

POLLED HEREFORD

The Polled Hereford is a new breed developed by selecting and breeding Herefords which showed polled characteristics. The double-standard Polled Herefords are purebred Herefords which are hornless and are eligible to registry in the Hereford herdbook. They differ in no way from the Hereford except that they have no horns. The polled feature has been well fixed and the bulls when mated with native cattle sire few calves having either long scurs or horns.

ABERDEEN-ANGUS

Aberdeen-Angus cattle are solid black in color and have no horns. These characteristics are so strongly developed that a hull, when bred to horned cows of various colors, will usually produce calves of which 85 per cent or more are black in color and hornless. Occasionally a red animal is found in this breed, but the color is not popular among breeders. While the Aberdeen-Angus is an old breed, it is only within recent years that it has been so popular in this country. While they are good rustlers, they have never been as popular on the ranges of the West as either the Hereford or the Shorthorn. They stand next to the Hereford and above the Shorthorn as grazers on scanty pastures.

Cattle: Breeds and Management

This breed is extremely valuable for grading up native cattle, but they have been criticized to a certain extent by rangemen because they do not get a greater percentage of calves. This has usually been true where they have been in a herd with horned bulls. If all the bulls were either polled or dehorned there would doubtless be less ground for this claim. The milking qualities of the cows are only fair; they give more milk than the Hereford, but not as much as the Shorthorn. Enough milk is produced to raise a good calf.

This breed is very early maturing, and has a tendency to fatten well at any age, hence their popularity for

while the mature cows weigh from 1,000 to 1,300 pounds each.

These cattle are exceedingly good rustlers, not being excelled by any other beef breed in this respect, and their long, silky coat of hair enables them to stand severe weather with little discomfort. For these reasons they have proved to be very valuable on some of the ranges of the Northwest. They do not respond so readily to good treatment and to plenty of feed as do the other breeds, and have therefore not become popular.

BREEDS OF DAIRY CATTLE

In case one is going to make a specialty of the dairy business, it is desirable that he select some one of the dairy breeds for this purpose, to be used either as foundation stock or for the purpose of grading up the herd. The closer one adheres to the blood of one breed in grading up a herd and the closer the herd approaches the purity of blood of some one of the dairy breeds, the greater will be the result obtained in the form of profits.

The different breeds of dairy cattle vary considerably in their adaptability to conditions. For this reason it is a good plan for every one to make a careful study of the breeds and select the breed best adapted to his conditions.

The dairy breeds are as follows: Jersey, Guernsey, Holstein, Ayrshire, Dutch Belted, French Canadian and Kerry. The first four breeds are the most important and the only breeds to be seriously considered by the farmers of the Northwest. For that reason only the first four named breeds will be discussed.

JERSEY

The native home of this breed is the island of Jersey where it has been bred pure for a century or more.

The breed is fawn colored but quite variable in shade, ranging from brown to a silver fawn. Most of them are a solid color, although white markings often occur. Mixed colors are not favorably considered by the best

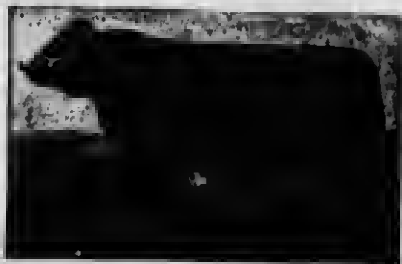


Jersey

Jersey fanciers. The hair about the muzzle and eyes is usually of a creamy or grayish shade.

In form the breed approaches closely the dairy type in most respects. There are, however, a number of individuals of the breed that are too beefy and smooth. Many lack sufficient heart girth and width in the hind-quarters. They have very shapely and attractive heads. Their heads are of medium length of good width and have considerable dish in the forehead.

The horns are comparatively small, short, and curved forward, upward and slightly inward. The horns of the bulls are short but are thicker than those of the cows. A white or amber-colored horn with blackish tips is the most approved type. The breed has considerable skin secretion which is a strong yellow in color and is found in the ear, about the tip of tail and around the udder. This secretion indicates something of the richness of the milk. The skin should be thin, elastic and mellow with a fine coat of hair.



Aberdeen-Angus

producing baby beef. In general form they are different from the Shorthorn and Hereford. The body is more cylindrical in shape, and they are smoother throughout than either of the breeds named. The Angus responds quickly to good treatment, and, because of their readiness to fatten, early maturity, exceptional vigor, high quality, general smoothness and uniformity, and the high percentage of valuable meat produced, it is the most popular of all beef breeds among cattle feeders. They usually dress out a higher percentage of marketable meat than any other breed, and their merit has been shown by the repeated winnings they have made in the show ring and on the block.

The quality of the animal is unsurpassed, as shown by the soft, pliable, mellow skin, and fine hair. The meat is fine-grained and of the highest quality. The constitution and vigor of this breed as indicated by well-developed chest and good heart girth are worthy of mention. For grading up native stock and for crossing, they hold an enviable record.

GALLOWAY

The Galloway is one of the oldest breeds of cattle. They are polled, solid black in color, though occasionally some brown is shown, and have a long, curly, silky coat. This breed is very prepotent and transmits the black color and polled characteristics readily to offspring from cows of any color. As high as 90 per cent



Galloway

of the calves from various-colored cows are black, and from 95 to 99 per cent of the offspring from horned cows are polled. This breed is slow maturing when compared to the Aberdeen-Angus or the Hereford. In size they are smaller than any of the other beef breeds. Mature bulls usually weigh from 1,700 to 1,900 pounds,

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The Jersey is the smallest of the four breeds under consideration. The lack of size of many individuals of the breed results in delicacy or lack of constitution, which is a criticism made against them where they can only be given ordinary care. The cows will average about 200 pounds and the bulls 300 pounds in weight.

Their lack of size and quality of flesh make their use for beef purpose almost prohibitive.

GUERNSEY

This breed has for its home the island of Guernsey where they have been bred by the people of that island in a very painstaking manner for a long period of years.

The prevailing color of the breed is yellowish or reddish fawn, mixed with white. The muzzle is buff or flesh colored, surrounded by a whitish or yellowish circle of hair. The eyes are also encircled by a similar marking.



Guernsey

The Guernsey cattle are somewhat larger than the Jerseys. The difference, however, is not marked. On the average the Guernseys will weigh about 500 pounds more. They are considered to be about medium in size in comparison with the other dairy breeds.

Guernsey milk tests quite high in butter fat, ranging from 4 to 4.5 per cent on the average. The breed ranks high as a producer of butter fat. They have demonstrated that they rank high in this respect in public tests in comparison with other breeds.

HOLSTEIN-FRIESIAN

The native home of this breed is Holland and it has been one of the factors adding to the fame of that country for its dairy products. The breed as they are produced in this country are found most numerous in North Holland in the provinces of Friesland and Drenthe. The breed is one of the oldest and most widely known throughout the world. It is claimed, the origin of the breed can be traced back 2000 years. At any rate the breed must have been in a rather high state of perfection for the past thousand years for Holland has been noted for its dairy products for that length of time.

The breed is readily distinguished by their black and white color. The proportion of the two colors varies in individuals of the breed to a large extent. More white than black is the most preferable color. At the present time a bull with a large amount of white crossed on grade cows will produce calves resembling more nearly the characteristic Holstein-Friesian color which is one of the chief reasons why the large proportion of the white color is preferred.

They are large framed, strong boned cattle—resulting from the rich and luxuriant herbage of the fertile and moist reclaimed lands upon which the breed was perfected in their native country. While their frames are large they conform quite closely to the dairy type in most respects. There are to be found two types in the breed in this country, the one is more on the refined dairy type, while the other shows considerable thickness with more of a beefy tendency. The more refined type is apparently meeting with the greatest favor, but size must not be sacrificed for the refinement.

The Holstein Friesian is the largest of the dairy breeds. It is not uncommon for mature cows to weigh

from 1400 to 1500 pounds and mature bulls, 2000 pounds. Their size and the resulting excess of vigor, make the breed better adapted to meet adverse conditions and neglect than some of the smaller breeds.



Holstein-Friesian

The size and vigorous qualities of the calves at birth also make them meet with favor for veal purposes. The male calves of this breed can be grown and fed out so as to make a fairly good beef carcass. They will not compare favorably, however, in quality of flesh with the beef breed steer.

AYESHIRE

This is a Scotch breed of dairy cattle, having been improved in the county of Ayr in Scotland. If the environment under which a breed has been reared and developed influences in any way the characteristics or qualities of it this breed should possess hardy qualities as the climate is somewhat vigorous in this portion of Scotland and the feed limited.

The color is red or brown, flecked with white. Many members of the breed have a larger proportion of white than red or brown. The horns are white with black tips. They curve outward, upward, and backward at the tips. Their horns are quite long and up-standing, compared with the horns of most modern breeds.

They have well developed forms, and correspond quite closely to the requirements of the dairy type. They have spacious bodies; long, well sprung ribs; broad, long and well developed rumps and thighs of the desirable shape. They are smooth in appearance and in fact have a tendency to put on flesh somewhat more readily than most of the other dairy breeds. Their heads often look rather plain, because of an exaggerated thickness at the throat latch.



Ayrshire

They are noted for their perfect form of udder. The udder is better developed in the forequarter on the average than in any other breed. A pendent udder is a rarity in this breed. The selection for the perfection of development of the udder, was obtained at the sacrifice of the length of the teats. The lack of length of the

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tests is a criticism that is quite common against the breed.

The Ayrshires are about medium in size. The standard of excellence of the breed calls for the mature bulls in weight about 1500 and the cows 1000 pounds. The Scotch standard favors a little heavier animal.

THE DUAL PURPOSE BREEDS

The following breeds are classed as dual purpose. The Milking Shorthorns, Red Polled, Brown Swias and Devon. The Brown Swias, however, are classified by many as a dairy breed. The Milking Shorthorns and the Red Polled breeds are the only breeds that it is advisable to consider for our Northwestern conditions. The Devon breed has considerable merit, but very few representatives of the breed are available in this country.

MILKING SHORTHORN

The dual purpose type of Shorthorn represents the Bates family of the breed—the family of the breed most generally raised in this country until the past 15 or 20 years. Since that time the blood of the Cruickshank or Scotch strain has predominated in the herds of this country, which has tended to lessen the milk producing function of the breed. There still remains some pure Bates bred cattle which are the only reliable source to obtain the true dual purpose sows of the breed.

The characteristics of this breed with the exception of the form is similar in the characteristics of the Shorthorn breed proper, which is fully given in the discussion of the breed under the beef type.

RED POLLED

This breed was improved in England. The breed is of a solid red color varying in shade somewhat, but a medium red is preferable. They are polled (free from horns). They represent the dual purpose type as far as form is concerned quite closely. There exist, however, two types in the breed, the one approaching more the dairy type the other the beef type, at least they can be grouped in this way. This however, is not the result of an effort to breed the two types, but rather the result of a lack of uniformity in breeding the breed. The breed is somewhat cylindrical in appearance. This is especially notable at the rump. The tail head is often prominent also.

The breed is about medium in weight. The milking Shorthorn surpasses them in this respect. The lack of size is a common criticism held against the breed by many of our farmers. Mature cows will weigh on the average 1250 to 1300 and males 1900 pounds.

The breed ranks well as a producer of milk and butter. Several cows of the breed have produced to exceed 10,000 pounds of milk in a year. Several also have yearly butter records in excess of 500 pounds. The cow 2965 Mayflower A-12 from July 18, 1902 to July 10, 1903 produced a total of 11,008 pounds of milk and during four years she produced 43,118.25 pounds of milk.

The breed ranks very well as a producer of beef. They fatten readily and the quality of the flesh is of high grade. Steers of this breed can not be expected to equal the steers of the breeds of the beef type in this respect, however, they compare very favorable when grown and fed out properly.

QUANTITY OF GRAIN PER COW

When figuring a ration scientifically one requires to know the kinds and price of the feed available, and in the case of dairy cows, the animals average daily or weekly milk production. There are several good guides for determining the quantity of grain to feed which we give here. Give a cow one pound of grain mixture per day for each four pounds of milk she produces per day, if her milk tests less than 4 per cent butter fat. Give one pound of grain mixture per day for each three pounds of milk produced per day if the test is over 4 per cent butter fat. On the average, if you do not know what your cows test, or do not care to measure feed as given as above indicated, one pound of grain to each three and one-half pounds of milk will be found about right. Another feeding rule followed by experienced dairymen is to feed as many pounds of grain per day as the cow produces pounds of butter fat per week.

AGE TO BREED HEIFER

It is not a question of age that determines the time for breeding a heifer, but her development. A well-grown heifer may calve at 30 months, and a slow developer even later. Not many years back there used to be a belief among dairymen that heifers should calve early at about two years, and then breed again so as to have about 18 months of a milking period. It was claimed that by this method of milking a long period on the first calf the heifer was trained to be a persistent milker. This may have been true, or it may not have been. At any rate, the system went into disrepute. The heifers bred so early could not grow a calf without sacrificing some of their own growth and vigor. Their calves were not as vigorous as they should have been, nor did the heifers grow out. The habit of persistency in milking may be a very good one, yet a dairyman cannot afford to acquire it at the loss of vitality and development. It is always best to give the heifer a chance to fill out before requiring her to commence working for you. It is for this reason that a well-grown heifer, bred at about 20 or 21 months of age, and calving at 29 or 30 months, is the better cow throughout her years of usefulness. A slow growing heifer should not be bred until 24 or 27 months calving at 33 to 36 months.

DETERMINING THE AGE OF CATTLE

There are two ways of determining the age of cattle. One is by the rings on the horns, the other by the teeth. The first ring on the horn appears when the animal is three years old. The fourth year a second ring appears, with one each year following, until the animal is six or seven years old. Thus, by adding two years to the number of rings visible the age of the animal



Fig. 1—Calf Teeth

may be approximately estimated. This method of determining age is not absolutely reliable for the reason that the rings on the horns are not always clearly defined and at best the method is useful only in estimating age in a cow, and one too, that has horns. In a bull the rings do not begin to appear until the age of four or five years, and are never very clearly defined. Also the rings do not always appear at three years of age. In the case of heifers, bred when about two years old the rings may appear earlier, and the age if estimated by this method would be incorrect. An animal would always appear a year older than she really was. Another weakness of this method of judging age is that sometimes the two horns on the same animal show different numbers of rings, and further, if the horn has been filed and rubbed down as with show animals, some of the oldest rings may become so indistinct as to be difficult of observation.

The best method of determining age is by the teeth. A cattle beast has eight incisors on the front of the lower jaw and six molars or cheek teeth in the back of each upper and lower jaw, a total of thirty-two. The front teeth serve for indicating age. The calf at birth, a few days later, shows two teeth. Within two weeks two more teeth have appeared, one on each side of the first pair, two more follow these within



Fig. 2—At Two Years of Age there are Two Prominent Teeth



Fig. 3—At Three Years of Age there are Four Prominent Teeth

three weeks and inside of a month the calf has a full set of eight temporary or milk teeth. The first or center pair of milk teeth disappear between the age eighteen months and two years. An animal usually has two prominent incisors at the age of two years, the appearance of the teeth at that age being as shown in Fig. 2. The second pair, one on each side of the two center teeth, disappear by the time the animal is three years old, the mouth then being as shown in Fig. 3. The third pair of milk teeth have been replaced by the time the animal reaches four years. This pair comes in between three and a half and four years, and the



Fig. 4—At Four Years of Age there are Six Prominent Teeth

mouth has the appearance shown in Fig. 4. The fourth, final pair of permanent incisors, come in at about four and a half years of age, the animal at five years having a full complement of incisors.

Between the age of five and six there is a leveling of the permanent incisors; from seven to eight they are noticeably worn, the middle pairs especially, and



Fig. 5—At Five Years of Age there are Eight Prominent Teeth

by ten years the corner teeth. After the age of six the age of an animal can be only guessed at. The teeth gradually wear down and change to a more slanting position. At nine years of age the middle pair begin to show reduced size, and at ten both central pairs are smaller than the others. The decrease in the size of the teeth continues until when a cow is fifteen or sixteen years of age she has no teeth excepting small stumps.

In estimating age from the teeth it may be assumed the two permanent teeth indicate a two-year-old;



Fig. 6—Old Age Teeth

four a three-year-old; six, a four-year-old; and eight a five-year-old. Some consider six teeth as a sign of a three-year-old and eight as a four-year-old. It must be remembered that feed conditions have an influence. Some cattle mature earlier than others

as a result of better feed or care or because they are of an earlier maturing breed. All cattle mature earlier to-day than they did 50 years ago.

MARKING CATTLE

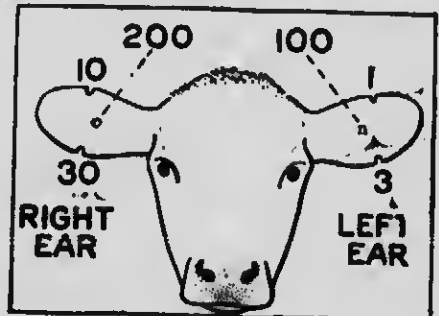
Except on the ranges the old method of branding with the iron is rapidly becoming a thing of the past. True, in all parts of the west, the brand on the animal is the symbol of ownership and is recognized in law as proof that the cattle, beast or horse bearing the brand is the property of the person in whose name the brand is registered. But for ordinary farm stock branding is growing less in favor, particularly with pure-bred cattle. The brand is a disfigurement on a pure-bred animal and on any animal is less desirable than some mark that can be made easily made and is less damaging to the hide than is the mark made by a red hot iron.

Various means are used for marking cattle. Among them is the ear-tag or label, the chain around the horns, notches in the ear, and latest of all tattooing.

The tattoo method consists of depositing an indelible ink beneath the surface of the skin on the inside of the ear in such a way that it remains there throughout the life of the animal. Figures and letters in various combinations are used to identify each animal, so that regardless of the size of the herd, each animal has its own mark—a written memorandum serving as an index and a permanent record.

As will be readily seen, the chief advantage of this method is that it is permanent. As a result of placing it underneath the skin with indelible ink, it is readily understood that it cannot be removed or changed for fraudulent purposes, and it cannot be disputed as evidence for identity when connected with a carefully kept, written record. At the same time it is thoroughly legible. The ink used is of a contrasting color and absolutely indelible, and when the mark is properly made it is always discernible. Another thing to recommend the use of the tattoo method is its simplicity. Both the apparatus and the operation are very simple, anyone being able to operate the instruments by which the tattooing is done. It is perfectly safe and humane. When one remembers the treatment animals received with the old hot branding iron, he will be ready to admit the humanity of using the tattoo method. There is no metal that remains in contact with the wound to keep it irritated, and aside from the excitement incident in tattooing the animal, there is no harm done.

The illustration shows a method for notching calves in the ears for identification. The notches are made by a special punch made for the purpose of inserting cartilage. Under no circumstances should they be made with a knife, as the notch made with a knife easily becomes obliterated. It is also very difficult to make the cut the right size with a knife. To illustrate the use of this method, suppose you wanted to mark a calf with one of the following numbers: No. 7, two notches would be cut on the lower edge and one on the upper edge of the left ear; No. 46, one notch on the lower edge of the right ear, one notch on the upper edge of the right ear, and two notches on the lower edge of the left ear. No. 152, one notch in the center of the left ear, one notch on the lower edge of the right ear, two notches on the upper side of the right ear and two notches on the upper edge of the left ear.



Cattle: Breeds and Management

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Ear tags are another common and convenient means of identification in cattle. The tags are inexpensive and easy to attach but have the disadvantage of being easily torn from the ear. However, if one puts similarly numbered tags in each ear and looks over the cattle occasionally there is not much likelihood of both tags being lost. Tattooing is the best means of identification. This system has the advantage of not disfiguring the animal, and if the tattoo mark is properly made it will be in the ear forever. A disadvantage of tattooing is that it requires close inspection to distinguish the marks in the ears.

KICKING COWS

The habit of kicking is due, usually, to wrong management. Cows kick at first from either fear or pain. If not properly handled, they may develop the habit. Striking a cow that kicks makes her worse. In case the cow's teats are sore, use vaseline, or in severe cases, use a milking tube, until the injury can be healed. If the cow is afraid, handle her gently. In some cases gentle measures will not work. Some old cows that have got into the habit cannot be cured. Such animals should be tied during milking. This is best done by using a rather heavy strap with a buckle and a loop. The strap is put around one leg, above the hock, and the end drawn through the loop. The strap is then put around the other leg and buckled so the two legs are held close together. The cow soon learns to stand quietly as long as the strap is in place.

HARD-MILKING COWS

Some cows cause considerable annoyance because they milk unusually hard. This condition, which is caused by a strong muscle (sphincter muscle) that closes the opening of the teat, can be remedied by proper treatment. Instruments are made by means of which it is possible to overcome the difficulty, with no danger to the animal. In most cases the use of teat plugs alone is sufficient. These plugs, which are made of rubber or lead, are placed in the teat duct and allowed to remain there until the next milking. This is continued until the muscle is somewhat relaxed and the opening remains larger. In severe cases a cutting instrument known as the teat slitter, is used. This operation should be performed by a veterinarian or one having experience in the use of such instruments. In using teat plugs, milk tubes, or any instruments which are inserted in the duct of the udder, great care must be taken to sterilize the instruments thoroughly before using them, for if germs gain access they may cause serious trouble. A two per cent solution of carbolic acid or a weak solution of cresolin, is suitable for disinfecting instruments. It can also be done by boiling them in water just before using. The teats should be thoroughly cleaned before inserting any instrument.

SPAYING HEIFERS

Spaying is done to prevent the female from coming in heat during which period she is nervous, restless and excited so that she does not tend to fatten. The operation quiets the animal so that it feeds better, and meat of a spayed heifer also is preferred in the market to that of the unspayed animal. It is not a practice that warrants any wide application in our present system of farming. The operation is done on any fine, dry day, when flies will not bother. It is usual to spay the heifer when well under one year, but older cows may be spayed if the operator is expert and experienced. The operation may be done by way of the vagina, but it is customary to remove the ovaries through an opening cut in the flank, the animal being thrown or secured in stocks or a chute. If the animal is old the incision is made in the right flank, if young, high up in the left flank. Cup the hair from the seat of the operation, wash the skin clean, disinfect and paint with tincture of iodine. Make an incision about 4 inches long from above downward at a point equidistant from the last rib, spine and hip bone. Cut and tear with the fingers through the muscles and wall of the abdomen until the left hand, perfectly cleansed and disinfected, can be introduced. Then locate each of the ovaries in turn by finding the womb and following the horns to their ends, crush them off by means of a special cesarean in the adult animal or long-handled

curved shears in the young heifer. After withdrawing the instrument, ovaries and hand stitch the skin wound close, dust with iodoform and cover with pine tar. Some operators first close the inner wound with catgut sutures and then the outer one with silk. Withhold feed and water for at least twelve hours before operating.

USING A YOUNG BULL

A yearling bull, under farm conditions, should not sire more than 20 calves; a 2 year old bull 30 to 35 and a three year old bull 40 to 50. A bull should not be used for service before he is 10 months old. Under range conditions not more than half this number can be expected. A rule some follow regarding the number of cows with which a young bull may be mated is that the bull may serve during the season as many cows as he is months old. If cows are being bred every month of the year and not just during the breeding season a greater number may be served, but as a rule one bull to 50 cows under farm conditions is about the right number. Ranchers put one mature bull with from 20 to 30 cows. A bull is in his prime when over 3 years old. He may be used as long as he will sire calves. We have seen 12 year old bulls in service; usually however a bull is not kept longer than 8 to 9 years and rarely more than 6 or 8. A great many bulls are sold long before they should be.

A cow comes in season in from six weeks to three months after calving and after that is in season at intervals of from 18 to 21 days. She remains in heat from 12 to 18 hours each time. Heifers are usually bred so they will drop their first calf when about 3 years of age. A well grown heifer may be bred to calve at 2 or 2½ years.

HOME-MADE CALF MEAL

There are two very useful English home-made calf meals that have given good results, made as follows: No. 1, wheat flour, 1 lb.; flax seed meal, 2 lbs.; linseed meal, 1½ lb. Stir ½ lb. of the mixture into six pints of boiling water for one feed (twice a day) at first. Gradually increase the quantity until it is doubled. No. 2: linseed meal, 2 lbs.; oatmeal, 2 lbs.; flax seed meal, 1 lb. Mix one pound with seven pints of boiling water, and allow to stand overnight. Next morning take one-half of the mixture, add water enough to make five pints, boil for ten minutes and add one-quarter teaspoonful of salt and two teaspoonfuls of sugar. This makes one feed for the first few days that the calf is put on this ration and fed twice a day. Gradually increase it until the quantity is doubled.

It is the idea of many who have never used milk substitutes, that calf meals will entirely take the place of milk, but experience has proven that they will not. Whole milk is Nature's food, and no substitute is its equal. Milk alone should be fed for at least two weeks, and gradually substituted for gruel in seven or eight weeks' time. If milk is dispensed with sooner than this, you cannot expect to raise calves suitable to take their place in the breeding herd. A good policy is: give the calf its mother's milk for the first two weeks, and during the third and fourth weeks gradually change the feed to three parts half whole and half skim milk and one part of gruel. At the end of the sixth week, the feed can be changed to half skim milk and half gruel, and at eight weeks gruel alone can be fed. The milk and gruel should be mixed at feeding time. The gruel will settle to the bottom of the pail, but the calf will soon learn to like it. If there are indications of scouring, the quantity of gruel should be reduced.

AVERAGE WEIGHT OF CALVES

The average weight of dairy calves at birth was retained for a number of years at one of the high American colleges. They had a large herd of each of the following breeds: Jersey, Guernsey, Ayrshire and Holstein. The average weights at birth were as follows: Jersey, female, 59.7; male, 62.4; Guernsey female, 68.8; male, 70.0; Ayrshire, female, 71.4; male 77.7; Holstein, female, 88.0; male, 90.0. The weights are very much as one would expect. The breed having the greatest weight when mature has the heaviest calf and the weights of the calves grade down according to breed size.

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YEAST CAKE TREATMENT FOR STERILITY

It is advisable first to have an examination made to find out what is causing the trouble. The trouble may be mechanical, as a growth for example in the generative organs, or it may be caused by the ovaries becoming diseased. Less frequently the cause is an over-acid condition in the genital organs, which is the condition the yeast cake treatment is helpful in correcting. If you want to try this treatment in the case, proceed as follows: Take an ordinary cake of yeast, and make it into a paste with a little warm water. Allow this to remain in a moderately warm place for twelve hours; then add one pint of lukewarm, freshly boiled water, mix and allow to stand for another twelve hours. Prepare this mixture twenty-four hours ahead of the time the cow is expected to come in heat, and inject it into her vagina the moment she is seen to be in heat. Breed her just when she is going out of heat.

RINGING A BULL

When a bull is eight months to a year old he should have a ring of 1½ to 2 inches in diameter put in his nose. This ring will be satisfactory until he is two years or older, when it should be replaced by a ring three inches in diameter. Copper or cannon metal are most generally used for rings, but either shows wear in time, and care should be exercised to insert a new ring before the old one is worn out.

The ringing of a bull is not a difficult operation, but the animal should be securely tied. A bull punch sold by dealers in such supplies may be used for making the opening, and the ring slipped in as the punch is withdrawn. The insertion of the ring by using a cannula and trocar is equally satisfactory. The trocar is forced through the cartilage division between the nostrils and withdrawn, leaving the cannula in the opening. One end of the opened ring is then passed through the opening as the cannula is withdrawn. After closing, the ring should be filed and sandpapered smooth at the joint. In some cases a sharp knife or a 32-calibre wad cutter (used for refilling cartridges) may be used, but the other instruments are preferable and will make a better job. In using the wad cutter the hole is made by placing a block of wood on one side of the cartilage to be cut and the cutter on the other side is struck with a hammer. The bull's head should be well secured before performing this operation. He should not be handled by the ring until the nose is entirely healed up and is no longer sore.

TREATMENT OF MANGE

Mange on properly domesticated animals is easily cured. Clip the affected animal if the hair is long. Burn the hair and thoroughly disinfect the place where the clipping is performed. Rub the animal all over with soft soap to which a small quantity of creolin may be added. After a lapse of a few hours give the animal a thorough dressing with this preparation:

Sulphur 2 pounds
Oil of tar 8 ounces
Raw linseed oil 1 gallon

Heat these ingredients gradually together, but do not allow to boil. Rub the mixture well into the skin at a temperature as high as can be comfortably borne and allow to remain on for 10 days, when it may be washed off and the application repeated.

CONTAGIOUS ABORTION

Abortion has been and can be controlled by thorough and intelligent treatment. It is not a lazy man's job, but by careful attention to details of sanitation and the control of breeding, this disease can be overcome.

Don't waste your energies on unprofitable animals. Send the boarders to the butcher, then give your attention to the good cows. "An ounce of prevention is worth a pound of cure." Clean up the stable, put in windows and let the sunshine in, then give a liberal coating of whitewash, so that you can see if there is any dirt.

Treatment for Bull

To prevent the bull from carrying the infection from a diseased cow to a healthy one, first clip the tuft of long hair from the opening of the sheath, then disinfect this penis and sheath with a solution of one-half per cent. of cresol compound, lysol or a 1 per cent. carbolic acid (see note A), or 1 to 1,000 potassium permanganate

in warm water. The only apparatus necessary is a soft rubber tube ¾ inch in diameter and 5 feet long with a large funnel attached to one end; or an ordinary fountain syringe and tube would serve the purpose. The tube should be inserted into the sheath and the foreskin held with the hand to prevent the immediate escape of the fluid. Elevate the funnel as high as possible, and pour in the fluid until the preputial sac is filled. In addition to this, the hair of the belly and inner sides of the thighs should be sponged with an antiseptic of twice the strength of the irrigating solution. This disinfection should invariably precede and follow every service.

Treatment of the Cow

Isolate the aborting cow. The germs of the disease are contained in the discharge and in the dead fetus and its membranes. Gather these up and bury or burn them and disinfect the stall thoroughly. Don't neglect this cow. By thorough treatment you can restore her to usefulness and prevent sterility.

More than half the cows abort but once, so don't sell your cow because she aborts.

The uterus should be irrigated daily with one of the antiseptics mentioned for the bull, using the same apparatus, and irrigation should be continued until discharge ceases. If large numbers of animals are to be treated, a bucket can be fitted with a small faucet to which the tube is attached. This can be suspended from the ceiling. Lugol's solution, in a strength of 2 per cent. (see note B) has been found to be desirable as a uterine douche. It is not permitted to remain in the uterus, but is flushed out with salt solution. (See Note C.)

The action of the antiseptic should be noted, and if it causes straining or irritates the tender membranes of the genital organs, a less irritating solution should be used. In addition, the external genitals, root of tail, scutcheon, etc., should be sponged daily with a solution twice as strong as that used for irrigation, and this latter treatment should be given the non-aborters as well. Should the preliminary symptoms of abortion be detected, the animal should be removed from the herd and treated as above.

Notes

Note A—Two tablespoonfuls of fluid equal 1 ounce, therefore this amount of antiseptic added to 6 pints of boiled water makes approximately a 1% solution.

Note B—Lugol's solution of iodine is compounded as follows: Iodin 5 parts, potassium iodid 10 parts, and boiled water to make 100 parts. Two parts of this compound in 100 parts of boiled water make a solution suitable for uterine irrigation. Lugol's solution can be purchased from your druggist.

Note C—A 1 per cent. solution of common salt in boiled water at body temperature makes a suitable irrigating fluid. A heaping tablespoonful of dry salt weighs approximately 1 ounce, and this amount in 1 gallon of boiled water gives the proper strength.

Retention of Afterbirth

The retention of the afterbirth is a serious matter. It should not be forcibly removed, as the lining membranes of the uterus would be torn and a point of entry thus provided for the germs which cause blood poisoning. The uterus is very susceptible to this form of infection at such times, and injury should be carefully avoided. Clumsy and forceful manipulation of the parts may cause infection and death of the animal. The best practice is to flush the uterus twice daily with a mild antiseptic to prevent the accumulation and absorption of poisonous product and allow the membranes to come away of themselves. In all these manipulations, hands and utensils should first be thoroughly disinfected. In fact, so much special knowledge and operative skill is required that a competent veterinarian should be employed to instruct the owner before these operations are undertaken.

After abortion, breeding should not again be tempted within two months, or until the discharge shall have ceased, as the uterus would not be normal and the animal either would not conceive or would abort again in a short time.

Sterility, weakling calves, retained afterbirth, white scours and calf pneumonia frequently accompany abortion. The measures recommended will also assist in overcoming these complications.

BREEDS OF SHEEP

Sheep are of two types—mutton sheep and wool sheep. The mutton breeds are commonly classified according to their fleece being known as medium wool breeds and long wool breeds. The medium wool breeds are as follows: Shropshire, Southdown, Oxford Down, Hampshire, Suffolk, Dorset Horn and Cheviot. With the exception of the Dorset Horn and occasionally the Cheviot, these breeds are all hornless.

The long wool class is represented by the following breeds: Leicester, Lincoln, Cotswold and Romney Marsh. To the wool breeds as distinguished from the mutton, belong the Merino and Lambouillet.

The following is a brief history of each breed and their general characteristics:

SHROPSHIRE

The native home of the Shropshire is in the counties of Shropshire and Stafford, England. The breed has been developed by the use of Southdown, Leicester and Cotswold blood on the native stock.

In general appearance the Shropshire conforms to what is recognized as excellent mutton type. It is somewhat heavier than the Southdown, rams weighing at maturity about 225 lbs. and ewes about 160 lbs. The head is covered with dense wool, which should completely cover the entire face excepting a small part of the nose. The legs are also well woolled. The color of head and legs is usually a dark brown, being con-



Shropshire Ram

siderably darker than those of the Southdown. There should be an absence of black wool on the head. The wool is reasonably compact, of good quality, medium fine, and should be free from black fibres. It is longer than the Southdown but shorter than the Oxford, being about three and one-half inches in length. The skin should be a bright pink.

As a breed the Shropshire has been very popular in Canada. Like the Southdown they are very hardy and do well under climatic and feed conditions in this province. The ewes are fairly prolific and the quality of the mutton is good.

SOUTHDOWN

This breed originated in Sussex County, southeastern England. Southdowns, as we know them at the present time, are the result of improvement of the native stock of Sussex County. This improvement was brought about by selection and careful breeding, until to-day the breed ranks among the first as a mutton sheep.

The Southdowns are the smallest of the down breeds, the mature ram weighing about 175 lbs., the ewe 135 lbs. The shortness of leg, compactness of form and general smoothness of outline give this breed an advantage as they weigh well for their appearance, and what they lack in size is made up, in part at least, by their excellent quality as the mutton of this breed has always held a premier place on the largest markets

and with the most discriminating mutton consumers. A blocky, compact, well-rounded-out form is characteristic of the breed. The head is covered with a cap of wool which should not extend below the eyes.



Southdown Ewe

This, as with the wool covering the legs, is a greyish-brown or mouse color. The wool is of fine texture, should be dense all over the body, averaging possible two and one-half inches in length. Associated with this the skin should be a bright cherry pink.

OXFORD DOWN

As the name indicates this breed is a native of Oxford County, England, and the foundation was begun by a cross of a Cotswold ram with a Hampshire ewe. From the result of this cross followed by selection a fairly uniform breed of sheep was developed.

In some respects this breed resembles the Shropshire. They have, however, more scale, being the largest of the medium woolled breed. Rams weigh 275 lbs. when fully developed, and 200 lbs. is not uncommon for ewes. The wool covering of the head does not extend below the eyes nor is it as dense as with the Shropshire. The color of the head and legs is usually a uniform dark brown. The ear is inclined to be larger, the face longer, and the entire head lacks the general



Oxford Ram

refinement found in the Shropshire. The fleece is longer and coarser than the other down breeds, but withal is usually of good quality and the sheep shears a heavy satisfactory fleece.

HAMPSHIRE

To the county of Hampshire, England, can be traced the foundation of this breed. The original stock differed considerably from Hampshires as we know them to-day. They were inferior sheep possessing horns and lacking in those characteristics that go to make a good mutton sheep. These animals were im-

proved by the use of the blood of the Southdown, and out of this cross, together with rigid selection, developed the present-day Hampshire.

The Hampshire is the second largest of the medium woolled breeds, being surpassed only by the Oxford.



Hampshire Ram

Mature rams should weigh around 250 lbs. and ewes 190 lbs. The head is woolled to a point just below the eyes and on the cheeks, the color of both head and legs being a dark brown herding in some cases to black. The ear is long and droops somewhat, the head large and inclined to be rather Roman nosed.

As regards wool the Hampshire shears a fleece of medium length and quality, but lacks the quantity reasonably expected from sheep of their weight. As a mutton producer, however, the breed ranks high, the lambs mature early, their flesh is of excellent quality and they are looked upon with considerable favor where early lambs are required for the market.

DORSET HORN

The counties of Dorset, Somerset and Wiltshire, of Central and Southern England is the native home of this breed. The general improvement of the breed has been brought about by careful breeding and selection, with the result that the modern Dorset Horn differs considerably from the original stock.

The outstanding feature of this breed is that they are horned (both sexes), those on the male curving backwards and around spirally, while those on the ewe curve downwards and slightly forward. The face and legs are white; the same is true of the hoofs and nose. There is a cap of wool on the head which should not



Dorset Ram

extend below the eyes. This breed does not always exhibit the fullness and compactness of form found in some other breeds of the medium wool class, but the best specimens of the breed conform fairly well to

mutton type. In size the Dorset is about the same as the Shropshire, mature rams weighing around 225 lbs. the ewes about 165 lbs.

The chief claim for this breed is that they are well adapted for the production of early lambs, the ewes are said to breed at almost any time of the year, and it is not uncommon in some Dorset flocks for the ewes to raise two crops of lambs in one year. In addition to this they are fairly prolific. The quality of mutton, particularly with young fat lambs, is good, while that from older sheep is classed as fair.

CHEVIOT

That section of country between England and Scotland, known as the Cheviot Hills, is claimed as the original home of this breed. They have been improved by crossing with Leicester, Merino and the Black-faced Highland.

The head is free of wool, being covered with white hair. The face is inclined to show a Roman nose not unlike the Leicester. It is not uncommon to find horns in the rams. The Cheviot is medium in weight, the rams often reaching 225 lbs. or more, while the ewe will average 160 lbs. The fleece has been said to lack compactness, although within recent years more attention has been given to the question of density of the wool. In its native home the Cheviot is looked upon as an exceptionally good grazing sheep.

LEICESTER

This breed derives its name from the county of Leicester, England, where it has been bred since very early times. Much credit is due Robert Bakewell for the improvement of this breed. From a slow-maturing, hard-feeding, coarse, leggy sheep he developed a very superior animal showing excellent mutton qualities.



Leicester Ram

This improvement was brought about by close breeding and careful selection. The breeders of long wool sheep owe much to the Leicester, as this breed has done a great deal in the improvement and development of practically all the sheep of the long wool type.

The general impression of the Leicester is that they are inclined to be long in the leg, the fact that their legs are absolutely bare of wool possibly tends to exaggerate this. They are comparatively broad in the back and carry out a full level rump. There is an entire absence of wool on the head, which is covered with short, fine white hair, the skin often showing a slight bluish tint. A tendency towards a Roman nose is quite common in this breed. Black spots on the head, if not too large or too numerous, are not objectionable. The Leicester shears a real good fleece of long wool. This breed is possibly the smallest of the long wool breeds, rams weighing from 225 to 250 lbs., and the ewes as much as 200 lbs. This breed has a fairly wide distribution over the Dominion, many of the grade flocks showing a predominance of the blood of the Leicester.

Sheep: Breeds and Management

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COTSWOLD

This breed originated in the County of Gloucester, in central south-western England. By the use of Leicester rams on the native stock both the quality of the mutton and wool was greatly improved.



Cotswold Ram

The head of the Cotswold has a tendency to be Roman-nosed and is covered with wool that hangs in long ringlets from above the eye, sprawling out over the face. The legs are also woolled to below the knees and hocks. The hair on the face and head may be either white or mottled with brown. The wool is comparatively coarse and long, and hangs in locks or ringlets over the body; the fibres are usually parted down the back, falling away on either side. This is a large breed, mature rams often reaching a weight of 275 lbs. and the ewes from 200 to 230 lbs. The Cotswold is a stylish sheep, possessing a bold, graceful carriage, and this with the characteristic wool covering of the breed gives it a very attractive appearance.

LINCOLN

This breed has been bred for many years in Lincoln County, England. The native stock lacked many of the good features of the present-day Lincoln, being coarse and slow maturing. The infusion of Leicester blood did much to improve the mutton qualities and to bring the breed into prominence.

Like the Leicester and Cotswold, the Lincoln is inclined to have a Roman nose. The face is usually white, although may have brown spots. A small foretop of wool is found on the head and the wool on the body is comparatively long and coarse, hangs in ringlets, and is usually parted down the back. The Lincoln shears a very heavy fleece of wool. A weight of from 20 to 25 lbs. of unwashed wool has been known in case of mature rams.

In common with some others of the long wool breeds the Lincoln may be criticized for too great length of leg, but the back is broad and the rump level and full. The Lincoln is the largest of the long wool breeds, 300 lbs. being the standard weight for mature rams, and the ewes weigh close to 275 lbs.

CORRIEDALE

This breed is of New Zealand origin, and was developed by the cross of a Lincoln ram on Merino ewes, the aim being to produce a sheep that would be suitable for range conditions, and at the same time would produce reasonably good mutton and wool. They are considered as being more or less of a general purpose sheep. The wool is a little longer than the Rambouillet, and is more dense and finer, while the lambs from the Corriedale ewes are said to weigh as much as 100 to 150 lbs. when six months old.

The following description adopted by the American Corriedale Association describes the characteristics of this breed:— (a) Body large and symmetrical, general appearance to be bold and attractive (b) Head bold and strong, well woolled down to the eyes

but not below, free from horns or scurs, with clear, white face free from any trace of black or brown hairs. (c) Neck strong, well set at the shoulders and free from any folds or conspicuous wrinkles. (d) Legs strong, set squarely under the sheep and well apart, also free from any trace of black or brown hairs.

ROMNEY MARSH OR KENT

This breed is native of Kent County, England. This district is comparatively flat and moist, and this breed is said to give a good account of themselves under such conditions.



Romney Marsh Ewe

In general appearance this breed resembles the Lincoln, although lacking the extreme size of the Lincoln. The face is white and usually covered with a short crop of wool. They shear a good fleece of average weight. As already suggested, they are better adapted for grazing on low, flat land, than some of the other breeds, and they are reported as being comparatively free from many of the diseases that affect sheep.

RAMBOUILLET

The Rambouillet is really of the same origin as the Merino, although developed in France on a large estate in the village of Rambouillet. The French government did considerable work in an endeavor to improve the breed, with the result that the Rambouillet is larger, possesses more of the mutton form, and is said to be hardier and has a superior quality of fleece as compared with the stock originally brought over from



Rambouillet Ram

Spain. The head is large, and in most cases the males have horns the same shape as the Merino; the ewes are hornless. The folds or wrinkles of the skin are common to this breed, although not being so marked as with the Merino. In fact the Rambouillet, as a breed, might be classed midway between the Merino and the recognized mutton breeds.

SUFFOLK DOWN

Originating in the counties of Norfolk and Suffolk, England, this breed has been improved by the use of Southdown and Hampshire rams. The Southdown blood improved the breed in respect to quality and general mutton form, the Hampshire increasing the weight and scale.

The head is fairly long, distinctly black in color and the wool does not cover the head beyond a point behind the ears. The ears are rather large and the same color as the head and legs. In size the Suffolk ranks between the Shropshire and Hampshire, the rams weighing around 230 lbs. and the ewes about 180 lbs.

The Suffolk Down as a mutton sheep ranks high, the infusion of the Southdown blood giving it a high quality of flesh. As a feeder too, the Suffolk has given a good account of itself, the lambs making very satisfactory gains as compared with those of other breeds. In regard to fleece this breed is only fair, the wool is of good quality, being reasonably fine, but the breed is said to be a comparatively light shearer.

MERINO

To this particular breed belong three classes differing somewhat in general type, but for our purpose it is not necessary to go into detail, the general characteristics of the breed as a whole being sufficient.

They are of Spanish origin, and as suggested previously the Merino has been bred for production of wool, and for this reason individuals of the breed differ considerably in type as compared with the mutton breeds. The fullness and roundness of form is lacking, and instead of the fleshy form of other breeds a general, bare, muscular appearance is evident. On parts of the body, especially the neck and shoulders,

are to be found folds or wrinkles in the skin, the number of these folds varying with the different classes.

The head is of medium size, and fairly well covered with wool. The rams possess horns, which are large and have considerable curl to them. The size of the Merino is not great, varying according to the different classes. The wool found on the Merino is of finest quality, the length and size of wool fibre varying with the different classes. In all classes, however, the wool should be dense, the fibre fine, the staple strong and the crimp close.

A special type of Merino has been developed in the United States called the Delaine Merino, a little larger and more compact in form than the other Merinos; a sort of dual-purpose breed, combining wool and mutton qualities.

KARAKULE

This class of sheep are maintained altogether for the production of the pelt, the lambs being slaughtered when only a few days old and the skins sold on the market as Persian lamb. Very satisfactory results have been attained by crossing the breed with long wool sheep such as the Lincoln, the offspring in most cases being black with a lustrous, tightly-curved fleece and a pelt which commands a comparatively high price. The business of breeding this particular class of sheep is at the present in the hands of a few men. As a matter of fact it is an industry that demands considerable skill and it is doubtful whether there will be any remarkable development in the business in this province.

The sheep are native of Bokhara, Central Asia, and were first introduced into America in 1908. In appearance Karakule sheep are long of body, medium in size and possess steep rumps, broad tails and long, drooping ears. The wool is long, coarse and hair-like on mature sheep and a light gray to brown in color.

MINOR BREEDS**Kony Hill****Exmoor****Wensleydale****Ryeland**



Welsh



Blackface

FEEDING THE PET LAMB

Patience and care are needed in raising a lamb by hand. Use milk from a cow that has a high butterfat test. Feed the milk at a temperature of about 90 degrees F. A bottle with a nipple attached is the most convenient way to have the lamb take the milk. It is necessary to have a little patience the first few times of feeding, as a few lambs may not like the "nipple-and-bottle" stunt at the start. They soon think this is a fine way to get their dinner and will not cause any trouble if the few suggestions herein given are carried out. The first few days the young lamb should be fed every two hours. The lamb when young requires only a small amount of milk at a time but wants it often. Boil the bottle and nipple in water each time after feeding. This detail is necessary for real success. Use the milk from the same cow each day.

CARE OF EWE AND LAMB

During the last few days before lambing, pen the ewe at night where it is intended she shall be until the lamb is a few days old. Avoid crowding and jamming in doorways and around feed racks. Give good, clean, palatable feed, consisting mainly of roughage.

Ewe at Parturition

When the ewe is giving birth to the lamb do not disturb her so long as everything seems to be going well. If she must have help (which she should have if little or no progress is being made after much laboring), the first thing to do is to learn what position the lamb is in. To be delivered alive, it should be presented fore feet first, with the nose lying snug on the fore feet (this is the normal position for birth), or it may be delivered hind legs first. Before entering the ewe to get the lamb into the proper position, the hand should be disinfected and smeared with vasoline or oil. Care should be used not to tear the parts of the ewe, and it may be inadvisable for a person with a large hand to attempt the operation. Pull steadily on the lamb slightly downward toward the ewe's udder and use most strength in pulling when the ewe labors. Be sure to keep the head coming with the fore feet until the nose is exposed.

Attention after Lambing

After the lamb is born, give the ewe close attention for several days. Note whether she casts the placenta (afterbirth) and whether her bowels are normal. Watch her udder. Milk her if the lamb does not take all of the milk. Do not expose her to cold drafts. Give her all the water she wants, but not large quantities at one time, and it should not be ice cold. Give her good feed, such as sound hay and oats; allow grain sparingly for two or three days after the lamb is born, unless she is in thin condition.

After the lamb is a week old, the ewe must have plenty of feed until there is an abundance of grass; and abrupt changes in her ration should be avoided.

Ewes that Refuse Food

Do not worry if the ewe refuses to eat for the first three to six hours after lambing, but if she continues to refuse feed, make sure that her bowels are in good condition. Four ounces (one-third pint) of raw linseed oil, or 4 or 5 ounces of Epsom salts dissolved in water, is a good physic. For a very quick-acting physic, 2 ounces (4 tablespoonfuls) of raw linseed oil with 4 ounces of Epsom salts may be used. To aid the appetite, give three times daily a teaspoonful each of tincture of gentian and ginger in one-half pint of lukewarm water. If the ewe is in thin flesh, add a teaspoonful of the tincture or iron to each dose.

Udder and Teat Troubles

When the ewe's udder is swollen, keep it milked out and paint it twice a day with tincture of iodine until the swelling begins to go down, and thereafter paint it once a day until it is evident that further treatment is unnecessary. If pus forms, make an opening for drainage and wash the affected part once a day with a good disinfectant. Ewes with swollen udders should be removed to comfortable quarters outside the sheep barn, for their trouble may be caused by an infection that will spread through the flock. Since their milk is often poisonous, their lambs should be taken away from them and fed by hand until the swelling subsides.

Sore teats in ewes are most often caused by the formation of pock-like sores, but sometimes by the long, sharp teeth of the lamb. The first symptom of the pock sore is a whitish pimple or blister. As soon as the sores are discovered they should be opened and washed twice a day with a solution of sheep dip, one part to twenty-five parts of water. If the lamb's teeth make the teats sore, about the only thing to do is to take the lamb away from the ewe. When the teats are very sore, the ewe refuses to let the lamb nurse; hence the shepherd should see to it that she is kept milked out.

CARING FOR THE LAMB

When the lamb is born, place it and the ewe in a pen measuring 4 feet x 4 feet, or 4 feet x 6 feet. Little attention need be given the strong lamb, whose mother has milk, except to see that it finds the teat. If its mother has no milk, it is best at first to take a little from a ewe that has more than enough for her lamb. The next best thing to do is to feed whole cow's milk, using about two tablespoonfuls every two or three hours. The milk should be heated to about 90 deg. F. in a bottle placed in warm water. In order to give the milk at proper temperature, the bottle and the water should be in a pail which can be taken to the place where the lamb is to be fed.

A lamb too weak to stand to nurse should get a fill of its mother's milk as soon as possible. If it is anxious to nurse, back the ewe into a corner and hold the lamb to the teat and increase its anxiety to feed by patting it on the rump. If it refuses to nurse, draw some milk from the ewe and feed the lamb from a bottle until it gains in strength and develops a strong appetite.

HANDLING CHILLED LAMBS

One of the best ways to handle a chilled lamb is to place all but its head in warm water as the elbow can bear. As the water cools, put in more warm water to keep up the temperature. When the lamb becomes somewhat lively, take it out of the bath, and rub it briskly with a coarse cloth until it is almost dry. Then feed it, wrap all but its nose in a thick blanket or cloth, and place it in a warm place to sleep. Keep it away from its mother no longer than absolutely necessary. Always wrap a lamb in a cloth when placing it in artificially heated quarters.

THE LAMB THAT IS DISOWNED

When the ewe disowns her lamb, try to get her to claim it. A ewe recognizes her lamb at first wholly by smell. This being the case, it may help to smear on her nose and on the rump of the disowned lamb some milk drawn from the ewe. Another procedure is to tie the ewe in a small pen where it is easy to hold her and force her to let the lamb nurse often and being tied it is difficult for her to get away from it. When the disowned lamb is one of a pair of twins, both lambs should be placed in a pen next that occupies by the ewe so that she can see them, and both should always be put with her at the same time. In her anxiety to nurse the lamb she claims, she is likely to let the other one nurse also.

If a ewe with a good supply of milk is left without a lamb, an attempt should be made to have her raise one, an orphan or one not getting enough milk from its mother. If she has just lost a lamb, it is unusually easy to get her to take another by immediately removing the skin of the dead lamb and placing it on the stranger intended for her. If this proceeding is not possible, the suggestions given above may be employed.

PUTTING STRANGE LAMB ON EWE

If a ewe has lost her lamb, it is sometimes desirable to transfer one to her. The skin of the dead lamb may be placed on the stranger, and the ewe induced to take him that way. Other devices may be tried, one being to tie the ewe up in a small pen and let the lamb nurse often until it is strong enough to make life miserable for her if she does not let it nurse. Another device is to smear some of the ewe's milk on the rump of the lamb and on her nose. Since the ewe knows her offspring wholly by smell, this serves to establish the ewe's recognition of the lamb. It is said that rubbing the lamb and the ewe's nose with a rag strongly scented with kerosene will often accomplish the recognition.

SHEARING

Giving directions for shearing sheep is somewhat difficult. Sheep shearing, ordinarily, is not learned that way. The best way to learn is to have an experienced man show you how. Once one has learned the knack, it is astonishing how quickly a fleece can be taken off and how easy it is to do it too. First of all, do not be in too much of a hurry to get done. The best place to shear is on the grass but in the shade, if a warm day. If shearing inside, a clean floor is best. Catch your sheep, set it on its rump with its shoulders against your knees and hold the head back under the left arm. Begin to open the fleece at the point of the brisket along the neck to the left ear and continue to shear the left side, working from the neck to the hind flank, allowing the fleece to fall back ahead of you. It will be slow at first around the neck but with experience you will get along faster. Have a sharp pair of shears. When the left side is done, clip the right in the same manner, down the neck and side, around the rump to the tail, until the fleece comes off in one piece. Lay the fleece on a clean floor, cut ends down. Throw the broken pieces into the centre. Fold in the sides and begin rolling at the head end. Tie with paper twine. Do not use binder twine.

DIPPING

Dip immediately after shearing. If you have a small tank, the flock may be done very easily, providing you fix up a small platform above one end of the tank so the dipped sheep may be held there for a while to drain

back into the tank. Otherwise you will lose a lot of the dip. A dipping vat, 16 inches wide, 4 feet deep and 10 feet long at the top will be found satisfactory if you want to fix up a regular vat. The end of this vat where the sheep go in should be perpendicular so they will be thoroughly immersed. The other end should be made on an incline with a raised bottom, thus enabling the sheep to walk out themselves. A small dripping platform should be placed at the end where the sheep come out to carry the liquid that drains from them back into the tank. Use any of the standard dips, available at almost any drug store, using as per manufacturers' directions. Dip the lambs as well as the ewes and repeat in 10 days.

LUNG WORM

While various remedies have been made use of for destroying lung worms, their value is exceedingly doubtful, as agents that are sure to destroy the worms are very likely to kill the sheep. It is true some benefit may be derived from such treatment but destruction of all the worms is rarely, if ever, accomplished, and so the patient remains a menace to the rest of the flock by contaminating pastures and fodder. As the meat of affected animals is not unfit for food, the slaughtering of the entire flock is recommended as soon as they can be made fit for the butcher, as the best means of dealing with the trouble. Disposing of the flock in this manner and buying a new healthy lot of ewes entails less loss than any other procedure we know of. Sheep should not be grazed on low or swampy lands nor permitted to drink from stagnant ponds. Infected pastures should not be used for sheep until a year at least has elapsed. It is also advisable to burn them over if possible.

GRUB IN THE HEAD

Gid in sheep is due to the development in the brain or spinal cord of a cyst having the appearance of a fish bladder. This bladder or cyst is filled with a watery fluid containing a number of white objects which may be as large as a grain of wheat. These objects are tapeworm heads and usually project into the fluid from the cyst wall.

When the brain of a sheep affected with gid is eaten by a dog or other animal of his kind (such as coyotes, wolves, or foxes), the cyst wall is digested and the tapeworm heads fasten themselves to the intestinal wall and develop into adult tapeworms. In a month or two they commence to give off segments containing hundreds of tapeworm eggs, which pass with the faeces and dropping on the pastures or water, are later taken in by the sheep. Having gained the body of the sheep the larvae migrate through the tissues until they reach their final resting place in the brain where a bladder worm develops.

When the embryo first reaches the brain slight restlessness and fever may occur, but these signs generally pass unnoticed and it is not until eight or nine months after infection that pronounced symptoms of disease appear when death usually follows within a short time.

The symptoms exhibited depend upon the location of the bladder worm in the brain. Some animals turn continuously to one side. Others go forward in a straight line, the head being carried high and often to one side. Sometimes the sheep starts forwards with a bound, but falls after taking a jump or two. Some are unable to rise. There may be total blindness. The symptoms may be mistaken for certain kinds of weed poisoning, but trouble from such a cause usually occurs during the summer months.

Treatment of such cases is of no avail. It is true that trephining of the skull has been employed, but the practical value of such an operation is negligible. The only remedy lies in prevention. Sheep's heads should always be burned or buried and in no case left to be eaten by dogs, wolves, or other animals. On the other hand, if all dogs and other animals affected with this form of tapeworm could be effectively treated or destroyed the disease in sheep would disappear, but such a method is, of course, impracticable.

BLOAT

Bloat may result from sudden changes of pasture and feeds, from over-eating on alfalfa pastures and from eating frozen rape and other green feeds.

The first stomach fills with gas, and unless relieved the animal dies from suffocation. If noticed in time the formation of gas may be checked and relieved. Raise the animal's head, tie a small stick between its jaws and give the following: 3 drams hyposulphate of soda, 1 dram ginger and one teaspoonful of turpentine, in milk or raw linseed oil. Should this fail to give relief, it will be necessary to use the trocar or, in cases of a emergency, a jack knife. The insertion is made on the left side half way between the last rib and the point of the hip bone, and two and a half to four inches from the middle of the backbone. Direct the point of the trocar or knifs downwards, forwards and inwards.

GARGET IN EWES

Garget may result from the lamb not taking sufficient milk, from over-feeding, injury or a chill. The udder becomes red and inflamed. The ewe is stiff on one or both hind legs, and as the disease develops, swelling takes place on the under side of the body near the udder. The udder turns a dark bluish red color, circulation stops and it becomes cold.

As soon as the disease is noticed the ewe should be milked frequently and given a purgative of 4 to 6 ozs. of Epsom Salts or one half to one pint of raw linseed oil. Every effort should be made to keep up circulation in the udder by rubbing it with turpentine and camphorated oil. The udder should then be wrapped in warm cloths and external heat should be applied from time to time. In bad cases it is advisable to apply a mustard plaster. The ewe should be fed lightly on loosening foods such as bran mash, roots and good hay. The lambs should be transferred to another ewe or raised on cow's milk. Garget is always more prevalent among flocks that are carried in fairly high fit throughout the winter months.

CONSTIPATION

Young lambs whose mothers are not getting sufficient succulent feed and older sheep that are being fed exclusively on dry feed, are often subject to constipation. Lambs become dumpy, refuse to suckle, and often show symptoms of pain, while others take fits or act strangely. Older sheep refuse to eat, the bowels have little or no movement and the temperature rises. Exclusive feeding on dry timothy hay is one of the most common causes of constipation in sheep.

Young lambs should be given an enema of soapy water. Repeat the enema until a movement of the bowels is effected. In stubborn cases a tablespoonful of castor oil may be given as well. The diet of the ewe should be made more laxative, and often a purgative of raw linseed oil will have a beneficial effect on the milk, thus correcting the tendency for constipation in the lamb.

With older sheep a purgative of one-half to one pint of raw linseed oil should be administered at once. Smaller doses may be given every four or six hours until the bowels move freely. The patient should be fed lightly on a laxative ration for a few days, when it may be brought back gradually to its full feed.

TELLING THE AGE OF SHEEP

Like cattle, sheep have no upper teeth in the front of the mouth, but have eight teeth in the lower jaw at the front of the mouth. A lamb will have eight temporary teeth, which may be readily distinguished from the permanent set. The temporary or milk teeth are small and narrow, being practically the same size at the top of the tooth as where it joins the gums. The permanent teeth are broad and widened considerably at the top. This gives them a chisel-shaped appearance,

distinctly different from the shape of the temporary teeth.

The age of a sheep is known by the order in which these permanent teeth displace the temporary ones. They come in pairs, the first pair being the canines two that appear when the sheep is one year old. The next pair, that is, one on each side of the centre pair, appear the following year, and that is when the sheep is two years old. The third pair appear when the sheep is between two and three years old, and the fourth pair when it is between four and five years old. After this age such characteristics as discolorations of the teeth, worn edges, loose teeth, broken teeth or missing teeth would indicate that a ewe was getting past her period of usefulness. Accompanied by these indications would be a general shrinkage in weight when compared with younger ewes.

WHY CASTRATING PAYS

1. Castrated lambs are not as restless as ram lambs and attend to their business better which is getting fat and ready for the block.
2. Wethers are easier to fence and herd on the farm.
3. Wethers do not annoy the ewe and ewe lambs in the flock. The wether lambs can be left in the ewe flock without danger. Ram lambs must be separated or breeding will take place.
4. On the same feed and under the same conditions wethers will grow bigger and fatter than ram lambs.
5. If the market in the fall drops and becomes dead, the wethers may be carried over, but the ram lambs must be sold at any price.
6. Finally and most important, wethers sell at a premium above ram lambs on the market.

FLUSHING EWES

Flushing consists in giving an extra allowance of nutritious, highly palatable food for two or three weeks before the desired date of breeding, so that the ewes will then be rapidly gaining in flesh. Several advantages result from this practice. Not only is the ewe which is bred in a thrifty condition more certain to produce a vigorous lamb, but she is a more reliable breeder and more likely to drop twins. The flock will all breed within a briefer time if flushed, thus shortening the lambing period with its anxious hours. It has been found that ewes suckling twins lost no more flesh than those with one lamb, and that twins made as rapid gains as singles; hence the advantage of twins under favorable farm conditions. On the range, where but little attention can be given to the individual ewe, single lambs have given the best results. The average farmer has not got a real good pasture at this time of year to turn them into, so he must do most of his flushing by feeding a small grain allowance. A little oat chop morning and evening will put the ewes in thrifty shape for breeding.

MARKING SHEEP

There are two ways of marking sheep in the ears—by ear tags and by notching the ears. In the cut A shows the proper position of the ear tag. The ear tag is inserted by means of a special punch which can be bought from manufacturers of ear tags. The same punch can be used for notching the ears according to the plan shown in B. This plan permits numbering from 1 to 99 without requiring more than two notches in the same ear. In figure C is shown the tattoo method of marking sheep. This is the most certain means of numbering and identifying. Equipment for tattooing can be bought from houses dealing in live stock supplies.



Method of Marking Sheep in the Ears

SWINE: BREEDS AND MANAGEMENT

There are seven breeds of swine common to this country and two or three that are raised in a limited way: The breeds divide naturally into two classes—lard and bacon. The lard hog is a thick, fat hog; the bacon hog is a longer leaner pig, smoother and trimmer. The principal breeds of the lard type are Poland China, Chester White, Duroc Jersey and Hampshire. The principal breeds of the bacon type are the Yorkshire and Tamworth. The Berkshire is both a lard and a bacon hog, there being two distinct types of the breed. The other breeds mentioned here are of relatively small importance.

The following description of the different breeds of swine will give at least a general idea of the fitness of any one breed to particular conditions and requirements, giving information as to origin and popularity.

BERKSHIRE

The Berkshire was originated and developed in England and was bred there many years before being imported into this country. The Berkshire is a very attractive animal in appearance and is a little above medium size. The color is similar to the Poland China, black with white on the feet, face, and tip of tail. An occasional small splash on the foreleg is not regarded as objectionable, although a large white spot on the jaw, shoulder or other part of the body is regarded by most breeders as objectionable.

The face is medium in length and sharply dished. The ears are erect or slightly inclined forward. The



Ber's-hire

Berkshire has good width and depth of body. The back is broad with good spring of rib and good thickness through the rump and hams. A common fault is that the tail is not set high enough, the rump sloping too rapidly. Representatives of this breed generally stand well on their feet and possess strong, clean bone.

The Berkshire is well adapted for bacon production, although sometimes the shoulder is too heavy and the side lacks the desired length for prime bacon sides. The early-maturing qualities of this breed are good. Generally the sows are more prolific than the Poland Chinas and somewhat less so than the Duroc Jerseys and Chester Whites. The Berkshire also ranks high as a grazer. The meat of this breed is of prime quality and the lean and fat are well marbled.

The boars are prepotent and impress their characters upon the offspring to a marked degree. Pigs of this breed at one year old should readily weigh 300 pounds. In breeding condition mature males should weigh about 500 pounds and sows 400 pounds.

DUROC JERSEY

The Duroc Jersey swine were first bred in New Jersey and other Atlantic States. This breed from its early days has been noted for docility, fecundity and hardiness. During the last two decades the breed has been improved in quality, ease of feeding and early maturity, and has equal favor with the Poland China.

The Duroc Jersey is similar to the Poland China in size and conformation; in fact it has often been called facetiously "a red Poland China." The ears break one-fourth to one-third from the tip, the face is slightly dished, the snout is of medium length, and the shoulders and hams are heavily fleshed. The legs are short and the bone is good. Cherry red is the popular color, but as the hogs grow older the shade becomes darker. Sandy red is objected to by most breeders. Duroc Jersey sows are more prolific than Poland Chinas or

Berkshires, and they are also conceded to be better milkers and mothers. The Duroc Jersey is also one of the best grazers. As an early maturing hog it ranks high, and crosses well with other breeds, but the



Duroc Jersey

Berkshire and Poland China crosses seem to be the most popular. At maturity a boar should weigh about 600 pounds, a sow 500 pounds.

CHESTER WHITE

The Chester White hog originated early in the nineteenth century in Chester County, Pa. The breed is now widely distributed. The Chester White is moderately long, thick and deep, possessing strong bone, but somewhat loosely coupled. The original Chester Whites were dished slightly in the face, but the dish has disappeared, and the present day animals possess straight faces with rather long snouts. The ears droop about one-third the distance from the base.

In conformation the Chester White is long but not so deep in body as the Poland China. The legs are short but some individuals may lack strength in the pasterns. The color is white and the hair has a tendency to be wavy. Black and bluish spots on the skin are not uncommon, but breeders aim to prevent them as much as possible. The sows rank high in point of fecundity, and are exceptionally good mothers and milkers. The Chester White crosses well with almost



Chester White

any breed, but to obtain the best results they should be crossed on pigs possessing superior bone and feet. As a feeder the Chester White ranks high and the quality of its flesh is good. Mature males in fair flesh weigh 600 pounds and sows about 450 pounds.

HAMPSHIRE

The Hampshire originated in the English county of the same name. This breed is sometimes classed between the fat or lard hog and the bacon type, but most breeders consider it as belonging in the former class. The most characteristic feature of the Hampshire is the white belt around its body, including the shoulder and front legs, while the rest of the body is black, some individuals being entirely black. The most popular color, however, consists of black with a white belt from four to twelve inches wide encircling the body and including the forelegs.

The Hampshire in general appearance is rather upstanding on legs that are fine-boned but of good

quality and strong, with strong and upright pasterns. The body is not very broad, but deep; the jaws are light, the head small, the snout rather straight and medium in length. The head is narrow, the ears set



Hampshire

close and extending forward, but not breaking. The shoulders are smooth and well set, the back is strong and arched, the hams are deep and broad, but not very thick. In quality the flesh of the Hampshire has a very high reputation.

The Hampshire possesses good early maturing and feeding qualities, and the sows are prolific; the breed is also a good grazer. Owing to the fact that the Hampshire has only recently come into prominence, its value for cross-breeding is not well known, but it seems reasonable to suppose that it should cross well with fat types of hogs. In breeding condition mature males should weigh 600 pounds, mature sows about 500 pounds.

TAMWORTH

Of all breeds the Tamworth is probably the purest. There is no evidence of its having been crossed with any other breed. In general outline the Tamworth is long, smooth and fairly deep, having a moderately light fore end and deep ham. The snout is rather long and



Tamworth

pointed, the neck is light and muscular, the jaws are light, the ears are large and usually upright, but often inclined forward. Although the legs of the Tamworth are long, they are strong and the pasterns erect.

The color is red, varying from light to dark. A "golden-red hair on a flesh-colored skin, free from black" is preferred. Tamworth pigs do not mature early. The bacon is of exceptionally fine quality, well mixed with lean and fine grained. The Tamworths are good rustlers. The sows are more prolific than those of the lard breeds, and the boars are very prepotent. A mature boar in good condition should weigh about 650 pounds and a sow 600 pounds. Many individuals weigh more.

YORKSHIRE

The Yorkshire is a white breed of English origin. Black spots on the skin do not disqualify, but the aim of the breeders should be to reduce them to a minimum. The presence of black hairs is regarded by authorities as sufficient to justify disqualification.

The conformation is typical of the bacon hog in general; that is, upstanding, comparatively narrow, deep and long, with light shoulders and hams. The back is slightly arched, and the ribs well sprung. The

underline and sides are trim, straight and level. The body is supported by well-placed legs of medium length. In Denmark, England, Ireland and Canada, where raising of pigs for bacon is an important industry, the large Yorkshire with its crosses is the most common breed used.

The large Yorkshire boar is very valuable for crossing upon breeds which are fine in bone and lacking in size



Yorkshire

and fecundity. Large Yorkshire sows make good mothers, and the boars are exceptionally prepotent. A mature boar in good condition should weigh net less than 700 pounds and a mature sow 600 pounds.

POLAND CHINA

The Poland China hog originated in Ohio. At present there are two distinct types in this breed the large type Poland China, which is a large, prolific heavy-boned animal, and the highly refined quality strain or show-ring type. The aim of many breeders for a number of years has been to develop quality, early maturity, and smoothness of fur. Some of them, however, have recognized that this type of Poland China was being produced at the expense of size and fecundity. The Poland China of early days was a large rugged, prolific, spotted hog, and, except for the color, breeders of the large type are simply holding to early standards. They have disregarded the fancy type and are breeding hogs which have size and fecundity.

In general appearance the Poland China is compact, symmetrical, full and round, smooth and inclined to massiveness in build. The color is black with six white markings—the face, feet and tip of tail. The face is practically straight and the ears droop over about one-fourth to one-third from the tip. The body is smooth throughout, with thick, broad, heavy sides, which are somewhat short, but very deep. The hind quarter is thickly fleshed, and the hams are very wide and deep, extending well down on the hocks. The legs are short and the bone fine. Poland Chinas stand remarkably well on their feet. A broken down pastern is exceptional in this breed.

Poland China is not surpassed by any breed in producing a finished carcass at an early age. The meat



Poland China

of the Poland China finds ready sale on the market but it has been criticised for carrying too much fat in proportion to lean.

Poland China pigs fed for market may be made to weigh 200 pounds or over at six months. At one year

old males should weigh about 300 pounds, and sows 250 to 275 pounds. In breeding condition at maturity males should weigh about 600 pounds and sows 500 pounds.

MINOR BREEDS

The breeds above mentioned are the chief breeds produced in this country. However, in addition there are several other breeds which have been raised to some extent or in which a few breeders are interested, breeds such as the Mule-foot, Cheshire, Essex, Small Yorkshire, Victoria and Large Black. The first-named of these, the Mule-foot, enjoys some popularity in the United States on account of the claims made by the breed's promoters that the Mule-foot is immune to cholera. It is not believed to be immune, but has gathered to itself some supporters on the reputation that it is. The chief characteristic of the Mule-foot is the solid hoof, like a mule or horse. The breed is said to be gaining ground in the United States and to be a very good hog in many ways. So far as known, it is not represented in Canada.

The Cheshire is an intermediate type of hog. It is neither lard nor bacon, but between the two. The breed developed in New York state some years ago but has never gained a very wide popularity. The color is white, the head of medium length, the face slightly dished, the ears are small, fine and stand erect. The body is of medium width, depth and length. Cheshire meat enjoys a good reputation. The lean and fat are well mixed and the meat well marbled. The sows are fairly prolific and the boars prepotent.

The Essex is an English breed, originating in the county of Essex. In England the breed is often spoken of as the Small Black or Black Suffolk. It is one of the small breeds, being smaller than the Berkshire or Poland China. The color is entirely black, no white being permissible. The head is short and the face slightly dished while the ears are small, fine and carried erect. The Essex is a short, thick, deep, chunky type of hog with short, fine-boned legs. The meat is fine and of good flavor, but possesses a tendency to excessive fatness. The chief defect in the Essex is its lack of size, a defect likely to prevent it from enjoying much popularity in this country.

The Small Yorkshire, or Small White as it is known in England, is an English breed. It is the smallest breed of swine raised in America. The head is remarkable. The snout is very long and turned up, the face is wide and small, the ears erect, the jaw heavy and the neck very short. The body is short, thick and deep and the bone fine in quality. The color is white and the hair abundant and fine. This breed is very slightly bred anywhere. Some few herds at one time existed in the United States, but the larger breeds have all but replaced the Small Yorkshire in America. The breed is dying out in England.

The Victoria is an American breed, white in color and of medium size. It has a rather short head and a medium dished face, ears small and carried erect, shoulders and hams thick and full, with good length and depth of side. The quality of the meat ranks high; the breeding qualities are also good. The breed is not growing in public favor.

The Large Black is a rather old breed of English origin. It is large, coarse and all black in color. The ears are large and decidedly drooped. In general conformation it approaches the bacon type. In England the Large Black enjoys some reputation for its bacon qualities. It is not a handsome pig and has never been raised in this country to any extent, although farmers in England consider it a first class breed. The sows are prolific and excellent.

SOWS EATING PIGS

Occasionally a sow will be found which will eat her pigs. It is claimed by some that the tendency to eat their young is sometimes caused by allowing sows to eat their afterbirth. As a precautionary measure, the afterbirth should be promptly removed from the pen. There is little doubt that the trouble is generally caused by a fevered condition in the sow, often induced by injudicious feeding before farrowing, or even after farrowing. A remedy that has been suggested is to feed the sow salt pork, but the danger is that if the sow has eaten her pigs she acquires the habit and is likely to do it again. Unless she is a very valuable sow, it is safer not to give her a second opportunity,

but to turn her into the feed lot and fatten her for the butcher.

CASTRATING RUPTURED PIGS

Pigs ruptured in the scrotum may be easily castrated, as follows: Have an assistant hold the pig up by the hind legs. In making this incision, cut only through the skin of the scrotum, being careful not to cut the membrane or sac which envelops the testicle. Then draw out the testicle enclosed in its membrane and, at the same time, work the testicle back into the body of the pig. With the pig held as described, the testicle will go back to its place with little or no assistance. Having drawn out the testicle far enough tie a strong string firmly around the ear of the testicle (including the membrane), and then cut away the testicle (enclosed in its membrane) just outside of where the string is tied. Leave the ends of the string three or four inches long, so that they hang outside the wound. If the string does not come away in a couple of weeks, it may be pulled out.

If the rupture is only on one side, the remaining testicle may be removed in the ordinary way. The scrotum should be washed with disinfectant before any incision is made. The hands of the operator and his knife should also be washed with disinfectant, and the string should be soaked in disinfectant before it is used. The incision in the scrotum should extend well downwards to facilitate drainage from the wound. These simple precautions assure success.

BLACK TEETH IN PIGS

Some people have the idea that black teeth in a pig's mouth amount practically to a death warrant for the pig. As a matter of fact it is doubtful if any more pigs have succumbed to black teeth than cattle to another malady termed "hollow horn" that years ago used to ravage the herds on the back concessions of Ontario. Most pigs have a black tooth or two, and most cattle have hollow horns, hence it is comparatively easy to have an outbreak of either "disease." The condition known as black teeth in young pigs, is merely a discoloration of the pre-molars, or the first temporary cheek teeth. Their presence does not injure the health of the pig. Where a number of young pigs have black teeth and not thriving well, the cause is usually due not to the presence of the black teeth, but to malnutrition and unthriftiness, due to the lack of sufficient essential nutritive elements in the diet. This can usually be remedied by feeding more nutritive and concentrated diet and by the use of digester tankage, to supply bone and flesh forming elements.

HOW MUCH GRAIN TO FEED SOWS

Swine producers have always differed widely in their methods of summer feeding pigs. Some advocate a very scanty grain feed along with a suitable pasture, others a more liberal allowance; and still others are staunch believers in the self-feeder or free-choice system. As one would expect, pigs fed to capacity on grain will eat but little pasture, and so make their gains largely on the concentrates, while pigs on pasture and a light feed of grain make the maximum use of the forage crops. What the swine grower wants to know then is, with feeds at present price, will it be advisable this summer to feed very little grain to pigs on pasture; would you recommend a fairly liberal allowance; or would it be even more profitable to self-feed?

With a view of securing some definite information on this question Prof. A. A. Dowell and J. E. Lattimer, of the University of Alberta carried on a very interesting experiment last summer with 160 pigs. They included both the bacon, the medium thick and the lard types. Certain lots were put on self-feeders with pasture, other lots were fed all they would clean up twice daily with pasture, other lots were fed 3 pounds of grain per day per 100 pounds live weight on pasture, others 2 pounds of grain per day per 100 pounds live weight on pasture, and still other lots got 1 pound of grain per day per 100 pounds live weight on pasture. It was found that pigs on self-feeders and with access to pasture would eat about 4.5 pounds of grain per day for each 100 pounds of their live weight, that when fed all they would eat twice a day on pasture they consumed 4 pounds. Thus those getting 3 pounds per day per 100 pounds of their live weight were actually getting three-quarters as much grain as they

would have consumed if hand fed all they would eat twice daily, those getting 2 pounds were getting one-half, and those getting 1 pound were getting one-quarter of what they could eat if on full feed twice daily. Thus the results should show whether it is best to use a self-feeder on pasture feed all they will eat twice daily on pasture, or to what extent a farmer could profitably cut down the grain ration forcing the hogs to utilize pasture.

The results of this experiment showed that if the labor costs are not excessive it is most profitable to provide the young growing pigs a succession of good pasture crops and feed about three-fourths as much grain as would satisfy their appetites, than to give them all they would eat twice daily, or to use a self-feeder on pasture. Full feeding twice daily on pasture proved more profitable than self-feeding on pasture, although the difference is not great and if the cost of labor were taken into consideration the results might be in favor of self-feeding. The cost of feed, which usually comprises about two-thirds of the entire cost, was the only cost taken into consideration.

KEEPING PIG RECORDS

On a farm where swine are raised for purely market purposes and where the number of sows is small there need be no identification of the stock. The feeder

knows his animals and even when mistakes are made they are of relatively small importance. But where large herds are maintained or where pure-bred stock is bred, there is necessity of some method of identifying the individuals. It enables the careful breeder to tell the ancestry of any member of the herd, which is a self-evident advantage in the selection of breeding stock. The clerical end of record keeping need not be discussed, but it is well to mention a few methods to identify the animals. No practical method of branding hogs has been devised. Some breeders use ear tags marked with different number, but these tear out very easily and become lost. They are also subject to the objection that it is impossible to mark pigs by this method at birth. No system is free from defects, but one of the most satisfactory methods is to mark by means of ear cuts or notches, each of which represents a number, and by combining them any number from 1 up can be designated. These notches can be cut at the time of birth, and unless the pig has an ear mutilated in fighting, they usually remain permanently. The following is a key to a simple and effective method of notching pigs so as to be able to record their breeding. All pigs in the same litter should have a common litter mark. Keep a record of the mark and the sow's identification, and her pigs can then be selected at any time.

WINTER SHELTER FOR SWINE

The "A" Type Colony House

The accompanying photograph (Fig. 1) shows the "A" type colony house prepared for winter use. This is one of the oldest of the movable types. Houses of a good type are made of 2 in. by 4 in. studs covered with 1 in. siding, 2 in. plank floor, and placed on skids for moving—the inside dimensions being 6 ft. 6 in. by 9 ft. base, and height of 7 ft. This gives sufficient room to winter comfortably 3 to 5 hogs, depending on size. During the winter of 1916-17 they were left without additional protection—simply well bedded—and it was noticed that several sows suffered from frostbites during periods of extremely low temperatures. To avoid this for the following winter they were protected as indicated in the photograph. The houses were placed four feet apart, facing south, and a log enclosure set two feet from the west, north and east sides, and simply closed in between on the south. This enclosure was then filled with straw so that it came well up on the sides of the buildings. Any number of houses could be lined up in this way. For the open prairie sections it would be advisable to use stakes and woven wire for the enclosure instead of poplar poles as in the bush country. These houses proved to be warm and comfortable at all times; they have sufficient height to facilitate the cleaning out process, and are provided with proper ventilation to insure uniform temperature. Ventilators which will be noticed at the upper end of the buildings are made by leaving a 6-inch opening at the end when boarding up, then boarding down for about 14 inches on the

outside of the framework so that an opening is left between for the movement of air. At no time during the winter did frost collect on the walls, so the buildings were always dry and airy.

For early spring use the straw packing is removed, house faced to the east and the side, then to the south, being hinged, is propped up to allow thorough sunning during the middle of the day. For the summer months these buildings are faced to the west so that the hinged side can be propped up on the north and give added shade. They provide excellent shelter for the brood sow and litter during the spring and summer months.

The "A" type colony house is easily moved, durable, readily cleaned and disinfected in case of an outbreak of disease and convenient for winter or summer use. For the man who wishes something of a rather attractive and permanent nature, it will prove very satisfactory.

Iowa Gable Roof House

The Iowa gable roof house has the advantage of perpendicular walls which allow utilization of entire floor space during the winter. It is doubtful, however, if this advantage holds good during the farrowing period, for feeders must then be added to prevent sows crushing the new born pigs. They are made of 2 in. by 4 in. studs, 1 in. siding, 2 in. plank floor, placed on skids for moving, and have the inside dimensions of 6 ft. by 8 ft. base and 4 ft. 4 in. height. Roof doors are provided, so that it is possible to flood the house with light at the time of year the young pigs need it most. If desired, the perpendicular sides may also be hinged so they can be propped up for shade during the



Fig. 1—"A" Type Colony House



Fig. 2—Iowa Gable Roof House

summer. There is an upper ventilator door at either end of the building which is intended for opening or closing as occasion demands.

Fig. 2 shows the Iowa gable roof as prepared for winter use. They were placed facing south and packed with straw as previously described. The low ceilings made cleaning somewhat difficult, and apparently did not allow sufficient air space above the animals. The ventilator doors proved very unsatisfactory, under local climatic conditions, for if open they allowed a constant sweep of cold air over the pigs and if closed it became close and stuffy. During the cold snaps a little frost collected on the walls and ceiling, with the result that the buildings were a trifle damp and musty during periods of higher temperature.

As the name would indicate, the Iowa gable roof house was planned for use in a warmer climate. Its chief value in this locality as designed, is for spring, summer and fall use. With a little modification, however, it is felt that it would give as good satisfaction as the form previously discussed, and, with fenders removed, have the advantage of increased floor space. It should be made at least one foot higher to give increased air space above the hogs and the ventilators changed to something like that described in the "A" type. The addition of windows ran the cost of construction somewhat higher than the plain "A" house, but may be omitted if desired.

Crate Colony House

A 6 ft. by 7 ft. plank floor is first made. The walls consist of four separate crates—similar to those used for shipping swine except that the top and bottom require only sufficient cross pieces to hold the framework secure. All crates are made 15 in. wide and from

3 ft. to 3 ft. 6 in. high, depending on the size of hogs to be housed. To enclose the 6 ft. by 7 ft. platform, which is placed with the long sides facing the north and south, the north crate should be 9 ft. 6 in. long, so it will extend the width of the crate beyond each side of the floor; the east and west crates to extend a like distance south of the platform should be 7 ft. 3 in. long; and the south crate need be but 5 feet in length to allow for the 2 ft. entrance. To avoid the prevailing winds in Alberta, Mr. Bailey prefers the south-west entrance. All crates are put in place, securely wired to the plank floor, and supports tacked across for the roof. Straw is then packed into the crates, the roof well covered, and the house is complete. If necessary, the entrance can be further protected by lashing a piece of bunk from the top and attaching a board at the bottom to carry it back in place as the hogs pass in and out. This 6 ft. by 7 in. house will accommodate 3 to 5 sows comfortably during the winter, and insure ample room for the individual sow and litter during the spring and summer months.

Fig. 3 shows crates in position and legs placed over the top for the roof. The construction is made plain by leaving the roof and south crate free from straw for this photograph. It might be stated that the object of placing the plank floor with the long sides to the north and south and then making the entrance in the south-west corner is to afford more complete protection from winds. By this plan the pigs are always assured of a good warm bed. ... could be more readily elevated as well as! ... nearly rain-proof by elevating the centre ... of the roof. We feel that the Alberta crate colony house is to be highly recommended for use in the west.

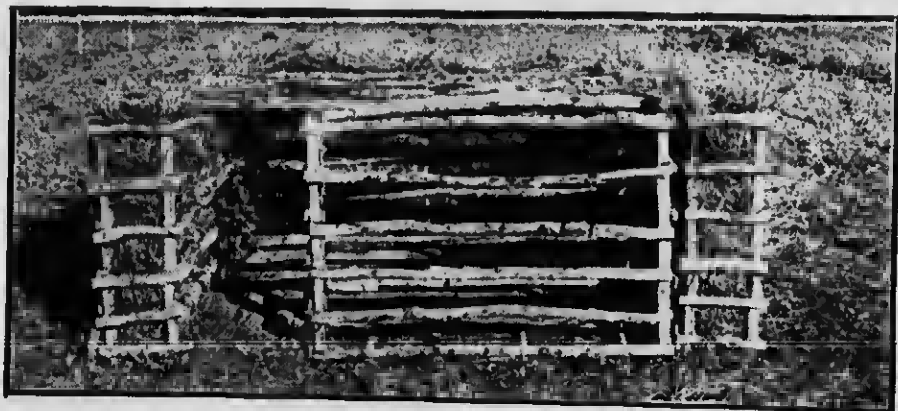


Fig. 3—Alberta Crate Colony House

Modified Crate Colony House

Fig. 4 shows a modification of the Alberta crate colony house in that it is stationary rather than movable. In this case a double pole wall—18 inches thick—was built around a 7 ft. by 8 ft. plank floor. Corner posts were first driven into the grounds, then poles



Fig. 4—Modified Crate Colony House

nailed in place for the walls to a height of 3 feet, and the framework completed by a log roof made with the centre poles raised about 12 inches to facilitate cleaning and to make it as rain-proof as possible. Straw was then tightly packed into the walls and the roof covered to a depth of one foot with the same material. It will be noticed that the entrance in this case was made in the centre of the south wall, but for simplicity of construction, if for no other reason, the center entrance is to be preferred. Considering economy of construction and suitability for winter shelter, this modified crate house proved one of the most desirable of any used in our comparison. It is to be highly recommended to all men who wish to keep the cost of equipment at a minimum. The crate walls can be made of poles in the bush country and cheap crating material in the prairies. Such a house will prove warm, dry, free from frost and well ventilated at all times. It naturally is not so permanent or attractive as a frame colony house, nor is it so well adapted to summer use, especially during continuous heavy rains, unless the roof is properly constructed and well covered. A visit to the house in question, however, after a continuous

three days' rain found the bedding dry and the pigs warm and comfortable.

1. Winter shelter for hogs should be neither too hot nor too cold, and above all dry. If too hot, the pigs come from their beds wet and steaming, with the result that they are subject to chills, rheumatism and the like. When too cold, much of the feed that should go towards body growth or fat is immediately used to maintain body temperature. In all cases wet bedding is to be avoided, for it is a sure forerunner of rheumatic troubles.

2. To allow efficient ventilation and prevent frost formation, the roof should be sufficiently high to give reasonable air space above the animals. If too high, the bedding will be too odd, and if too low, the result is wet bedding and steaming pigs. In the event that straw beds are to be used, see that the roof covering is not too deep—1 to 1½ feet is ample. Natural ventilation can then take place.

3. Movable colony houses have proved far more satisfactory here than any of the common large or small frame sheds. See that they are equipped with good working ventilators that prevent draughts but allow ready escape for foul air.

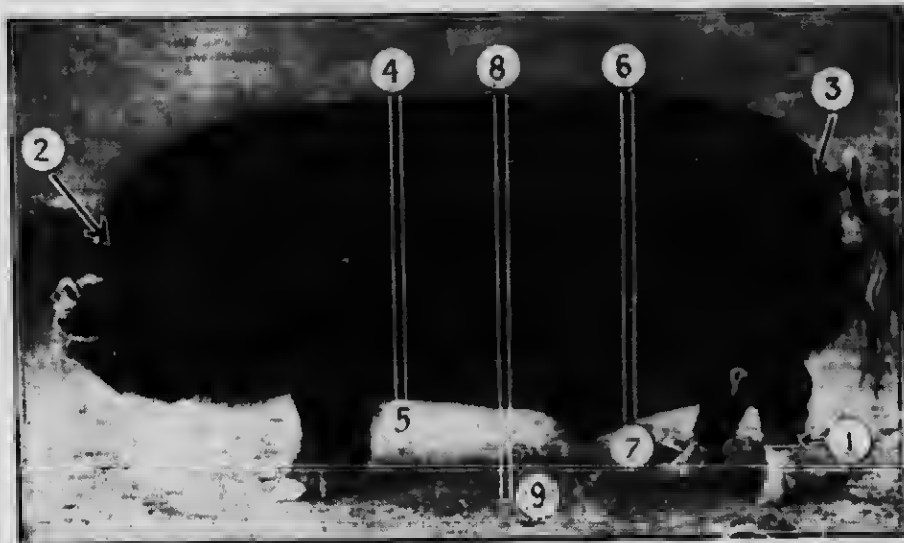
4. All winter houses to be used for farrowing purposes should be provided with a good floor, and, if large, arrangements be made to divide the space into compartments before the arrival of the pigs.

5. The Alberta crate colony house and the modified crate house will prove especially valuable in sheltering hogs comfortably and at little expense.

6. See that ample space is available and if necessary divide the herd into smaller groups to prevent losses through "giling up." This is especially important with the late summer or fall pigs.

MEASURING A HOG

This illustration shows the method of measuring bone in hog. Bone measurements are around the hind leg at the smallest part between the hock and the fetlock. Measurements for the other parts are from the head to the tail, with head down, taken from between the eyes to the root of the tail, from figures 2 to 3. This gives the length of the hog. Other measurements are as follows: Heart girth, 4 to 5; hock from 6 to 7; height from the middle of the back to the floor, figures 8 to 9. Figure 1 shows point to measure bone.



Taking the Measurements of a Hog

SELF FEEDER FOR PIGS

The feeder is best placed on a platform that will remain clear during wet weather, and will be accessible to hogs at all times. It is best used when located in some kind of a hog pasture where they have access to green feed as well as to chop. However, it can be used in a dry lot without pasture.

Young pigs from ten weeks of age, onward, may be safely and economically fed by this method. Until this age is reached it is generally wise to feed them by hand, although experiments have proven that even sucking pigs may be benefited by the feeder. Shoats of all ages, in fact all pigs, to be finished for market, may be profitably self-fed. However, it is not wise to use a self-feeder for brood sows, particularly as farrowing time approaches.

The following describes briefly the construction of a home-made self-feeder. Changes in the details may be suggested by the ingenuity of the builder. The line-drawing shown, illustrates a feeder with one-half of the roof hinged and used as a filling door, the possibility of leakage being prevented by continuing the opposite side several inches past the peak, thus protecting the joint.

Brief Specification

Base—The structure rests on three pieces of 2 by 4, on edge, as shown.

Walls—The walls consist of three 2 by 3 inch studs on each side, covered inside with 3/4 inch tongued and

grooved boarding. On top of the studs is a 2 by 3 inch plate. The boarding should start at 5 inches above the floor of the troughs and a gate, or feed-control board, 3/4 inch by 10 inches in width, the full length of the feeder, slides behind the boarding. This gate may be fastened at any desired height by thumb-screws, sliding in a vertical slot on the outside face of the boarding. Connection between control board and thumbscrew is made by two iron straps, 1 inch by 3/4 inch.

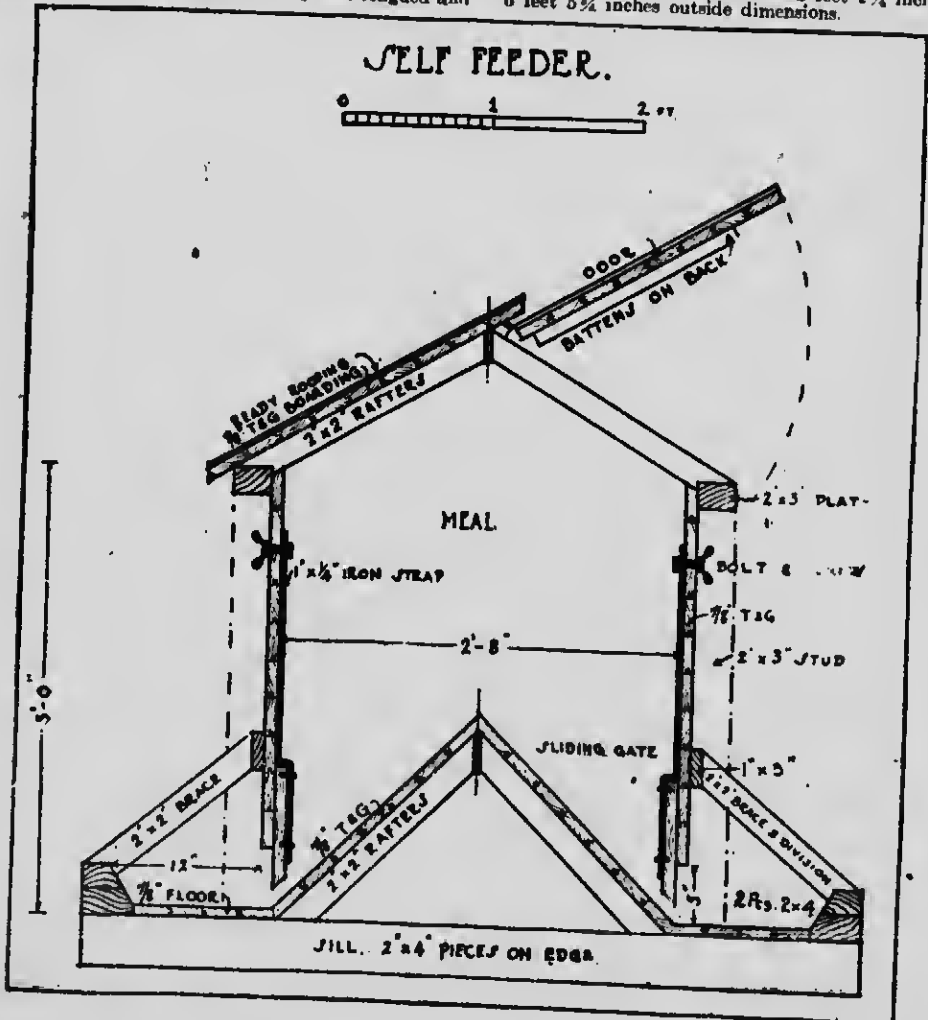
Floors—The floor of the bin consists of 3/4 inch tongued and grooved boarding laid on 2 by 2 inch rafters at 45 degrees. The floor of the feed troughs is 3/4 inch tongued and grooved boarding, laid across the 2 by 4 inch base pieces.

Feed Troughs—The front of the feed trough consists of one piece 4 inch by 4 inch (two 2 inch by 2 inch) bevelled from the centre down to the flooring. From this front are placed 2 inch by 2 inch braces, 12 inches apart, running up to a 1 inch by 3 inch piece laid along the sides.

Roof—The roof consists of 2 inch by 2 inch rafters resting on the 2 inch by 3 inch plate and covered with 1 inch tongued and grooved boarding and ready roofing.

Door—The door, which is made of 3/4 inch tongued and grooved, with 1 inch by 3 inch battens at back, should be equipped with hinges and handles for lifting and should have a prop to keep it open.

Dimensions—The structure is 3 feet 1 3/4 inches by 6 feet 5 1/2 inches outside dimensions.



THE FEEDING OF SWINE

In the consideration of feeds for the production of cheap pork, choice is largely influenced by locality, season and local conditions. By these factors economy of purchase or production is governed, provided the food is palatable, easily digested and nutritious—essential in any successful ration. The complete ration must, further, be properly balanced, compounded of a variety rather than one or two constituents, and above all things contain some succulent food, winter or summer. To the latter or natural class of food largely depends the continued health of swine. It is essential in the feeding of breeding stock.

The Stock Boar

Supply a pasture of clover, alfalfa, or fine grass with water and shade for summer feeding. If no pasture is available, supply fresh green food liberally, clover, alfalfa, grass, green peas and oats or weeds as lamb's quarter, pig weed, dock, etc.

Alfalfa or clover hay fed dry, in racks is suitable in winter. Roots such as raw mangel or sugar beets, pulped; cooked potatoes and turnips, 5 to 10 pounds daily; or in the absence of roots, clover or alfalfa hay, cut fine and soaked or steamed.

If skim milk, buttermilk or whey are available, supply at rate of 3 to 10 pounds daily as needed the year round. The meal ration may be made up of ground oats, ground barley, bran and shorts in any combination of two or more, fed at the rate of 2 to 5 pounds per day, as needed. Use judgment in feeding the boar. If overfat, he will prove a poor or uncertain stock-getter, indifferent and sluggish at service. If too thin, he will transmit to his get, lack of vigor and vitality and poor condition generally.

The importance of exercise cannot be overestimated. Supply a roomy, shady pasture in summer, not a filthy fly-infested pen or corner. In winter, arrange a paddock out-of-doors, close to the barnyard. If convenient give him the run of the yard for a few hours. As a shelter use, the year round, a cheap, portable, single-boarded cabin, about 6 feet by 8 feet. Supply lots of bedding. By feeding and caring for as outlined, crippling and rheumatism, so common in boars, will be avoided.

The Brood Sow

In summer pasture the same as advised for boars; in winter roughage same as for boars. Meal mixture of bran two parts, shorts one part, except when nearing farrowing time, when the mixture should be of equal parts. If necessary ground barley or oats might replace either. Avoid corn in more than one-quarter the ration. For the breeding sow it is debilitating and over-fattening. Feed meal at the rate of 2 to 4 pounds as needed.

Bring the sow into good condition before breeding. Maintain this condition after breeding. Avoid over-fatness with the ensuing troubles—difficult farrowing, small, weak and dead pigs. Too thin condition, particularly with the young sow, may permanently injure, in any case will likely mean small, thin pigs, a high percentage of runts and small milk secretion. The in-pig sow must receive a cooling ration tending toward a laxative nature. The ration above advised qualifies in this regard. Constipation at this time makes very certain, serious trouble with the litter—small unthrifty, poor-doing pigs, due to constipation in both themselves and their mother. Such litters dwindle rapidly with no perceptible cause.

Exercise is equally as important as with the boar. With the exception of that period spent in the farrowing pen, house the brood sow outdoors the year round in a portable cabin, 8 feet by 10 feet, placing four or five sows in each cabin. Choose a dry site. Make the sow work to obtain feed. This has an unfailling influence on the vigor, size and numbers of the coming litter, and lessens liability to rheumatism and crippling.

Avoid exciting the sow during or after farrowing. Always be present at this time but give only such attention as may be required; no more. First feed should be a tepid slop of middlings. During the first ten days gradually increase ration to maximum. Particularly avoid over-feeding, causing scours and thumps in little pigs. Feed the sow for milk production such rations as ground oats, middlings, (equal parts), or ground oats, bran, shorts (equal parts), both combinations with milk products. In summer allow

green feed or pastures only after pigs are two weeks old. In winter, feed roots, clover hay, etc., to keep functions healthy and blood cool. Empty a paiful of earth and wood ashes in a corner of the pen. When weaning cut down meal supply and remove young pigs for longer periods each day until the sow is dry. If pigs are over-fat, lazy and sluggish and the sow a heavy milker, force exercise.

Weaning Pigs

Teach the litter to eat three weeks before weaning. Use a creep which admits the pigs but not the sow. For best results milk products are practically a necessity with middlings. A few handfuls of dry grain scattered in bedding ensures the pigs taking exercise. Avoid over-feeding and make exercise necessary. Gradually increase middlings until weaning. If skim-milk is available, and two litters per year are anticipated, wean at six weeks of age; otherwise, wean at eight weeks.

After weaning start grain feeding as follows: Daily ration for the two to three month pig weighing about fifty pounds: 1 pound of a mixture of barley, 3 parts; shorts, 3 parts; linseed oil meal, 1 part, with 5 pounds of skim-milk daily. Soak for twenty-four hours and feed. If in pen, add to this some dry grain, oats or corn, scattered in litter. This is not necessary if pigs are on grass paddock. As pigs increase in age, gradually increase the grain to three pounds or more daily, as needed, increasing also the proportion of ground barley or oats in mixture, until at six months the ration consists of ground corn or barley, 6 parts; shorts, 3 parts; linseed oil meal, 1 part. Shelter the pasture or paddock fed pig either with a portable cabin or a light open-sided shed. Avoid, particularly, turning the weaned pig outdoors to a shadeless paddock. Sunburn, skin trouble, temporary and often permanent stunting ensues. Have natural shade if possible, and supply clean, fresh water.

Pastures

Compared to pen feeding, the pasture affords 5 to 25 per cent. cheaper gains. For growing breeding stock, pasture feeding provides for growth of bone and muscle and general vigorous health. For fattening and finishing pigs, firmer, better quality pork will result. With the latter class of stock, however, the range, must, of necessity, be more limited. Alfalfa forms the best pasture, with clover next. With both, however, avoid too close grazing. Rape and artichokes are best pastured in conjunction with clover or grass.

General Rules for Feeding

- (1) Never feed more than the pigs will clean up.
- (2) Make all changes in rations slowly.
- (3) Realize that the breeding pig is an out-of-doors animal.
- (4) Approximate outdoor conditions in the farrowing and feeding pen, i.e., supply fresh air, light, drainage, and above all avoid draughts and dampness.
- (5) Make exercise a prime factor with every class and age of breeding pig.
- (6) For economy and health see that green food, pasture, roots and well-cured roughage are part of the ration.
- (7) Remember that the pig is a poor patient and particularly difficult to treat. Strive to eliminate the causes of disease—prevent rather than cure it.

The Health of Swine

The following descriptions and treatments apply to several ailments already alluded to, such as are usually caused by faulty methods of feeding.

Constipation

This disease is to be particularly guarded against with pregnant and milking sows. It is caused by too little exercise, lack of succulents and bulky material, and too much concentrated feed in the ration. Treatment consists in removing the cause.

Give 2 to 4 ounces raw linseed oil, once daily, in slop, for mature animals. If no effect, give as drench, 4 ounces Epsom salts. Use laxative feeds, bran, oil meal, flax-seed, etc. Avoid drastic purgatives with the milking sow. Try to induce the desired condition through feeding cooling, laxative feeds.

Diarrhoea (Scours)

This is common and fatal with young pigs particularly. It is caused by over-feeding the sow after farrowing with rich feeds; sudden changes in feed;

use of decomposed or sour slop; nervousness and irritability in the sow. Change feed. Give 15 to 20 grains iron sulphate to the sow in slop, night and morning. Mix lime-water with slop, or supply where sow can reach it a mixture of iron sulphate, sulphur and salt (equal parts), with four times quantity of ground charcoal. Limit supply if sow is greedy. For young pigs give 2 ounces castor oil.

Indigestion

This disease is indicated by unbriftness, poor feeding, arched back. It is caused by over-feeding; feeding decomposed slop or swill containing injurious substances. Treatment consists in withholding all food for twelve hours; give 4 ounces castor oil; feed lightly on bran and shorts slop with green food or roots.

Thumps

Usually seen in young pigs. The symptoms are dullness; constipation or diarrhoea; short breathing with a peculiar thumping noise. The cause is disordered digestion due to too much concentrates in ration or too much feed in combination with lack of exercise.

Treatment is largely preventive. Provide exercise, forcing it where necessary in cases of heavy milking sows, by removing pigs to another pen for an hour or so daily. Restrict feed of sow. Apply those measures at first sign of over-fatness or sluggishness and thumps will not appear. With weaned pigs reduce concentrates, increase skim-milk and force exercise. In individual cases use castor or linseed oil. Difficult to treat.

Crippling

This disease is often confounded with rheumatism. Stiffness and lameness generally of hind legs. Animal lies most of time until walking becomes impossible. Finally refuses to come to trough. Appetite disappears and death ensues. The cause is strong food and too much of it; lack of exercise; damp quarters due to poor ventilation; wet floors; filth. Usually a combination of all.

Prevent by supplying right conditions. Exercise outdoors; feed as already outlined. If condition is advanced, force exercise, give 2 to 4 ounces Epsom salts in pint of water, repeated in twenty-four hours. Feed, in small quantities, milk, bran and shorts with roots or green feed. Give two tablespoonfuls, daily, of sulphur, Epsom salts and charcoal, equal parts.

Rheumatism

The symptoms are lameness, stiffness, pain and swelling in joints. The cause is damp quarters due to wet floors, filth or damp walls and impure air, the result of poor ventilation. Heavy feeding, in conjunction, complicates matters. Treatment is difficult in advanced cases. See treatment for "crippling." Give salicylate of soda three times daily in feed, 20 to 30 grains to the dose. Use liniments or blistering ointments on affected joints. Give dry quarters and plenty of bedding. Prevent, by adopting outdoor methods for all but fattening and very young stock.

Inflammation of the Udder

Milk two or three times daily. Give small dose of Epsom salts and feed on sloppy diet. Apply ointment as follows, kneading well: Extract belladonna, gum camphor, 1 dram each; vaseline, 3 ounces. Apply hot fomentations.

Parasites (Internal)

For intestinal worms, give turpentine, 1 teaspoonful for every hundred pounds, in raw linseed oil, as a drench, after having removed all food for at least twelve hours; or administer in slop. Follow by physic of Epsom salts. Prevent, by allowing pigs access to mixture of charcoal, wood ashes and salt.

Lice

Apply crude castor oil, crude petroleum, a mixture of raw linseed oil 2 parts, kerosene $\frac{1}{2}$ part, or fish oil 12 parts, creolin or coal oil 1 part. Disinfect and clean quarters, if infested.

To Drench a Pig

Use care. Go slowly. Back it into a corner, raising the head slightly. Attach a piece of hose six or eight inches long to a small, long-necked bottle. Insert

hose into pig's mouth and pour contents slowly. The pig chews the hose, receiving the dose naturally and lessening danger of choking.

MAKING KEROSENE EMULSION

Boil half a pound of soap in a gallon of water. When the soap is dissolved remove from the fire and pour into 2 gallons of kerosene. Thoroughly agitate the mixture for 5 or 10 minutes when it should have the consistency of cream. Dilute this solution with ten to twenty parts of water for use against lice.

DISEASES OF YOUNG PIGS

The successful pig raiser never figures much on giving medicine to sows or pigs. If the pigs are born right and handled afterwards as above suggested, there is not much danger of them going wrong. Fresh air, sunlight, dry quarters and fresh earth to root in, are the only pig medicines that the experienced breeder thinks of giving, but occasionally it is necessary to do more. Scours and thumps are the two most common diseases of the nursing pig. The scouring is due to the sow's milk, not agreeing with the pigs. A remedy is to give the sow 15 to 20 grains sulphate of iron (copperas) in her slop night and morning, and if necessary, slightly increase the dose until effective. Lime water may, with advantage, be freely mixed with the slop as a preventive when there is a tendency to derangement, or after the trouble has been checked, and it is also an excellent corrective for weaned pigs showing a tendency to scour on slop or skim-milk. Where little pigs are scouring severely, each may with advantage be given a raw egg and 5 to 10 grains of subnitrate of bismuth twice daily, in addition to changing the feed of the sow and mixing copperas in her slop. In cases which do not promptly respond to treatment, success may follow the administration of a dose of castor oil shaken up in milk. In all cases it is important to set right all errors in diet and sanitation, and to provide the pigs with dry, sunny, well-ventilated quarters. The derangement is always most apt to occur, and sure to prove disastrous among pigs kept in unsanitary conditions. Clean quarters, sunlight and outdoor exercises are the best preventives of disorders in nursing pigs. Medicine does little good.

Thumps is a disease due to the pigs being too well nourished. It is caused by disordered digestion. A great many young pigs die of the disorder every year. Treatment is mainly preventive and consists in providing exercise for the pigs. It is difficult to reduce the amount of feed they get if the sow is a good milker, but if, given an opportunity to exercise the trouble may be successfully combated. No medicine can be given that will cure thumps. In cases where exercising the litter is impossible on account of severe weather shutting the sow out of the pen for a couple of hours twice a day will usually stimulate the laziest of pigs to take considerable exercise. Thumps are easily distinguished in pigs by the jerking movements of the flank or panting. Very few pigs that contract the trouble survive and such as do are likely to be stunted and unthrifty. Treatment should be entirely preventive.

DISINFECTING BARN AND PREMISES

The first step to be taken is open up doors and windows, then remove all litter, manure and other refuse; the ceilings, mangers, and stalls should be swept clean. A disinfectant (any of the coal tar preparations) is to be mixed in the proportion of six ounces to each gallon of water. The mangers and feed boxes are to be scrubbed, followed by the sprinkling of the floors and stalls. This can be done with the aid of an old broom or a cheap spraying machine can be purchased from almost any hardware store. After the solution has dried all woodwork should be whitewashed, adding about four ounces of chloride of lime to each gallon of whitewash. This can also be applied with a sprayer, and is a very quick and thorough way of doing the work.

Pens and lots are first cleaned of all litter and the ground and fences sprayed as directed, followed by the whitewashing of posts and frames.

POINTERS ON CHICKEN RAISING

Chicks do not require anything to eat for the first thirty-six hours after hatching. Nature has provided enough for them up to this time. The first feed can be made of three parts of stale bread moistened in milk and pressed out and mixed with one part of a hard boiled egg cut up fine, shell and all. This should be fed three times a day. In addition, some grain should be fed. Small cracked wheat is as good as anything. Commercial chick feed is best, but it is usually pretty high in price. Pinhead or granulated oatmeal mixed with this small wheat makes a very good combination. Feed this two or three times a day, alternating with the stale bread as above. If milk is available, give them all they will drink. Feed it sweet or sour, but do not change from one to the other. The milk may cause looseness of the bowels, but this can be counteracted to some extent at least by feeding dry mash.

Feed-wheat, oats and barley, equal parts, finely chopped, will make almost an ideal mash for chicks from hatching time to maturity. A little granulated charcoal should be added. Little chicks will eat as much of dry mash as of anything else they can get. Feed it in pans so arranged that the old hen cannot scratch it out and waste it. Better put it under a small slatted run where no hens can get at it. Of course, there will be no troubles from outside hens if the chicks are reared away from the old hens, as they should be. A few shovelfuls of coarse sand should be thrown somewhere near the coops. This takes the place of grit. But few farmers seem to realize the real value of the dry mash, combined with buttermilk, as a drink. There is nothing like it for growing chicks. It should be fed in small, fairly low dishes with in a mesh wire lying in on top of the mash. Meat or table scraps may take the place of milk when milk is not available. All grain and dry mash should be hopped fed when the chicks are four weeks of age. Bread and eggs should be discontinued when the chicks are ten days to two weeks old. Whole grain should gradually take the place of the cracked grain, unless corn is used. This is better cracked than whole.

If the following suggestions are followed, the chicks are likely to get a good start, grow well, and be strong, vigorous and healthy:—

1. Give the first feed when the chicks are from 36 to 48 hours old; feeding too soon may cause bowel trouble.
2. Coarse sand or grit and green food should be within reach at all times. Grasses, weeds and sprouted grains usually furnish an abundance of green food.
3. Sour milk or buttermilk should be given from the start. These furnish the water required to make body growth, and the acid in the milk helps to digest the food. Buttermilk or sour milk is the cheapest flesh-forming food that can be secured.
4. Dry mash makes the chick grow, and helps to counteract the loosening effect of the buttermilk.
5. Wet mashes will help to make the chickens grow faster. Do not feed too wet or sloppy, as it will cause bowel disorder.
6. Free range will provide room for exercise and scratching, and will produce strong, healthy, vigorous growth.
7. Variety in grain and other foods will be relished by the chickens.
8. Mineral matter or ash is necessary for the growth of flesh and bone. The ordinary farm grains along with the insects and grains the chicks pick up will usually furnish mineral matter in sufficient quantity to produce good growth. Better results, however, can be obtained by feeding bone meal and beef scrap to get more flesh and bone growth. But under ordinary farm conditions, this is hardly practical, as the price of these special feeds is out of reach and too high compared with their food value.
9. Cleanliness in both the care and feeding of the chicks will prevent disease and lice.
10. During the first few weeks feed often and only a little at a time. Feed early in the morning and late in the evening to shorten the period between the evening and the next morning meal. Avoid over feeding.

LICE ON POULTRY

One application of sodium fluoride to all fowls on the farm will completely destroy all lice present. Sodium

fluoride may be applied as a dust or as a dip. One pound of the chemical will be enough to dust about one hundred hens by the pinch method. This method is as follows: Hold the fowl by the legs or wings with one hand while with the other hand a small pinch of the chemical is placed among the feathers next to the skin. Apply one pinch on the head, one on the neck, two on the back, one on the breast, one below the vent, one on the tail, one on either thigh, and one scattered on the underside of each wing when spread. Hold the chicken over a large shallow pan while dusting to recover the material that might ordinarily be lost.

CROP BOUND

Give the hen olive or castor oil all you can pour down her. Gently knead the crop with the fingers to mix the oil with the contents. Hold the fowl's head down and carefully squeeze the contents out through the mouth taking care not to strangle the hen while so engaged. If the hen is worth it, and the former method does not succeed, an operation may be performed. With a sharp knife open the crop at the top, insert a finger and scrape out the undigested lumps.

EGG EATING

This vice is largely due to the lack of shell forming material, lack of green food, lack of exercise and lack of fresh air. Soft-shelled eggs afford the provocation for this habit, and are also the result of the condition to be remedied. Supply the oyster shell required to make egg shells, and there will be but little trouble with soft shelled eggs. Supplying the other things lacking will usually produce harder shelled eggs, and then the hens cannot peck them open quite so easily. Also darken the nests. If these measures fail to break the habit entirely, then feed egg shells. By saving these in the summer, a supply can be had to meet this emergency in the winter. Leave them as nearly the appearance of eggs as possible. Do not crush them. Throw in a whole pailful at a time. Make the hens sick of the sight of eggs, and but little further trouble will be had. As soon as the hens get out of doors under natural conditions the trouble will vanish.

FEATHER EATING

This habit is due to a lack of meat food. It begins where there are a large number of idle hens together. The most common cause is a craving for raw meat. This craving is satisfied when they pick the new growing feathers out of a moulting hen. These contain a large amount of blood and soft material. Feeding raw meat every few days will usually stop the feather eating. Adding table salt to the soft mash will also check it somewhat. Some hens contract the vice so badly that it is difficult to stop them. In such a case, it is well to pare the hen's upper beak with a piece of glass far enough to draw blood. By doing this, the point of the bill is made so thin and soft that the culprit cannot get a firm hold for pulling out a feather.

TWISTED NECK

Twisted necks in mature fowl are caused by two things: Hard, rough and indigestible matter being taken into the crop, causing irritation and inflammation of the lining of the crop and gullet; or, second, by liver trouble. For irritation in the crop, hold the affected bird upside down, and work the crop so that the liquid will run out of the mouth. Then give a teaspoonful of Epsom salts or castor oil. Repeat the massage of the crop every day. Hard lumps in the crop indicate a gathering of this coarse, indigestible matter. A bird as badly afflicted as this one will be difficult to cure.

EGG BOUND

For hens that are egg bound inject a small quantity of sweet oil and endeavor to remove the egg by pressure. Sometimes it can only be removed by pricking the shell and allowing the contents to escape, after which remove the shell with the fingers. In aggravated cases the egg may break through the weakened tissue and escape into the abdominal cavity, in which case the bird should be killed.

ROUP

Roup, a contagious catarrh attacking the membrane lining the eye, the sacs below the eye, the nostrils, the larynx and the trachea. The disease is first indicated by watery discharge from the nostrils. In a few days this becomes thick, obstructing the breathing. The birds become listless and mopy, the wings droop and the head is drawn in to the body, while the birds show a decided loss of appetite. The inflammation, which begins in the nasal passages, soon extends to the eyes. The lids become swollen and glued together by the accumulated secretion. The rate of the discharge from the nostrils and eyes increases until they become completely closed, and the secretions become thick and cheese-like, producing swellings which continue to increase in size as the disease becomes more firmly established.

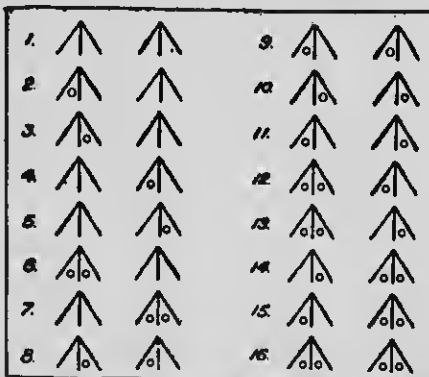
The course of the disease is usually of long duration. Where swellings occur about the head the case usually becomes chronic. Birds may become affected with the disease, but not at any time severely enough to be serious, yet may act as a carrier and source of infection to the flock at all times. Once introduced, it may remain in the flock for years.

Prevention is better than attempted cure. Be careful in introducing birds from other flocks. Isolate all sick birds, and aim to keep the flock as healthy as possible, thus rendering them disease resistant.

In case of infection, individual treatment is necessary and as the possibility of obtaining a complete cure is very slight, it is therefore not advisable to attempt treatment unless the bird is a particularly valuable one. Potassium permanganate may be used in the drinking water to help prevent the spread of the disease. Treat infected birds by immersing the head in a solution of potassium permanganate for twenty to thirty seconds. This should be preceded by a massage of the head applying pressure with the thumb and forefinger on the nostrils in the direction of the beak two or three times. If tumors are present, however, a cure is practically impossible.

TOE PUNCHING CHICKS

Punching a chick's toes is the simplest method there is for marking. There is a tendency for some of the toe puncher to grow up, so to make sure this does not occur it is advisable to go over the chicks a second time when about two weeks old, and any holes that show a tendency to grow up should be punched out anew. This second punch, if necessary, is almost certain to be permanent. The cut shows a combination of marks that may be used in toe-punching.



Method of punching a chick's toes; that is permanent and furnishes an easy means of identifying the birds.

RED MITES

Red mites live on the birds at night and during the day are hidden around the lower side and in the cracks and crevices of the roosts, in cracks about the nest, etc. Their habits suggest the means that should be taken for getting rid of them; treat the house rather than the hens. Spray the house well with a mixture of two parts of coal oil to one part of crude carbolic acid or senoleum. Apply with a sprayer, preferably. Be sure

to get the liquid well into the cracks around the perches, both on top, underneath and on the ends. One application per month will control the red mites. Whitewash will not kill them.

OBSTRUCTED GULLET

When a hen keeps its head turned to one side, never keeping the head straight it is a sign of obstructed gullet, either that or liver trouble. If liver troubled the comb will be dark and the bird lose its appetite. To relieve obstructed gullet work the crop with one hand being sure to manipulate well any section that shows thickening of the walls or undigested food inside. It is well, also, to pass the thumb and forefinger along the throat where the gullet lies, applying pressure from both sides. This treatment should be carried on after the bird has been starved and should be followed up by giving a dose of salts or a tablespoonful of castor oil. When the obstruction or irritation is further along the alimentary tract and inside the bird, it is almost impossible to effect a cure.

LEO WEAKNESS

Leg weakness occurs among chicks of the heavier breeds when they are being fed a heavy grain ration and are confined to small bare yards. Under these conditions the body puts on weight faster than the muscles are developed. The proper treatment is to remove the cause by giving the chicks free range on grass land; by cutting down somewhat on the amount of grain fed and by encouraging them to eat green stuff such as tender growing sprouts of grains or rape. If possible they should be given all the buttermilk that they can drink. The change of diet and the extra exercise will usually prevent any further trouble though some of the chicks which have already gone down on the legs will most likely remain cripples always.

TUBERCULOSIS

The symptoms of tuberculosis in hens and other fowl are: Paling or darkening of the comb, thirst, diarrhoea, weakness, lameness and loss of flesh. Post mortem examination usually shows the liver covered with small raised white spots varying in size from mere specks to lumps half an inch thick. The spleen, intestines and ovaries may be similarly affected. The eradication of the disease is largely a question of using or following preventive measures such as absolute cleanliness in feeding and care of the flock and also having lots of sunshine and fresh air in the house. There is no cure.

As means for checking and preventing the spread of tuberculosis, the poultry house should be cleaned out thoroughly and also whitewashed. If the floor is earth, the surface layer of the soiled or damp and filthy ground should be taken out and a few inches of clean gravel or sand put in again. When possible it is a good plan to plow or dis the ground around the poultry house, first scattering a few bushels of air slaked lime or lime dust on it.

In addition, the flock treatment should consist in first killing off and burning all diseased birds. Never leave any dead carcasses lying around the place. Burning them or burying deeply and covering with lime are the two safe ways to follow. While trying to prevent the spread of tuberculosis and observing the above suggestions for stamping it out, the flock should be given a dose of Epsom salts once a week for a few months. One pound of the salts dissolved in hot water and mixed in a bran mash is plenty for 100 hens. Keep the drinking trough or pails clean and give fresh water every day. We often find the disease very common when they drink barnyard seepage which probably carries the germs. Use a dropping board below the roosts to catch the droppings. Being a disease of the liver the germs are voided with the droppings and spread about in this way. The use of the dropping board will prevent the hens from carrying the germs.

Breeding only from strong, vigorous stock and avoiding inbreeding as much as possible will give the stock stronger disease resisting powers. Disinfectants should be freely used in the poultry house. Lime dust and sunshine are the two cheapest. Zenoleum, Isal and other commercial disinfectants can also be used, by spraying them on the roosts, dropping boards and nests once a month.

CAPONIZING COCKERELS

The operation can be performed with success by anyone who carefully follows directions as furnished with sets of caponizing instruments. Naturally, one is not expert at the start, and losses may be considerable, but after a few successful operations no difficulty should be experienced. You would learn easier, of course, if you had some instruction by an expert or a demonstration of the operation.

The first thing necessary to successful caponizing is a bird of the right degree of development and in the proper condition. The right stage of development is as important as the condition; either of these two points not right will cause a large per cent of failures. Many people ask how old should the birds be, or how much should they weigh, when they are right to caponize. How old they should be or how large they are is "wide of the mark," what they really should know is the proper state of development. This stage of the bird's growth is hard to explain so that all will understand alike. Different breeds, and different flocks of the same breed, vary as to the time and manner of their development. No set rules can be given that would be just right in every instance. The proper time to caponize is just before the bird reaches sexual maturity. Generally speaking, when the birds reach one and one-half to two pounds in weight. Legborns and all small breeds should be worked on much sooner than that, as they develop the generative organs much sooner than the larger breeds. All fowls of early spring hatches develop sexually much sooner than those of summer or fall hatches. For that reason the early hatched ones cannot be let run so long as the later hatched birds. It always sounds bad to try to explain the proper time to caponize on paper, yet a very little practice will show you when they are just right. Once you get the right idea, it will be easy to tell the ones that are "just right" by the look of the fowl. The main thing is to start—"get at it"—the rest will come to you all right. You will find the ones that are just right in a variety of different sizes and ages. The essential requirement is to have the testicle and its attachments in just the right state of development.

These organs should be just about the size of a common navy bean; in no case larger. Slightly smaller preferred. After you are in practice the work may be done where the testicles are no larger than plump grains of wheat. They should be about the same shape and color as a nice bright plump grain of soft winter wheat. The expert will get the best possible results where the organs are in this stage of development. The organs should be a little larger for the beginner, as they can be seen to better advantage. With old-fashioned clumsy tools it was, of course, impossible to do the work where the organs were so small. There was not room enough inside the bird to use the old tools. With the modern automatic tools it is possible and much better to operate on small birds.

By not having the birds just right has caused many failures. There are about three weeks in the life of each male bird when he is just right to caponize. Before that period he is too small and afterwards he is too much developed. Of course, it is understood that the operation can be, and is performed, on birds of all sizes and ages with success, insofar as the operation is concerned. A fowl that is fully developed sexually at the time he is caponized never becomes a capon. He is simply a stag, the same as where a bull or boar is operated on. He will only sell as a "stag" with the exception that a bird of this kind is called a "slip." In reality, a stag or proud male. After a cockerel begins to crow and his head and comb reddens up he is too far advanced to ever make a capon. They must be worked on before they get that far along if good results are to be expected.

Next to having the birds in the right stage of development, comes the condition. It is possible for the expert to operate on them in most any kind of condition. Yet it is very poor judgment for him to attempt it unless they are right. The birds should be growing and in thriving state of health. As the organs to be removed are inside the bird, it will be easy to understand that if the bird is full of feed, his inside fixings will be puffed up and expanded, tinking up all the room and shutting out the light so that the organ to be

removed cannot be found or removed for lack of room.

For this reason, it is very important that birds to be caponized be confined to a small yard or coop and not allowed anything to eat for at least thirty-six hours just before the operation is to be performed. It takes Nature about that long to exhaust the food supply that the bird usually has on hand.

For the beginner a good light is necessary, right out in the sun will be best. You can then see the inner works of the birds to perfection. The testicles occupy about the same position in a bird that the kidneys do in a hog or rabbit. No danger of getting the wrong organs, as the testicles are the only yellow colored objects you will see in the bird. If the bird is in good health the testicles will be yellow and shaped like a grain of wheat, or slightly longer, the other parts of the bird are red or nearly so. The testicles are always yellow or whitish yellow except in a diseased bird, when they sometimes become black, or partly so.

FEATHER EATING HABIT

Illness and wrong feeding seems to be the main cause of the trouble. Where hens have plenty outdoor run or if housed, forced to scratch for their living by feeding in plenty of litter and where they get plenty of animal food such as they get out of doors, with grasshoppers, fish worms, bugs and beetles of various descriptions there is not much complaint of this trouble. If your birds are housed make them work for their living. Give a variety of grain and as much meaty scraps as you can. At one of the agricultural colleges, laying hens fed exclusively on corn and corn meal for two months, not only picked the feathers but also the flesh from one another and two hens were killed.

BREAKING UP BROODY HENS

The most satisfactory device for breaking up broody hens is a coop with an open slat or wire bottom. If the hen is unable to find a spot she can keep warm she will soon quit sitting. If the hen is on the nest at night she should be promptly removed to the broody coop, and be fed liberally during the time she is confined. Usually three days in an open bottom coop will cure the broodiness, and in six or eight days she will go back to laying.

DETECTING FERTILE EGGS

There is no way of telling fertility in eggs without putting them under incubation temperature for a few days and then candling them. This is the only sure way of telling except by breaking the egg and putting the germ spot or blastoderm under a high power microscope, but in this case the egg would be of no use afterwards.

TREATING SCALY LEGS

For scaly legs use one part sulphur by weight to nine parts of lard. Soak the legs in warm water for a little while to soften the scales, then apply the ointment. Kerosene and lard may also be used, 1 tablespoonful of kerosene to 6 tablespoonfuls of lard. This may be done at night when the hens are on the roost.

SPROUTING GRAIN FOR HENS

The following method will give satisfactory results: Put into a pail a quart and a half to two quarts of oats for each 100 hens, and pour over them water as hot as the hand can comfortably bear, allow them to stand for about 12 hours, then drain and leave for about 12 hours, after which, spread them out not more than an inch deep on a warm basement floor or a wire bottomed tray, and water freely twice a day with warm water until ready for use, which will be when the sprouts are two or three inches long. They will have formed a solid mat which may be removed from the tray entire and torn into pieces to suit the flock, or the green may be clipped, leaving the roots to produce another crop. The object in feeding sprouted grain to hens in winter is to add green feed to the ration thus imitating summer conditions and encouraging winter laying.

PRESERVING EGGS

The best way to preserve eggs is by the use of water-glass. To preserve eggs in water-glass proceed as follows: Gather the eggs daily and put them in the preservative immediately. Success depends on having absolutely fresh eggs. Preserve only clean eggs. If there is any doubt as to the freshness of the eggs, candle them and discard any that show cloudiness, air-space, blood spots or rings or any unusual markings. A simple egg-tester is shown elsewhere.

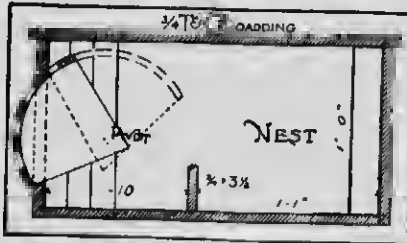
The best place to keep the eggs in the preservative is a cool, dark cellar where the temperature does not rise above 60 degrees. Clean stone jars that will hold about fifteen dozen eggs are the best receptacles. Next best are wooden pails or tubs. The best strength of water-glass solution to use is ten quarts of clean boiled water, cooled, to which one quart of water-glass has been added and the solution thoroughly stirred.

Place the eggs in the jar or pail, being sure that none are dirty or cracked. Then pour the liquid over them until they are completely submerged. The liquid should stand in the jar about an inch above the eggs. Cover over the jar. If left exposed the liquid turns a milky white and does not preserve the eggs properly. A perfectly tight covering for the jar may be made by melting paraffin and pouring it on top of the liquid. The paraffin forms a thin coating that absolutely excludes the air. Set the jars in the cellar on a shelf or platform and never expose them to the rays of the sun. Do not preserve eggs in metal receptacles.

Lime-water is another much used preservative. The best preservative of this kind is the saturated lime solution. It is made by slaking fresh quick lime in water. After it is thoroughly slaked and settled, stir repeatedly and allow to settle several times, then pour the clear liquid over the eggs in the jar or tub. The liquid should be cool when it is poured over the eggs. Two pounds of lime will make enough preservative for thirty dozen eggs.

MAKING TRAP NESTS

A good type of trap nest is shown in the cuts herewith. It is one of the best that can be made. It operates as follows: The hen goes into the nest and as soon as she steps over the 4-inch partition she knocks the circular door off its balance and it drops down

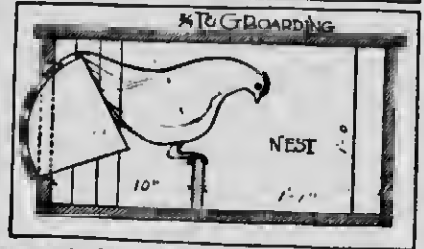
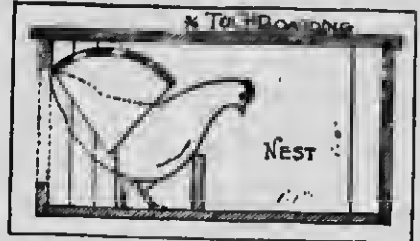


Cross Section of Nest Interior

behind her. The drawing shows pretty well the principle upon which the trap works. The hen always goes as far back as she can, due to the fact that when she goes in the front the nest is darkened. This nest has the advantage of being absolutely sure, and also it is reset for the next hen right after the hen is taken out.



How the Trap Door is Put In



Upper cut shows Hen entering Nest, ready to knock down Door. Lower cut shows Door and Nest closed.

RAISING RABBITS AND HARES

The following breeds and varieties of rabbits are raised for meat as well as fur: Belgians, Black Dutch, Colored Dutch, Colored English, Flemish Giants that include the varieties of Steel Gray, Gray, Black, White, New Zealand, Silvers and Tans. The Angora is especially good for fur.

A rabbit will produce her young in 30 days on the average from the time of breeding, and breeders of experience consider three litters a good year's work.

Five is considered a good number for one litter. If the doe raises half of each litter, to killing age, one does well in the rabbit business. There are breeders who do better than this but good money is made provided 10 or 12 rabbits from each doe are raised to killing age each year. Young rabbits should run with the mother at least eight weeks—ten weeks would be better. During the time the young are running with the mother see to it that she is fed plenty of good wholesome feed. When weaning time comes, take one young rabbit away each day. Cut down on the feed of the doe. Keep the young growing and fattening all of the time.

The feed should contain grains, greens, and concentrates. A rabbit will eat almost any kind of green feed. All kinds of grasses and clovers make good feed for them. Never feed the following: huttercups, night shades, potato plants, meadow horse tail, rhubarb, or onions. A rabbit is very fond of dandelions, but they should be fed sparingly. The following green feed is recommended: alfalfa, burdock, cabbage, carrot, celery, chicory, clover, ensilage, lettuce, mangold, pea vines, plantain, potatoes (baked or boiled, but not raw), oat and wheat straw.

Oats and barley make good grain feed for rabbits. The following concentrates are good: 2 pounds bran, 2 pounds barley or cornmeal, 1 pound fish meal, 1 pound oil cake (ground). Or these may also be fed: 1 pound pea or bean meal, 1 pound bran, 1 pound crushed oats, 1 pound cornmeal, 1 pound soy bean cake, 1 pound rice, 1 pound meal.

The meat of the Belgians is almost white, nothing like that of the cotton-tailed rabbit or of the prairie hare, and must not be compared with the latter named animals, being delicate, well flavored and much like the white meat of chicken. Young hares for table use weigh from two to four pounds each and lose nearly half of this weight in dressing. Old hares do not lose as much. Adult hares weigh from 10 to 13 pounds. The cooking methods employed with young chickens and fowls are applicable in preparing rabbits for the table. Where a few Belgian hares can be kept the meat they furnish will be found an acceptable change from the pork, beef or poultry ordinarily used. They can be raised very cheaply.

Up till a few years ago it was thought impossible to pick the good layers except by the use of the trap nest, but now with the work of the different agricultural colleges and experiment stations summarized and brought together, it is quite possible to not only pick out the good layers but also to tell fairly accurately how many eggs each hen has laid.

With the descriptive matter herewith given and the photographs shown it should be quite possible for any poultry keeper to get a pretty good idea how to go ahead with the culling work.

Common Points Which Indicate Laying

All poultry raisers are familiar with some of the common points which indicate that a hen is laying. Among these are the red comb, the general health of the hen and the happy contented singing disposition of the hen. The red comb is always a pretty sure indication of a hen just about ready to lay or laying, but it is no indication, as far as the ordinary observer is concerned, of whether she is a heavy layer or a poor layer. She may be laying all right but she may not lay enough eggs to begin to pay her way. Good health is absolutely necessary for laying but it is again no indication of whether a hen is a poor layer or a good one. Just as soon as a hen gets out of condition she stops laying and will not come back until she is back in normal health again. All laying hens are more or less contented and in a happy singing mood but this condition cannot be taken as one indicating heavy or poor laying in every case. So while all these points indicate that a hen is laying, still they do not give any estimate of whether she is a poor layer or a good one. In fact, it often happens that the poorest layer may have the reddest comb, be in the healthiest condition and make the most noise. But in a general way these things are what the average

poultry keeper looks for when trying to form an opinion as to which hens are laying.

The Finer Points in a Good Layer

Coming down to the details in connection with the selecting of layers and culling of farm flocks we note, first of all, that a hen in order to lay well must have a strong constitution and be vigorous and healthy. With this she must have capacity for food, a clear bright eye and an active disposition. These are points which any poultry keeper may recognize in looking over a flock of hens.

When it comes to handling each individual hen it is necessary to go into details very carefully. There are many changes that take place in a hen as she goes into and through a season's heavy laying. Naturally, these changes are far more pronounced in a heavy layer than in a poor one.

Under natural conditions a hen stores up quite a little surplus fat in various parts of her body. This is quite noticeable in all yellow skinned birds. With heavy laying this yellow coloring is rapidly taken out of the skin and it gradually fades to a whitish color. The deep yellow skin may to a certain extent be influenced by the class of feed fed but even then will be showing a fading of color. When hens are eating a lot of rich green grass the skin would have a far deeper yellow color and would naturally take longer to fade out.

Some Sure Signs of Good Layers

The yellow is taken out of the different parts of the hen's body in the following order. First, out of the vent. This part of the hen's body changes very quickly and is one of the surest signs of laying. A white or pinkish white vent would indicate that the hen is laying and a yellow vent would show she is not.



Testing Capacity and Span of Pelvic Bones

On the left the operator is testing a hen for abdominal capacity. Note the depth of the abdomen, an indication of an exceptionally good layer. On the right the operator is testing for laying quality by measuring with his fingers the space between the pelvic bones. This hen has a wide span; three fingers can be laid between the points of the bones. She will be a heavy layer. A wide span between the pelvic bones is a certain indication of laying capacity.

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This hen is an exceptionally good layer. Between November 30th and August 31st following she laid 192 eggs.

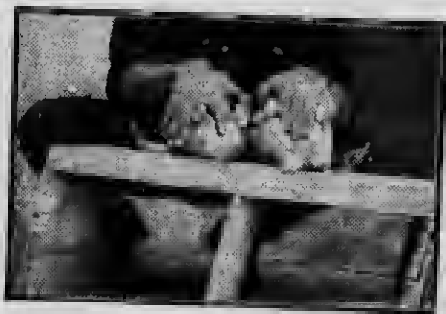
The eye ring is the next part of the body that bleaches out. While it fades more slowly than the vent, yet the bleaching process can be quite easily seen in all birds that have laid heavily. In white lobed birds like Leghorns, the ear lobes also bleach out about the same time.

The fading can be noticed next in the beak of all yellow beaked birds. It starts at the base of the beak or right next to the face and gradually the color disappears to the point of the beak. The upper beak usually fades a little faster than the lower. A well faded or bleached out beak would indicate that the hen has been laying quite heavily for at least four or five weeks whereas one that has streaks or cross patches of yellow in it would indicate that the hen has been resting or been broody a few times.

The bleaching out process affects the shanks last and is quite easily noticed in all yellow legged birds. This part of the hen's body takes longest to bleach out and, therefore, a thoroughly bleached out shank would indicate a longer period of heavy laying.

It must be remembered that this bleaching process in all parts of the body is faster in smaller birds like Leghorns than in the heavier breeds like Rocks and due allowance must be made for this in culling.

The yellow color in all these sections comes back in the same order as it bleached out, starting at the vent first. It comes back far more rapidly than it bleached out. This is shown especially in heavy laying hens that go broody. Inside of a few weeks the color gets back into these parts quite strong again



Measuring the spread or span of the pelvic bones. Notice that three fingers can be placed between the pelvic bones of the hen on the right, and one finger will span the hen on the left, which is a poor layer.



This hen is a typical poor layer; listless, lacking in capacity, approximating in type and appearance everything undesirable in a hen.

and then goes out again gradually as the hen starts laying. Resting periods and broody periods can easily be identified by the vent being a richer or deeper yellow than the beak and the beak deeper yellow than the eye ring and the shanks showing the most bleaching. The extent of this difference would indicate fairly well the length of time the hen has been resting.

So much for the changes that can be observed easily with the eye or easily seen by handling the hens. The yellow pigment as mentioned can be easily seen while handling the hen and while this indication is of great value to determine layers, yet we see that since it comes back so quickly after a hen goes into a resting period or stops laying, there are other factors which should be taken into consideration in connection with the color of vent, beak, eyes and shanks.

What the Shape of the Body Shows

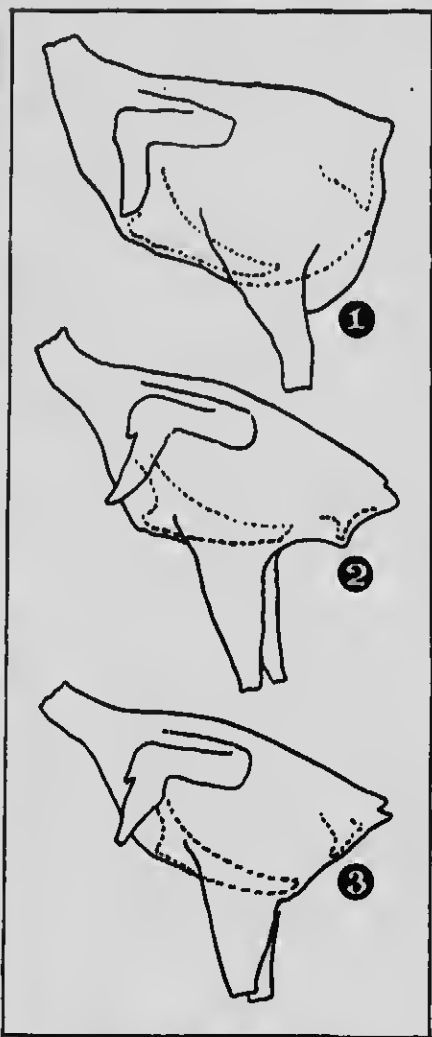
Along with these points a hen should be handled with the idea of finding out the body changes that have taken place due to laying. There are some decided changes that take place in the vent, the abdomen, the pelvic bones, the quality of skin, feathering, comb wattles and earlobes, moulting, temperament and disposition or activity.

The vent has been mentioned before in determining laying, by its color, and in this case again we find that the laying hen has a large, moist vent. It is usually in a dilated condition, being quite loose and flexible. In the non-layer it is generally dry "puckered," tight, wrinkled and hard.

The abdomen of the heavy laying hen is always deep and wide and dilated similarly to the vent. The



Testing the capacity of hens for laying. The good layer is shown on the right and the poor one on the left.



Good and Bad Body Types

- 1.—Discard birds with this type of body. 2.—Cut out birds of this type. 3.—It is birds of this type that should be kept for layers.

size of the abdomen would, however, be determined somewhat by the size of the hen and by the size of the egg she laid, as well as the number. A hen that is going to lay heavily for the next week or ten days would naturally have a large abdomen.

Closely associated with the abdomen are the pelvic arches or pelvic bones. In heavy laying hens these are quite a distance apart and are soft, pliable and quite sharp. In the poor layer they are close together thick, stiff and quite blunt on the ends due to the covering of fat or meat. In the non-layer the pelvic bones are sometimes almost touching at the ends, whereas in the heavy layer they are often as far as four finger widths apart. The longer a hen has been resting the closer these bones come together again. We like to handle a hen with quite straight, thin and fine quality bones for, as a rule, she is a good layer. Hens having curved-in pelvic bones are generally poor producers.

With the fine, pliable, pelvic bones and the deep abdomen should go soft, velvety feathers and a loose pliable skin. A hard, dry skin and correspondingly

hard, dry and quite loose feathers would indicate a poor layer. While the poor layer may look more neat and prim as to feathers, yet when it comes to handling her the above qualities can easily be noticed. Often the ragged condition of a heavy layer is due to working harder than the poor layer, who stands or sits around all day doing nothing except taking good care of herself.

The comb has already been mentioned but in this connection it might be well to examine it a little more closely. As the hen approaches heavy laying it increases in size similar to her ovary development. Both comb and wattle become larger, redder and quite waxy. They are full, smooth and warm to the touch. The dried, pale and shrivelled up comb with wrinkles and tiny scales indicate that laying has ceased.

Late Moulters are Good Layers

In selecting heavy layers we usually find that the late moult is the heaviest layer. As a rule when a hen starts moulting laying ceases, so the longer the moult is delayed the better the chances are of being a heavy layer. A hen may keep on laying during the early part of her moult and often she will keep on laying until she has grown in quite a few of her wing feathers. Quite a number, however, stop when they start moulting their wing feathers. This is especially the case with poor layers. A hen usually moults out in a regular systematic way losing her neck feathers first, then body, tail and wings. About three months are required for a bird to complete the moult. When she starts shedding her primary wing feathers she may stop laying almost at once. It takes about six weeks to grow a new primary and they are shed at regular intervals of about two weeks apart. There are ten primary feathers in each wing and the same feather falls out at the same time in both wings. In this way the bird remains evenly balanced as to flying powers during its moult. Moulting takes place the same way in both a good layer and a poor layer.

Singing Birds Generally Good Layers

As to the disposition or temperament and the habits of heavy layers and poor layers there is a big difference. The heavy laying hen is a bappy hen. She will come and meet you the minute you stop inside the pen. Heavy layers are singing and happy all day long; they are busy and active and yet contented and happy, scratching and working all the time. With poor layers it is different. The poor layer tries to dodge you all the time. When caught she "squawks and hollers" and tries to get away. This wild temperament is invariably a sign of poor laying.

Not Applicable to Pullets

The heavy and poor laying indications as herein outlined are supposed to be applicable to hens a year old and over and are intended as a guide for systematic culling. They are adapted for use in culling all breeds, but probably a little better adapted for the yellow legged and yellow skinned birds than those having white or light colored legs and skin. It may, therefore, be necessary in culling a flock of light colored leg breeds, like Orpingtons, to attach a little more importance to copacity, spread of pelvic bones, feathering, skin and general handling qualities than in the yellow legged breeds.

The Right Season to Cull

Owing to our extreme winter weather egg production is comparatively low as compared to that of hens in the more moderate eastern and southern climates. As a result low production is carried on till late in the spring and real heavy production does not come on till quite late. Following this in all farm flocks there is usually a period of broodiness and after this another period of laying; then follows the natural moulting season. Both heavy and poor layers may pass through the same process. This brings the birds well on to September before they could really be culled out in the most satisfactory way.

With the great variation in temperature to which our summer days are subjected we find also a corresponding rise and fall of egg production. There always are periods of high and low production in our summer's egg yield. The broody period in most farm flocks is carried well into July and after this is over, follows a period of production which carries well into September.

TURKEYS: BREEDING AND MANAGEMENT

Six varieties of domestic turkeys are recognized by the American Standard of Perfection. Of these by far the most widely known is the Bronze, after which come the White Holland, the Bourbon Red, the Black, the Narragansett and the Slate.

In color the Bronze turkey is of a rich, brilliant copperish bronze against a background of black and brown and contrasted by the clear-white tips of the tail coverts and main tail feathers. When wild blood has been introduced, however, the tips of the tail feathers are yellowish brown rather than white. The Bourbon Red is of a deep brownish red, with white wings and tail. The White Holland is pure white. The Black turkey is of a lustrous greenish black throughout. The color of the Narragansett is steel gray against a background of black. The Slate turkey is of a slaty or ashy blue color, more or less dotted with black.

Selection of a Breed

Owing to the fact that the Bronze turkey is the heaviest, it is more popular among turkey raisers than the other varieties. Sireo turkeys are sold by weight, the heaviest birds bring the greatest returns. When a large number of people are to be served, as in hotels, restaurants, and boarding houses, the demand is for heavy turkeys. For family use the demand is for small or medium-sized birds. Unless they are to be marketed locally among customers who demand small birds, it is far more profitable to raise the heaviest. Regarding other characteristics, it is quite generally asserted that the Bronze is the hardest variety; that the Bourbon Red and White Holland are the most domestic; and that the White Holland is the most prolific. These qualities are possessed in different degrees by individuals of every variety, however, and can be developed by proper management and careful selection of breeding stock.

Selection of Breeding Stock

One of the most important steps toward success in turkey raising is the proper selection of breeding stock. Unhatchable eggs, weak poult, and small, scrubby turkeys are largely the result of carelessness in the selection of the parent stock. In selecting turkeys for breeding purposes, strength and vigor are the first points to be considered. To indicate this the body should be deep and wide, the back broad and the breast round and full. The head should be of good size, and of a clean, healthy appearance. A strong, well-made frame is shown by thick, sturdy shanks and straight, strong toes.

The most satisfactory time of year to select breeding stock is November or December. By purchasing early in the season one not only has a large number to choose from, but the birds are given ample time to become acquainted with their new surroundings before the mating season, which in the South ordinarily begins early in February and in the North about a month later.

Management of Breeding Stock

Fifteen turkey hens can safely be mated in a vigorous tom. If 25 or 30 hens are kept, two toms should not be allowed to run with them at the same time, but one should be confined one day and the other the next. When two toms are allowed to run together during the mating season, they fight fiercely, and the stronger does practically all the mating.

When one or a few turkeys are kept it is the usual custom to allow them free range throughout the breeding and laying season. This is undoubtedly a good plan, provided the nests are found and the eggs gathered daily, if there is danger of their being destroyed or chilled. If many turkeys are kept, however, it is usually found most convenient to use breeding pens or inclosures. These should be of sufficient size to afford some exercise, an acre for 15 turkey hens being none too large. By taking turns in the use of three toms, as many as 45 turkeys may be kept in one inclosure, one tom being used every third day, or, better yet, one may be used in the morning, another in the afternoon, and a third the following morning. It is an excellent plan to allow the birds to roost outside the pen, turning them out late in the afternoon, after they are through laying, and driving them in early the following morning. Turkeys are easily handled, the

work of driving them into the pen every morning requiring but a few minutes if they are fed there regularly, and the exercise they get while ranging outside the pen helps to keep them in good condition.

Laying

Soon after mating turkey hens begin to look for nesting places and usually commence laying in from a week to 10 days after the first mating. One mating is sufficient to fertilize all the eggs of one litter, but the hens ordinarily mate three or four times before beginning to lay. All turkey hens, of course, do not begin laying at the same time, and in a flock of about 15 it may be six weeks or more from the time the first hen begins to lay until the last begins. Pullets usually commence laying a little earlier than yearlings or older hens. The average number of eggs in the first litter is about 18, although in individual hens it may vary from 12 to 30. Hens that do not have to be set can be broken up on becoming broody and made to lay a second or a third litter. The number of eggs laid in the second litter averages about 12, and in the third about 10, although there is considerable variation in the egg production of different hens. Some turkey hens can be made to lay four or five litters, but this is not usually advisable, as poult hatched later than June do not have a chance to develop for the Thanksgiving and Christmas markets and are not sufficiently mature by the following spring to be used as breeders.

Incubation

Turkey hens and chicken hens are ordinarily used to incubate turkey eggs, although incubators are quite generally used where turkeys are raised on a large scale. During the early part of the laying season it often happens that there are on hand a number of eggs that should be set before any of the turkey hens are through laying their first litter and become "broody." In such case and also, when it is desired to have the turkey hens lay a second or third litter, some of the eggs have to be incubated under chicken hens or in an incubator. About a week before the poult are to hatch a sufficient number of turkey hens should be allowed to sit to take all the poult hatched. They can be given a few eggs from the incubator or from under the chicken hens and allowed to hatch the poult themselves, or at night a newly hatched poult can be slipped under each turkey hen that is to be given a brood of poult and by morning they will take them.

Turkey hens are very close sitters, and if managed properly they are the surest means of hatching turkey eggs that can be used. Incubators, however, are quite as successful with turkey eggs as with chicken eggs. Poor batches are a very frequent cause of complaint among turkey raisers, and this is quite often due to crowding more eggs under the hens than they can properly cover. One egg too many means that every egg in the nest will probably become chilled at some time during the four weeks of incubation. Turkey hens cover 15 to 18 eggs and in some cases more, depending on the size of the hen. Chicken hens of the general-purpose breeds cover from 8 to 10 eggs. The turkey-egg capacity of an incubator is approximately three-fourths of the chicken-egg capacity.

The incubation period of turkey eggs is 28 days. The first egg is usually pipped during the first part of the twenty-seventh day, the first poult hatched by the middle of that day, and the hatch completed at the end of 28 days, although in extreme cases all the poult are not hatched before the end of 30 days. Turkey eggs are tested for fertility and for dead germs, as a rule, on the tenth and twentieth days.

Brooding

The average number of poult raised under ordinary conditions is about 50 per cent. of those hatched out, or about seven poult for every turkey hen. By far the greater part of this loss occurs when the poult are quite young, that is, under a week old.

If the weather is warm and dry, as frequently happens when the poult are hatched late in the season, an shelter is required, as they do better in the open, but it is advisable to keep them within a fenced inclosure for the first three or four days until they are strong enough to follow the mother. Weather conditions being favorable, the hen and brood can be given free

range after the third or fourth day, but care should be taken to keep them out of heavy dews and to protect them from rain for the first two or three weeks. After this, early morning dews or light showers followed closely by warm sunshine will do little harm, as the poults soon become warm and dry. If cold, damp weather sets in, however, they will need to be kept in dry quarters, for nothing is more fatal to young poults than wet and cold.

Successful turkey raisers use many different kinds of feed, some of the most common being as follows:

- (1) Hard-boiled egg chopped fine and corn-bread crumbs for the first week, and then whole wheat and hulled oats.
- (2) Stale bread, soaked in milk and squeezed dry, for the first few days, and then common chick feed.
- (3) Clabbered milk seasoned with salt and pepper, corn-bread crumbs.
- (4) Equal parts "pinhead" oats, whole wheat and cracked corn.
- (5) Cracked wheat.

In addition to the above, skimmed milk and butter-milk are quite often fed, with excellent results. A good plan is to keep the milk in front of the poults during the morning and water during the afternoon. If grit and green feed can not be picked up outside the coop, they must be provided in some other way. Chopped onion tops, lettuce leaves, dandelion leaves, and alfalfa make excellent green feed. Grit can be furnished in the form of coarse sand.

Rearing the Young Turkeys

When about six weeks old the young turkeys are old enough to go to roost. Practically all turkey raisers allow the birds to roost in the open trees or on fences or other roosts especially provided for them. In sections where high winds prevail it is customary to build the roosts next to a barn or shed, where there is some protection; when this is done posts are driven into the ground and poles laid across them four or

five feet from the ground. By driving them in the roosting place and feeding them there every evening just before dark, young turkeys can be made to roost wherever desired. For the first few times it is sometimes necessary to keep them under the roost until dark, but they will finally fly up, and after a week or so will no longer have to be driven, but will come up every night to be fed and to roost.

During the summer and early fall turkeys can find an abundance of feed on the average farm. Grasshoppers and other insects, weeds and grass seeds, green vegetation, berries and grain picked up in the fields all go to make up the turkey's daily ration. When this natural feed is plentiful, very little need be added until fattening time, except for the purpose of bringing the turkeys every night to roost and to keep them from straying from home. For this purpose one feed of grain every night just before roosting time is sufficient.

One of the greatest difficulties with which turkey growers have to contend is to keep their flocks from wandering over too wide an area and invading neighboring farms. To some extent, feeding heavily night and morning reduces the area over which turkeys range, but even then they often go too far. When trouble of this kind occurs, the most effective plan is to drive them into an inclosure, such as is described for a breeding pen, and keep them there until about noon. In warm weather turkeys do most of their ranging early in the morning and by 9 o'clock they are usually as far from home as they will get during the day. As soon as the sun becomes very warm they spend most of their time in the shade until 3 or 4 o'clock in the afternoon, when they begin moving toward home, ranging for feed along the way. If the weather is not too warm they do not spend so much time lying in the shade, and consequently range over a larger area and may keep moving away from home until noon. By feeding in the pen every morning they soon learn to go there on coming down from roost and no time is lost in penning them. If they fly out of the pen after being fed, the flight feathers from one wing should be clipped.

DUCKS: BREEDING AND MANAGEMENT

There are eleven standard breeds of ducks which have been admitted to the American Standard of Perfection. These may be divided into three classes: (1) the meat class, including the Pekin, Aylesbury, Muscovy, Rouen, Cayuga, Buff and Swedish; (2) the egg class, which includes the Indian Runner; and (3) the ornamental class, composed of the Call, the Crested White, and the Black East Indian.

Best Breed to Raise

The Pekin duck is kept almost exclusively by commercial duck farmers; it is also the most popular breed on general farms. This breed has a creamy white plumage, a long, broad and deep body, with a full breast and deep keel (the part extending backward from the breast). The color of the skin is yellow, the shanks and toes should be reddish-orange, and the bill orange-yellow, free from black. The standard weights of the adult drake and duck are 9 and 8 pounds, respectively. Pekin ducks are hardy, are fair layers, practically non-sitters, and especially adapted for the production of flesh. They are very docile, easily confined by low fences, and well adapted for general farms.

Ducks can be raised with success and at a profit on general farms, but do not appear to be as well adapted as a source of income to average farm conditions as fowls, although they serve to add variety, both of meat and of eggs, for the table. If the demand for ducks, and especially for duck eggs, increases, breeds of duck which are good layers should be profitable on farms, particularly where there is good pasture land containing a stream or any running water.

Selecting and Mating

Ducks in large flocks are usually mated in flocks of about 30 females with five or six males, as the latter do not fight each other. The number of males may be reduced to one for every seven females about the first of March, and again changed a month later to one male for eight to ten females. Active, healthy females of medium size should be used for breeding; that is, females weighing about eight pounds when mature.

Only mature females should be used as breeders. Select for breeding ducks with short necks, medium long bodies, flat backs, and of good depth to the keel bones. Watery eyes are usually a sign of weakness in ducks. The drake is usually coarser and more masculine in appearance than the duck and has a distinct curl in his tail feathers. Ducks should usually be sold after they are two years old, although the best breeders of layers may be kept over their third year. In handling ducks pick them up by their necks rather than by the legs, as the latter are apt to break easily. Ducks lay their eggs early in the morning, and should be confined to the house or pen until 9.30 or 10 o'clock in the morning. If allowed to roam early in the morning they may lay in a pond or stream and the eggs may be lost.

Hatching Duck Eggs

The period of incubation for ducks' eggs is 28 days, except for the Muscovy duck, which is 33 to 35 days. Place nine to eleven ducks' eggs under a hen, depending on her size and the season of the year, using the smaller number of eggs in cold weather and the larger number in warm weather. Confine the hens at hatching time and do not disturb them until the hatch is completed, unless they become restless, when it may be best to remove the ducklings that hatched first. Hens must be well cared for in hatching ducks' eggs, as the period of incubation is a week longer than that of hen's eggs. It usually takes ducklings from 24 to 48 hours to hatch after they pick the shells; therefore, it is advisable to allow the hen to get off the nest for feed and water when the first ducklings pick the shell and then confine her to the nest until the hatching is over. Ducks' eggs need more moisture than hen's eggs at hatching time, as it takes the ducks much longer to get out of the shell. The eggs should, therefore, be sprinkled with warm water previous to hatching.

Incubators Satisfactory for Hatching

Incubators for hatching ducks' eggs are usually kept at a slightly lower temperature than for hens'

eggs. Keep the machine at 102 degrees F. for the first three weeks and 104 degrees F. for the last week. The temperature may go above 104 degrees F. and sometimes will go as high as 106 degrees at hatching time. Operate the machines according to the manufacturer's directions. It is usually advisable to supply moisture for ducks' eggs during the last week or ten days of incubation. This depends upon the make of the incubator, or the climate, and especially on the humidity of the place where the incubator is operated. Many methods are used to supply moisture in incubation, such as sprinkling the eggs with warm water heated to about 100 degrees F., or pinning a pan of water, a receptacle containing moist sand, or a wet sponge below the egg tray. The eggs are usually turned twice daily after the second, and through to the twenty-sixth day, and cooled once daily after the seventh and through to the twenty-sixth day. After turning the eggs reverse the egg trays end for end and from one side of the machine to the other in two-tray incubators. The length of time to cool eggs depends upon the temperature of the incubator room and the day of incubation, but a good general rule is to leave the eggs out of the incubator until they feel slightly cool to the hand, face or eyelid. When the ducklings are all hatched, remove the egg-tray and open the ventilators according to the manufacturer's directions, but keep the ducklings in the incubator from 24 to 36 hours after the batch is over, before removing them to the brooder.

Feed and Care of Ducklings

When the ducklings are hatched they should be left for ten hours or so under their mother or in the incubator, and should not have anything to eat for 24 to 48 hours. They may be allowed a little water and milk in a shallow pan to drink so that they may just dip their bill without wetting their bodies. If they should become wet they ought to be put near a fire, otherwise they become chilled and often die. The first feed should be a mash consisting of stale bread soaked in milk, hard boiled eggs, bran, green food, finely chopped. Curdled milk may be added. Later on a fairly soft mash of corn flour mixed with cooked potatoes will make an excellent meal. Such roots as carrots, turnips and cooked beets may also be used. It is well to add a small quantity of animal food, blood, meat, flour, butchers' scraps, etc. The mash should not be too thin, otherwise it will cause diarrhoea. A small quantity of gravel or coarse sand should be added. All cooked roots and tubers, lettuce, fish

(in small quantity) given judiciously, are all suitable for duck raising.

Cold and rain are very injurious. A duckling that has got wet by rain or otherwise in the first eight or ten days of his life is in great danger of dying. He drowns quickly in a little water. Do not leave wet ducklings in the sun for the purpose of drying them; they might get sunstroke and die. Do not let them take a bath until eight or ten days after birth, and then only for a very short while, and if for market they are better kept from swimming at all.

When the duckling is a month old, if for stock purposes, it may be given its entire freedom if there is a stream in proximity. All it requires is a meal at noon and one at night. Ducklings well fed, in regular increasing rations, are ready to market at two or three months old. Ducklings that are reserved for breeding purposes should be selected among the most thrifty specimens and from an early hatching.

A great many people interested in poultry are ambitious to do business on a large scale. They want to specialise in some branch of the poultry industry and devote themselves exclusively to that one branch. Most of us have met poultry enthusiasts who liked to figure fortunes for themselves from keeping thousands of chickens. To persons of this temperate duck should be of interest. Intensive duck farming on a large scale has been much more successful than chicken farming. Ducks, especially the Pekins, stand confinement very well, and all breeds are easily brooded and are less subject to disease than chickens. In the Eastern United States, especially on Long Island, which is quite close to New York City, duck farming has been developed as a special industry to a considerable extent, and farms exist there where tens of thousands of ducks are raised yearly, fattened and marketed as "green" ducks when between 8 and 12 weeks of age.

However, it is as general farm fowls that the duck is most widely raised and always will be. They are so healthy and easily raised that it is rather surprising so few farms in these provinces have their duck flock. Water to swim is not necessary in duck raising, as many seem to think. Streams or pools to bathe and swim in are desirable, because the ducks find a good deal of food in them, but if no running water is available, or if there is no pool big enough so that they can swim freely, a tank should be set up with a sloping bottom at both ends so that the ducklings may easily go up or come down.

GEESE: BREEDING AND MANAGEMENT

The goose is one of our easiest and most profitable fowls to raise, and it should be bred far more extensively than it is at the present time.

The most popular breeds are Toulouse, Embden and African. They grow very quickly and fatten easily. The common goose is not so profitable as it is smaller and consumes nearly as much food as the standard breeds.

Housing

It is not advisable to house turkeys, ducks, geese and hens together as is sometimes done, as they differ in their habits and require different treatment. The males of the various species seldom agree and frequently fight and sometimes one or more of the combatants are killed. The house may be of simple construction but it must be bright, clean, well ventilated, free from dampness and large enough to avoid overcrowding.

The floor should be covered with litter which should be frequently renewed, or at least covered by an addition of fresh litter. Geese delight in cleanliness. It is essential to their well-being. A pond or stream is an advantage, but not absolutely necessary. Geese raised near a body of water are much better looking and more thrifty than others. Their feathers are of a finer quality and as the feathers are one of the products, this condition should not be overlooked.

Breeding Stock

A gander will mate with several females. It is better to have as few males as possible in the poultry yard so as to avoid quarrels and fights, as the Ganders may waste their energy to such an extent that they may

be useless as breeders. Geese should be mated early in the fall, for if the mating is delayed too long there is risk that females will not produce anything during the year. Goslings or yearlings are poor breeders; two-year-old birds are better, and although geese may live to a great age, they are only in the best possible breeding condition at from three to five years of age.

Feeding Adult Birds

Variety should be observed in feeding. Geese have a special liking for grass and green foods. They do well on all sorts of grain and clovers as well as on cooked vegetables or fruit. They must have a run of some sort but do not require a very large space. They may be kept in part of a field until they have eaten all the grass, then transferred to another part of the same field. Geese should never be pastured in seeded fields as they do great damage by eating the plants right down to the crown. They dig into the heart of the plant with their bill, which is toothed like a saw, and destroy vegetation. Their droppings, which are very caustic, burn the plants. They should not be left at large in pastures kept for farm animals.

Laying and Incubation

When the goose walks around, holding straws or bits of wood in her beak, it is a sign that laying time is near. It is best then to provide her with a pile of soft straw in which she may dig and hide her eggs. The eggs should be removed as soon as laid so as to avoid chilling, but, one or two dummy eggs should always be left in the nest so that the goose may not see that the eggs are being taken, as she would then go elsewhere

Geese: Breeding and Management

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When ready to set, some ten to fifteen eggs should be put in the nest, which should be almost flat, placed on the ground and spacious, so that the sitter may be quite comfortable, and in a secluded place where she will not be disturbed by any one. It is also better to keep the gander away during sitting time as he might disturb the goose and annoy the person in charge.

While sitting, the goose should be given pure water, grain and green food. Some breeders, during the first few days, carefully lift the goose from the nest to make her eat; in doing so care should be taken to see that no egg is retained under the wings. When she leaves her nest to feed, etc., she covers the eggs with down; feathers or with bits of straw.

Hatching takes about forty-eight hours. Experience has shown that it is best to let the goslings break through the shells unaided. By helping them there is danger of fatally injuring them, through the membranes being prematurely ruptured, bleeding to death may easily take place.

Rearing

Goslings should be removed one by one, as they hatch, so as to prevent the mother from leaving the nest before the hatch is over. They should be placed in a basket, lined with cotton or wool, or in a brooder.

When hatching is over give the goslings to the mother who will watch over them with great care; the gander may then be allowed with the mother as he helps her and protects the young ones very tenderly.

Although goslings are very hardy, they are very susceptible to cold or rain while young. It is best not to let them out for a few days and do not let them wander far from the buildings before they are two weeks old so that they may be put in, in case of rain.

The gander watches carefully over the mother during the whole time of brooding and shows the greatest solicitude for her. He is a very devoted father, taking great care of the young ones, protecting them and defending them with energy.

Care of Goslings

During the first few days, goslings should be fed bread crumbs, bran, shorts, cooked mashed potatoes, mixed with milk, chopped eggs, vegetables, lettuce, dandelion or other succulent green food.

When the birds are fairly strong, at about two weeks of age, they may run at large with their mother, but care should be taken to avoid exposure to rain, dew or the hot sun. A goose may lead as many as forty goslings. When they come in at night they should be given a little food as mentioned above. Artificial rearing is successful.

Distinguishing Sex

It is fairly easy to tell the sexes in adult birds of all breeds; the male is a little larger than the female and his cry is shrill while that of the female is harsh; the neck is a little longer and a little thinner in the male than in the female; the cheeks (between the eye and the jaw) are less prominent but the posterior part of the upper mandible, which is generally of orange color,

up to the skull, is more prominent than in the female. As two indications are better than one, it is best to inspect the sexual organs which furnish absolute proof. In the female, the sphincter or muscular tissue closing the anus, is folded and annular when stretched with the fingers; in the male, on exerting a light pressure over the same place, the penis soon appears. It protrudes more quickly in warm weather, and in a mature male.

Fattening

Fattening takes about a month. When they come in from the field, those to be fattened should be given such grain as buckwheat, corn, oats, etc., and water containing a little meal or shorts. Raw chopped beets are also very good. This preparatory diet should be given about a fortnight.

Young geese from six to eight months old fatten easier and better than old birds. They may be fattened in crates or in pens, the same as chickens. They should be confined in a small, dry, well-ventilated pen which should be kept dark so that the birds will remain quiet. During the first week, oats are given three times a day in small troughs; after the meal the troughs are taken away so that the geese may sleep and digest peacefully. After eight days of this, boiled potatoes and ground grain mixed with curdled milk should be added, five or six days later, a little corn or barley flour may also be given. When the meat is over, give a liberal supply of water, milk and water or whey with a little bran or shorts added, for drinking. Towards the end of the fattening period cranning may be resorted to, but it is not absolutely necessary for the finishing of geese.

Killing

Geese are killed by sticking in the roof of the mouth with a sharp knife, a quick motion severing the arteries and penetrating the brain. Pluck with care to avoid tearing the skin which, in a very fat bird, is very tender and offers little resistance.

Products

The products are the flesh, the feathers and the down, which is very valuable.

In some districts, breeders follow the practice of plucking their geese and ducks twice a year. The usual method is to pluck at moulting time. The last plucking should be done in time so that the feathers may grow again before the cold winter comes. The feathers are ready to be plucked when they come off easily. If not picked at that time, they would drop off and be lost. On the other hand, if picked too early they will not keep well. Feathers and down should be thoroughly dried and kept in a dry and cool place.

Never pluck the flank feathers which hold the wings as the latter would drag on the ground, detracting from the appearance of the bird and tiring him. Goslings should not be plucked before they have passed the critical period of their youth, that is, before the wings fold over each other on the rump. Geese which have just been stripped of their feathers should be protected from cold. Keep them under shelter when it rains and do not let them go to the water.

GUINEA FOWL

Guinea fowl are descended from the wild fowl of that name native to Guinea on the west coast of Africa. The domesticated guinea fowl are of three varieties: Pearl, White and Lavender. The Pearl is by far the most popular. There is no standard of perfection for guinea fowl, hence distinguishing points between varieties cannot be described.

Most breeders of guinea fowl allow their stock free range. They breed better this way. Guinea eggs are smaller than hen eggs and are not especially valuable except for sale for hatching. For home use, however, guinea eggs can be made to take the place of hen eggs.

Male and female guinea fowl differ so little in appearance that many persons are unable to distinguish the sex. Males usually have larger helmets, and wattles and coarser heads but to be positive one should listen to the cry made by each bird. That of the female resembles "buckwheat, buckwheat," and is decidedly different from the one-syllable shriek of the male. When excited both male and female emit one-

syllable cries, but at no time does the male imitate the cry of "buckwheat, buckwheat." Sex can be distinguished by this difference in the cry when the birds are about 2 months old.

Guineas usually begin laying in April and lay from 20 to 30 eggs before becoming broody. The eggs should be gathered soon after laying to prevent their being chilled. A usual setting for a guinea hen is 14 eggs and for a hen of the general purpose breeds, say a Plymouth Rock, about 18. Incubation period, 28 days. Guineas are fed much the same as chickens but they require less feed and more range. They gather up a great many seeds, bugs and insects if allowed free range and need very little feed.

They are marketed when about 2½ months of age. At that age they weigh from 1 to 1½ pounds and sell for a good price. Guineas are usually marketed with the feathers on like game birds, being stuck in the throat and roof of the mouth as chickens are. They have excellent eating qualities.

FARM MECHANICS

WHY PLOWS UPSET

The complaint is most common on pole plows, although it occurs sometimes on the poleless plows. Now, let us have in mind the fact that when hitching too close and too low on a three-wheel plow, the weight on the front furrow wheel and on the land wheel is lessened to a considerable extent. Instead of being carried on these wheels in equal proportion with the rear wheel, additional weight is thrust upon the rear wheel and a considerable amount of it is carried through the hitch by the team. This, you will readily see, practically suspends the plow between the horses' shoulders through the traces and evener, and the rear wheel.

Now, as the land wheel stands considerable distance away from the plow, it is practically impossible to upset the plow toward the land or unplowed ground. The furrow wheel stands very close to the beam, allowing for just the width of furrow between the rim of the wheel and the beam, so it does not require a great amount of effort to upset the plow toward the plowed ground. This usually occurs when turning "gee" with a right-hand plow or on hillsides. The remedy for this condition is to lengthen the hitch or raise it on the vertical clevis. I recommend lengthening the hitch, as it is better in all cases.

Now, on practically all three-wheel plows, when equipped with pole, the pole is attached to the top of the furrow wheel. The evener is attached to the point of the beam, or, in case of a gang plow, to the cross clevis, some distance to land from the point to which the pole is attached. In case of a fourteen-inch gang plow, this distance is considerable.

The neckyoke is attached to the pole by means of a sliding device, providing for from 12 inches to 18 inches room for the neckyoke to plow on the pole forward or back. In turning "haw" with the right-hand plow, the neckyoke will slide forward on the pole, and the traces will slacken so the plow will turn freely, even though the hitch be too short or too low. In turning "gee," however, the effect is exactly opposite. The neckyoke slides back on the pole to the stop, the traces tighten, and if the hitch be just a little too short, the plow will upset very easily. Here, again the remedy is to lengthen the traces. In cases of emergency, where traces do not permit of sufficient adjustment, slip the stop on the pole back farther so the neckyoke can slip back farther on the pole when turning "gee." This will prevent the traces from tightening and pulling the plow over.

In considering the foregoing instructions, it is understood that the plow is correctly assembled and all adjustments properly made; particularly must the share be in good condition. A share badly worn and rounded off like a sled-runner will cause the plow to ride out of the ground and upset easily.

BINDER CANVAS TROUBLE

Trouble is sometimes experienced in getting the binder canvasses to run true. The slats come over the rollers with one end in advance of the other, resulting in their being torn off and the canvas soon rendered useless. When this trouble occurs it is generally due to the frame of the elevator not being properly squared up. The upper end lower rollers, and the elevator sides, should form a perfect rectangle; the rollers should be parallel and the angles should be right angles. New binders sometimes are out of square, because the man who puts them up may be careless and doesn't square the elevators; old binders may be sprung a little. To test the frame, use a carpenter's square in the corners; or with a stick long enough to reach diagonally across the elevator, see if the two diagonals are exactly the same length—they should be if the elevator is properly squared. If the test shows it to be out of square the brace rods running from the main frame to the elevator frame can be adjusted. If the diagonal from the rear top corner to the lower front one is the longer, loosen the nut on the front brace rod, and tighten the rear one; if the other diagonal is the longer, reverse the adjustment. Unless the elevator is properly square the canvas will not run true, slats will be broken, and, as our correspondent has learned, there will be danger of tearing the canvas or pulling out the straps or buckles.

WHY KNOTTERS SOMETIMES MISS

Unbound hundles thrown out when starting to cut with a new hinder or with one that has been overhauled, do not indicate trouble in the binding mechanism unless the hinder continues to throw out loose sheaves after it has cut a short distance. Paint on new hinders, or rust on old ones may cause loose hundles to be thrown out. The trouble will be overcome as soon as the paint or rust wears off.

However, if the machine continues to discharge hundles without hindering them, after proceeding a short distance, examine the twine knife. Like any edged tool this becomes dulled by use and should be sharpened occasionally. A small whetstone or a small mill file should be used for this purpose. Try to maintain the original bevel of the knife, with a clean, sharp, cutting edge. Never use a file on the knotter itself. If unbound bundles continue to be thrown out after the knife has been sharpened, the trouble lies somewhere else, and a systematic inspection of the hands should be made to determine its location.

If the hand (fig. 1) is found clinging to the knotter hook or hills with the free end cut off square, it indicates that the twine disc is too loose or the twine tension too tight. The remedy is to loosen the tension, and if this does not correct the trouble tighten the disc spring slightly.

If the hand (fig. 2) is found on the knotter hook or hills with loose end ragged or crushed, loosen the twine tension, and if this does not remedy the trouble loosen the disc spring slightly.

If the hand (fig. 3) is found with the hundle with a single knot in one end, but the free end cut off square, tighten the disc spring, and if this does not overcome the difficulty examine the disc for wear. If badly worn the only remedy is to replace the disc with a new one. If this condition of the hand occurs regularly with each fifth, sixth or seventh hundle, look for wear in one notch of the disc. A very loose or broken twine tension may be the cause of the twine not being stretched tightly across the knotter hooks or hills.

If the hand (fig. 4) is found with the hundle with a single knot in one end and the free end ragged or crushed, the twine tension is correct, but the disc spring is very tight. To remedy, loosen disc spring.

If the hand (fig. 5) is found with the hundle, but both ends free from knots and straight, and each end ragged and crushed, the tension is right, but the disc spring is very tight. To remedy, loosen disc spring.

If the hand (fig. 6) is found with the hundle, but both ends free from knots, and folded, showing that the knot was formed but not completed, examine the knotter hook or hills. The knotter hook or hill spring may be too loose or the hook hills worn so badly that the ends were not held sufficiently tight to form a knot. The remedy is to tighten the knotter hook or hill spring, or, if excessive wear is present, replace the knotter hook or hills and shaft complete.

If the hand (fig. 7) is found with the bundle, or clinging to knotter hook or hills, in some cases with the knot perfectly formed but the head broken, the trouble may result from the knotter hook or hill spring being too tight when tying loose hundles. The remedy is to loosen this spring slightly, or set the trip end compressor arm to hold larger and tighter hundles. It may be caused also from a worn cam roller on the stripper arm. The remedy is to supply a new stripper arm complete.

If the bundle is tied with a slip noose (fig. 8) with the twine extending from the discharged hundle to the needle eye, the needle has failed to place the twine in the disc holder, because of excessive wear in the needle eye itself. If the needle eye does not have a special wearing piece, the only remedy is to supply a new needle. In replacing the needle the point should protrude slightly above the deck when needle is at rest.

As applying to some makes of machines sometimes the hundle is tied properly but with a bow knot in one end. This knot simply includes the short piece of twine which other makes of machines cut loose and which is lost by the machines that tie a hard knot. This knot withstands rough handling as well as a hard knot, and is not an apparent waste of twine. Knotters properly adjusted will not handle twine that is not reasonably uniform. The remedy is obvious.

FOUND ON KNOTTER HOOK OR BILLS.



FIG. 1



FIG. 2

FOUND WITH BUNDLE.



FIG. 3



FIG. 4



FIG. 5

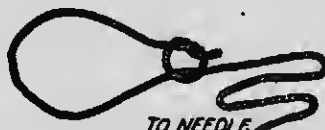


FIG. 6



MAY ALSO BE FOUND ON KNOTTER HOOK OR BILLS

FIG. 7



TO NEEDLE

FIG. 8

The Above Illustration Shows the Way the Knot is Left when the Binder Misses from Some Trouble in the Knotter

CARE OF BELTS

Leather belts should be cleaned and oiled occasionally. Certain belt dressings on the market are decidedly injurious, while others are especially good. Plain neatsfoot oil is a very satisfactory and safe dressing. It will keep the belt soft and pliable if used occasionally. Mineral oils are generally not satisfactory, it is alleged by many users. Rosin is injurious and experienced men claim it is not necessary to use it on a belt in good condition.

When using a leather belt in a horizontal position, it is best to have the under side the driving side for then the sag of the slack side causes much of the belt to be in contact with the pulleys and prevents slipping.

Good rubber belting of uniform width and thickness will resist a greater degree of change of weather than a

leather belt will. Rubber will stand wet or steam better than leather. Rubber belting is less apt to slip. Rubber belting is generally not as lasting as leather and is harder to splice when a break occurs. Rubber belting is made in two to eight ply thickness; a four ply rubber is considered the equal to one ply leather for transmission of power. All oils and greases must be kept away from rubber belts.

Canvas belts are generally used for portable engines. Canvas belts are uniformly strong and durable and will usually stand much hard usage. One large factor which prohibits canvas belts from use in fixed pulleys is the shrinkage and stretching under varying conditions, due to moisture changes. This stretching makes no difference in portable and traction engines, as the engine may be placed at the proper distance for the belt. Four-ply is considered equal to 1-ply leather belt.

ARRANGING THE LINES

Herewith are diagrams showing how to arrange lines for four, five and six-horse teams. Figures one and two show two methods of arranging lines on four horses abreast; figure 3 the arrangement for five

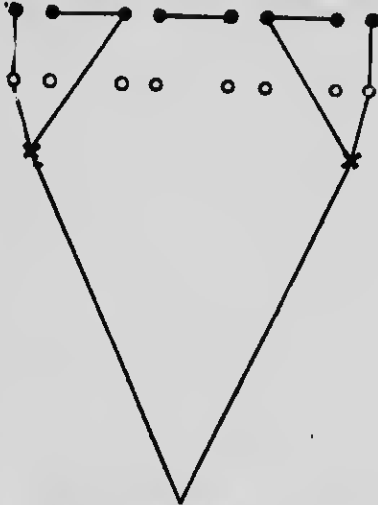


Fig. 1—Four Horses Abreast

horses abreast; figure 4 for five horses tandem; 5 for six horses abreast and 6 for six horses tandem, with two ahead and four behind.

By way of explanation these illustrations, although possibly not in exact proportion, show the position of hits, hames and huckles on lines, and the position of the different lines to these three points. The black dots represent the rings at the ends of each hit; the small circles represent the position of the hames; and X represents the huckle on each line.

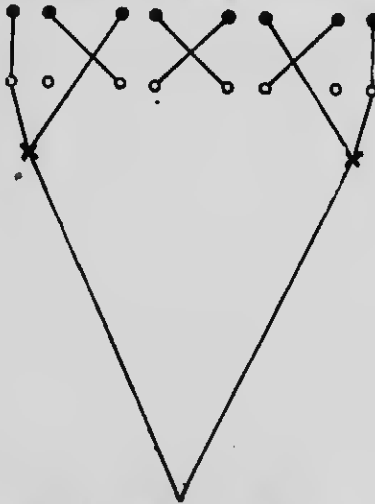


Fig. 2—Four Horses Abreast

Fig. 1 shows the haddlest arrangement of lines for four horses doing regular farm work. The lines are on the outside two, and the heads joined simply by a strap snapped from hit to hit. Where four horses work well together this arrangement is handy and

satisfactory. Some farmers prefer the arrangement shown in Fig. 2, especially where one or two horses in the team are keen. There are certain objections to this arrangement which might be pointed out. Horses find difficulty in turning when their heads are fastened to the hame of the adjoining horse. In addition to this annoyance they can turn but very slowly, and this means loss of time in a busy season. One farmer argued with the writer that such an arrange-

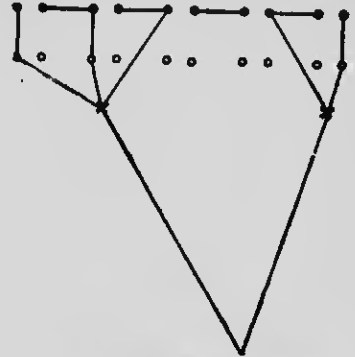


Fig. 3—Five Horses Abreast

ment as shown in fig. 2 was the only method of holding back a keen horse. This is not correct. In a four-horse team where one or two horses are keener than the other two, the keen horse or horses should be driven on the outside. Each outside horse can then be tied to the hame of the horse next him, and thus held back. The inside team can then be connected from hit to bit.

When it comes to hitching more than four horses abreast it is more satisfactory to keep the near line on the second horse from the left, instead of the outside

horse, especially when plowing. Fig. 3 shows this idea clearly. The lines are arranged in the ordinary way on the four right-hand horses, and the fifth horse is driven by an extra piece of line attached to his hit from the huckle on the outside line. This is not so important on the harrow or other implements where the driver can sit directly behind the centre of his team. Fig. 3 shows the position of the lines on a team hitched to a plow, while Fig. 5 shows the position of the lines on six horses hitched abreast to a harrow or cultivator.

Fig. 4 shows a simple arrangement of lines for five horses tandem, and Fig. 6 the same for six horses tandem. Where a driver objects to keeping four lines in his hand he can tie the lines of the hind team behind his back or hang them on the plow, thus driving only the lead team. Another satisfactory arrangement is to doush the line of

the lead team, making them just long enough to snap into the buckles of the lines on the rear team

arrangement for two horses in objections pointed out. Their heads are turned but very busy season. An arrange-

When the traces are snug. The horses are then driven with two lines.

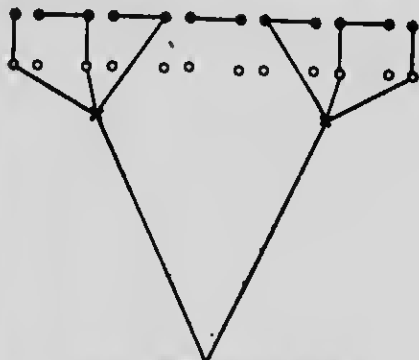


Fig. 5—Six Horses Abreast

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four horses near line on the outside especially when Fig. 3 shows early. The changed in the ray on the used horses. Each horse is an extra attached to the huckle outside line. An important low or other where the sit directly centre of Fig. 3 shows of the lines attached to a le Fig. 5 position of six horses rest to a cultivator.

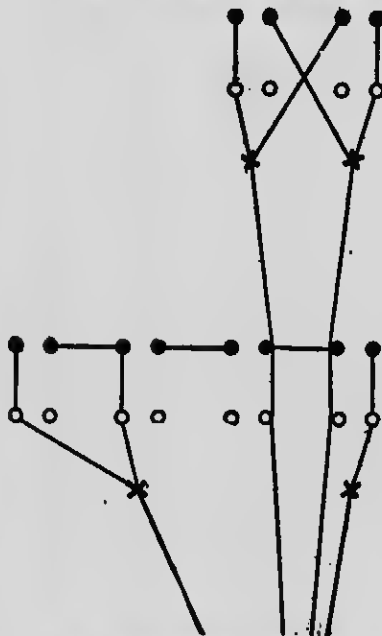


Fig. 6—Six Horses Tandem

EVENERS SIMPLIFIED

There are so many inquiries asking about eveners and how to divide them up accurately that it is the purpose of this discussion to make clear first of all the underlying principles, and second to answer two specific questions.

We all know, and will not dispute the fact, that if one man weighing 150 pounds sits on one end of a 16-foot plank and another man of the same weight sits on the other end that the plank will balance if the fulcrum or the triangular block in Fig. 4 is exactly 8 feet from each end. This gives us the fundamental rule namely that:

The force (P) x the force arm equals the weight (W) x the weight arm. The force arm equals the distance from the point P to the fulcrum, and the weight arm equals the distance from the point W to the fulcrum.

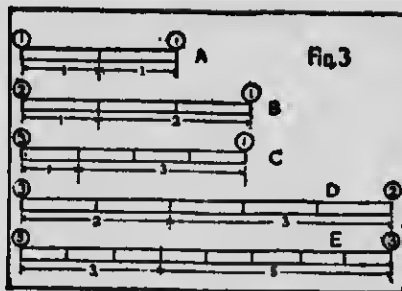


Fig. 3—Dividing Up Eveners

In figure 4a let us apply the above rule.
 $P \times \text{force arm} = W \times \text{weight arm}$
 $150 \times 4 = 150 \times 4$
 $600 = 600$

In Fig. 4 B,
 $250 \times 3 = 150 \times 5$
 $750 = 750$

In Fig. 4 C,
 $450 \times 2 = 150 \times 6$
 $900 = 900$

The closer the fulcrum is to the point at which the pressure is applied the greater must the pressure be. The closer the fulcrum is to the weight the less pressure will be required. In using a crowbar we know that. Now the correct proportioning of eveners depends on understanding the foregoing remarks. We will now consider Fig. 3. The respective distances in each figure are of course between the holes and the eveners would actually be at least 2 inches longer at each end.

A question that comes to us repeatedly is how can we divide up eveners in the ratio of 1 to 1, 2 to 1, 3 to 1, 3 to 2, 5 to 3.

Fig. 3A. Ratio 1-1.—There are two parts so that the length of the eveners between the end holes (in all cases) is divided into 2 parts. When applying our rule of the lever we have

$$1 \times 1 = 1 \times 1$$

$$1 = 1$$

Fig. 3B. Ratio 2-1.—There are three parts so that the length of the eveners is divided into 3, and the one horse gets 2 parts and the 2 horses one part, when we have

$$2 \times 1 = 1 \times 2$$

$$2 = 2$$

Fig. 3C. Ratio 3 to 1.—The proof that our decision is correct. There are four parts so that the length of the eveners is divided into 4. The one horse gets 3 parts and the 3 horses 1 part when

$$3 \times 1 = 1 \times 3$$

$$3 = 3$$

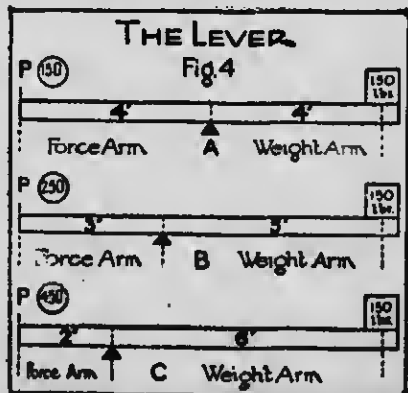


Fig. 4—The Fundamental Rule of Levers

Fig. 3D. Ratio 3 to 2. There are five parts, so that the length of the evener is divided into 5. The 2 horses get 3 parts and the 3 horses 2 parts for their respective lever arms, when
 $2 \times 3 = 3 \times 2$
 $6 = 6$.

Fig. 3E. Ratio 5 to 3—There are eight parts so that the length of the evener is divided into 8 parts. The 5 horses get 3 parts and then 3 horses get 5 parts, when
 $5 \times 3 = 3 \times 5$
 $15 = 15$.

We feel sure that everyone is now absolutely clear and surprised to see how simple the problem is.

Greater horse-power and less man-power in proportion to the work done is more and more the custom each year. With a careful study of this article those who wish to do so can make their own evener adjustments to meet with the changing conditions.

ADJUSTING GANG PLOWS

Oil the plow thoroughly. This means wheels, levers, axles, baile and lifting parts. The exact location of the hitch will vary with the size of horses, but the position of the clevises should be approximately correct. Let the traces be long, and do not use hip straps. Be sure to get the long doubletree of the evener on the land, and the short one on the furrow side of the plow.

With four large horses hitched abreast, and when using high-strap harness, take the traces out of the straps, permitting the traces to have a direct pull. Lengthen the traces as much as possible, without having the neck yoke come against the horses. Jockey the horses in front; that is, tie their heads together so they will not spread. Drive the horses with one pair of lines. Let the main lines extend to the outside horses and the cross lines to the centre horses.

Each furrow wheel should support an equal amount of weight. If there is more weight on the front furrow wheel than on the rear, lower the hitch; if more on the rear than on the front wheel, raise the hitch. The adjustment will vary with heights of horses. Set the front furrow wheel so it will run straight in the corner of the furrow. On gang plows, give the wheel a slight lead toward the land—just enough to hold it in the corner of the furrow.

For the sake of explanation, we will assume that the plowing is to be six inches deep and we have a furrow

row opened to that depth. Set the furrow lever in the ratchet so as to bring the furrow wheel on a level with the plow bottom. In this adjustment, the frames will be level and the plow will continue at a depth of six inches. When plowing around a field, keep the bottoms at their full depth, and turn square corners.

LAGGING A PULLEY

To lag a pulley, soak the leather well in water until it is very soft and pliable, then cut the end square and start at any point on the rim of the pulley, using copper rivets. Place the rivets about two inches apart across the face of the pulley and about three or four inches apart on the circumference. By placing the lagging on when it is wet, you will have a good tight job after it has dried.

HITCHES FOR FOUR OR MORE HORSES

The first thing necessary to know about hitches is the rule of hitches. Many are well acquainted with it, and others are not. If you have two horses on a plow you attach the centre of the doubletree to the plow and two horses equal distance to each side. If you had three horses, as shown in Fig. 1, you have two horses on one end and one horse on the other. If the evener were fastened to the plow in its centre as with

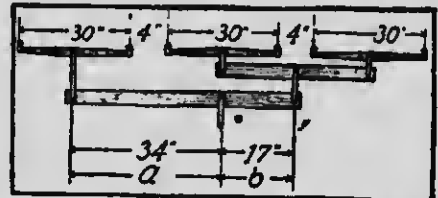
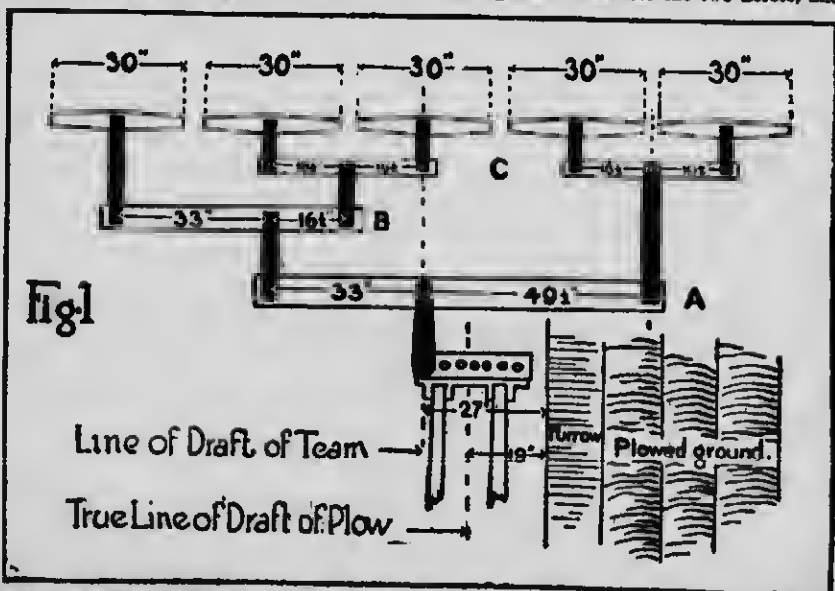


Fig. 1—A Three-Horse Hitch, showing the principle of Eveners. The Evener Arm a is twice the length of b. The length of a x 1 equals length of b x 2.

two horses then the one horse would have to pull as much as the other two. In order to have them all pull equally the one horse is allowed an evener arm twice the length of that on which the two are pulling. So it is in this drawing that one horse has 34-inch evener arm against 17 inch for the two horses, and they all



A Five Horse Evener. The Method for Calculating the Dimensions of this Evener is Outlined in the Preceding Article.

pull their equal share. If there were five horses as in Fig. 7, where one horse pulls against the other four, then the one horse must have exactly four times the leverage to make its share equal. And so it is, no matter how many horses are used. The number of horses multiplied by the length of the lever on one end must equal the number of horses multiplied by the length of lever on the other in order that each bears its share. Knowing this fact, one can commence figuring out a hitch for any number of horses.

After one knows how to equally distribute the load among all the horses in the team as explained above the next consideration is to make the line of draft coincide with the load line. If you just take a block

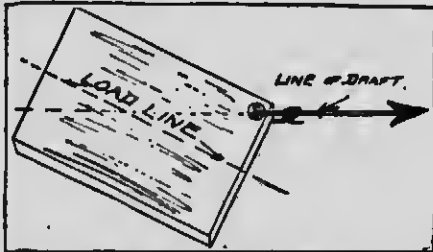


Fig. 2—This picture shows what side draft is on a block of wood. The action is the same on a plow when it is not hitched true with load line.

of wood end attach a string towards one corner the block will pull cornerwise because the line of draft is not near the load line. This is shown in Fig. 2, while in Fig. 3 we have the draft line right on the load line, and the block pulls true. This same thing is true in hitching to plows. If you hitch too far to one side of a plow you get it attempting to draw cornerwise, like the block of wood, but unable to do so to the same extent, because of the wheels and furrows. The force that tends to make the plow run to one side or the other is called side draft. Plows cannot do good work when drawn this way, and they wear out much more rapidly.

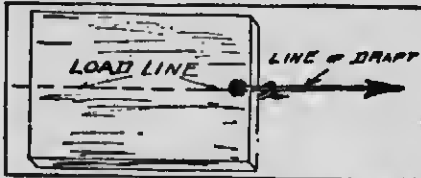


Fig. 3—A block of wood pulled without side draft. Point of attachment is right on the load line.

So we try to have the hitch to plows attached as near to the load line as possible, so that there will be the least possible side draft. By doing this better work is done, the plow does not have to endure the terrible strain and the horses do not have such heavy pulling.

Now take a two-furrow plow. The load line or the point of resistance of each plow is just 2 inches from the

shin on the moldboard. Then the line of load for the two plows is just half way between. This is clearly illustrated in Fig. 4. The two lines A A are the load lines on each plow separately, and the line B B is the

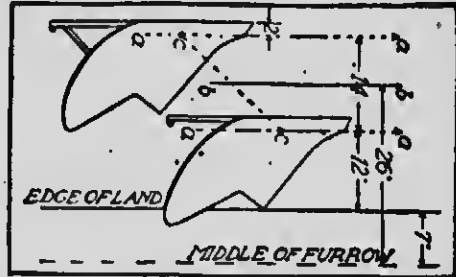


Fig. 4—Drawing showing the line of draft of two 14-inch plows. Lines a-a show lines of load for each bottom and b-b the line of load for the whole gang. It is the true line of hitch.

line of load of the whole gang plow, or the point at which if pull is applied it will draw true. If a three-furrow plow is used the load line will be two inches to the right of the shin of the middle plow. If four plows are used the load line will be midway between the load line of the two middle plows.

Now in order to arrange the line of draft correctly we must have some simple method. We shall consider the most commonly used plow, the 14-inch two-furrow. The right-hand or off horse usually works in the open furrow. The line of pull of this horse may be assumed to be in the middle of the furrow or 7-inch from the furrow edge. Thus the distance from the line of pull of the furrow horse to the load line of the plow is 7-inch to furrow edge and 12-inch to load line of first plow, plus 7-inch to load line of whole gang, or a total of 26-inch. This means that the point at which the furrow horse is hitched should always be about 26-inch from the point at which the evener are attached to the plow, if the draft is to be true in a two-furrow plow. It is, therefore, necessary in designing hitches to bear in mind the rule of hitches and also arrangement of them so that this furrow horse may be about 26 inches from the attachment to the plow.

FOUR HORSES TO PLOW

The simplest way to use four horses to a gang plow is the tandem method, hitching them two end two, both right-hand horses walking in the furrow. It is commonly in use and side draft can be completely eliminated. The evener in this case should be 52 inches long, in order to bring the line of pull 26 inches from the middle of the open furrow. This will tend to spread the horses out a little more than usual, and if they have a tendency to crowd they may be held apart by means of a neck yoke. The forward team may be hitched with long tugs, each forward horse pulling against the horse behind it as illustrated in Fig. 5. The chain to the forward horse is held by a loop to the hame of the rear one. Another method,

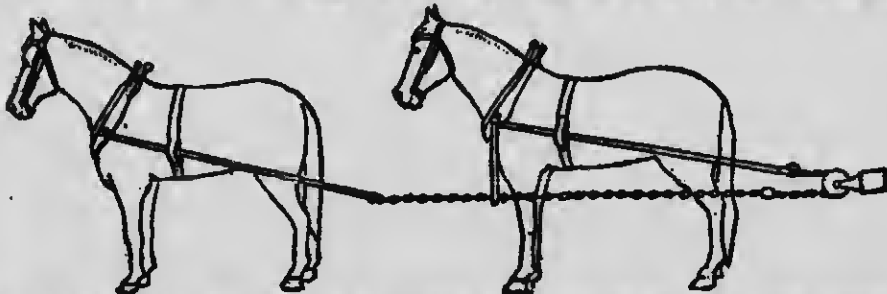


Fig. 5—A System of Equalising the Pull in a Tandem Hitch Pulley on the End of Each Singletree. Each Fore Horse pulls Against its respective Wheeler.

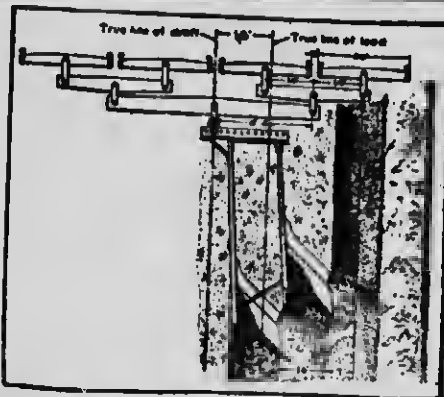


Fig. 6—This shows why it is not convenient to have four horses abreast with one horse in the open furrow and three on the land on a 14-in. two-furrow plow. There is just a 16-inch side draft, which is altogether too much.

and in more common use, is to have the doubletrees on both teams and the one team pull against the other by means of a long bar of iron or a chain and a pulley on the plow.

It is not an easy matter to put four horses abreast on a two-furrow plow with the right horse in the furrow and three on the land without a whole lot of side draft. We have often been asked how to do it, and we have to tell them that it simply cannot be done. The drawing Fig. 6 shows why. Even when making the singletrees 26 inches, which are too narrow for any satisfaction, the distance from the middle of the furrow to the point of attachment to the plow is 44 inches, when it should only be 26 inches. Thus the sidedraft is 18 inches, which is altogether too much in plowing. There is quite a lot of plowing done with this hitch in spite of the heavy sidedraft, but it is not the best of plowing, it is a heavy strain on the plow, and it is much heavier on the horses. It is simply a poor hitch, and is becoming less and less in use. If one horse is put on the plowed ground, one in the furrow and two on the land, then a four horse

abreast hitch without sidedraft is a comparatively easy matter.

FIVE HORSE HITCH

Figure 7 represents an excellent design of a five horse hitch. Three horses are hitched in the rear and two ahead. The two right-hand horses walk in the furrow and the other three on the unplowed ground. This makes the best arrangement possible for five horses. The strungout hitch does not increase the draft, as some people suppose. The length of hitch has no effect whatever upon the draft. The fact that hitching close to a load sometimes appears to make it move easier is to be explained by the fact that in a close hitch the front of the load is lifted off the ground by the sharper angle of the tugs, but any such lifting action on a plow could not be tolerated; hence there is absolutely nothing gained by hitching close to a plow.

The five horse hitch, with three horses behind and two ahead and the fifth horse to the left of the two rear horses, necessitates an evener with a long arm for the one horse which shall be four times the length of the short arm. The lengths of the singletrees must be just right for the size of bottom, and the only way we can readily arrive at all dimensions is to lay the problem out on a big board or on a piece of paper.

First we will draw the lines a—a and b—b. The first line represents the edge of the unplowed ground and the second the outer edge of the furrow. The line c—c represents the true line of draft for a two-bottom fourteen-inch plow, and this line lies twenty-six inches from d—d, the midline of the furrow. We are now in a position to sketch in the first singletree A. We will make it the usual length—thirty inches to begin with—then we will provide four inches of clearance for its mate B. This will locate the line e—e, which passes through the pivot point of the doubletrees of the forward team. Extending the line e—e downward, we find it is nine inches from the line c—c, so nine inches is the length of the short arm of the evener. The long arm, for the left-hand horse, must be thirty-six inches long, so we will sketch in the singletrees C, D and E. But something appears to be wrong, for the end of the tree C overlaps the one on its right. We could make each of the singletrees twenty-eight inches long and obtain one inch of clearance, which would be permissible, or we can leave all the singletrees thirty inches long and offset the hitch from the true line of draft one inch to the left, thus making the short arm of the evener ten inches

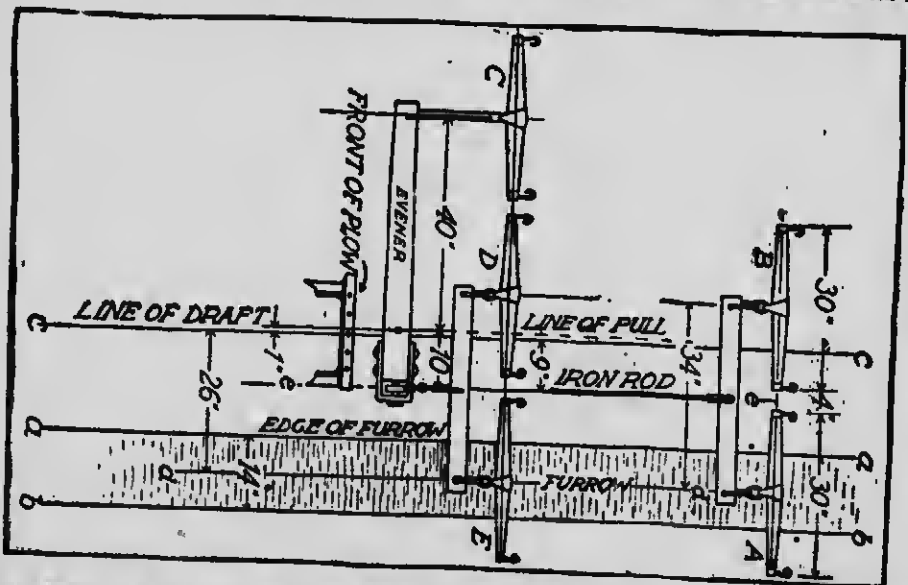


Fig 7—Method of Laying Out a Five-Horse Tandem Hitch. It is a good hitch with only a 1-inch Side Draft.

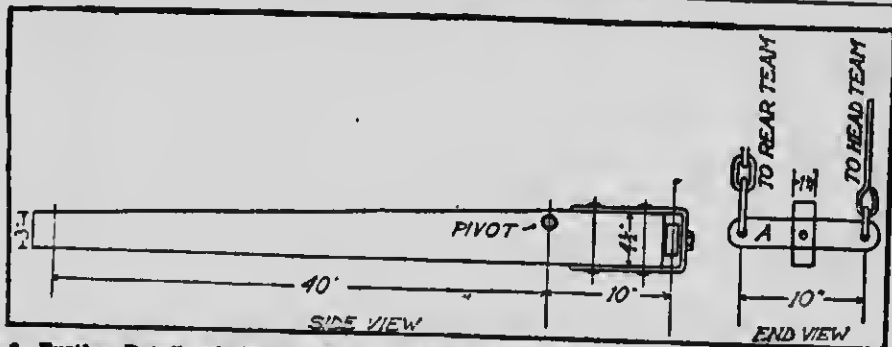


Fig 8—Further Details of the Five-Horse Tandem Evener in Fig. 7. A 10-inch Bar of Iron on a Swivel takes the place of a Pulley.

long and the long arm forty inches, as shown in the drawing. This provides a better solution of the problem, as a one-inch offset will not make an appreciable amount of sidraft.

There are two ways of attaching the two two-horse teams to the short end of the evener. One way is to use a pulley and the other is to use a short vertical swivel pivoted to the end of the evener as shown in Fig. 8. The rear team is hitched directly to this chain and the forward team is hitched to the other end.

An evener with five horses abreast can be easily made with a piece of 2 inches x 6 inches oak or ash, 79 inches long. Bore holes two inches from each end and make the centre hole 30 inches from one end hole and 45 inches from the other end hole. The two-horse doubletree is put on the long end and three horses on the short end. The dimensions are shown in Fig. 9. With this evener the singletrees are 28 inches wide and a 2-inch space between them. Three horses work on the land, one horse in the furrow and one horse on the plowed ground. The distance from the line of pull by the furrow horse to the point of hitching to the plow is just 30 inches, or 4 inches out of true with the true line of draft. This is fair and will work all right.

SIX HORSE EVENER

If six horses are to be worked on a 14-inch two-furrow plow we can use two teams in tandem, just as for a five-horse tandem hitch, as shown in Fig. 7, and two to the side on the long arm of the evener. If we use singletrees the same length as we used before, a little computation will show that the line of draft will be thirteen inches offset from the load line. The plows would pull hard, they would not run true and they probably would not scour properly. Moreover the strain on the plow frame would be greatly augmented and breakages would be more likely to occur. Such an arrangement is bad and ought not to be tolerated.

We might try to use shorter singletrees and see if we can reduce the offset. Now the very shortest singletrees that can be used are twenty-six inches long. That is too short for heavy draft horses, but here is a case where we must go to the limit. If we lay out a

four-horse evener and reduce the clearance between the singletrees to one inch, we can construct a set of whiffletrees that will give satisfactory service. The length of the main evener will be 54 inches, and, since four horses are hitched to one end and two at the other, the pivot point will be located eighteen inches from the right end or thirty-one and a half inches from the line of pull of the furrow horse. This will work very well for a two-plow sixteen-inch gang, but will mean an offset of five and a half inches for a fourteen-inch gang, which is not very good. There would still be the objection of having very short singletrees that would rub the horses' legs and make them sore.

A much better six-horse hitch is the tandem hitch, three on the plow and three abreast, using a three-horse hitch as shown in Fig. 10. If 28-inch singletrees are used with one-inch clearance between them, the line of draft for a 14-inch gang will be only 3 inches out of the load line, and if two 16-inch bottoms are used the offset will be only one inch. It is not possible to hitch three and three in the ordinary way with doubletrees on the front trio pulling over a pulley against the back three because the rod or chain would have to go forward between the legs of the centre wheeler. It is, therefore, necessary to have each fore horse pulling against each wheeler, using eveners as in Fig. 10, with an arrangement as in Fig. 5. Thus no eveners are necessary on the lead three and six pulleys do the equalizing. It may be noticed that these eveners are different from those discussed previously, as the point of attachment of the load is exactly in the centre of the main evener. In these cases the middle horse is given the advantage in working through a lever arm just twice as long as that of his two mates. In other words, the distance B in Fig. 10 is exactly twice the distance of A.

Another system of using six horses is hitching them abreast. It is not done very often in plowing and is not a good practice. However, there are those who do use it in special circumstances. One can be made with 28-inch singletrees. There is 11 inches sidraft for a 14-inch two-furrow plow and 7 inches sidraft for 16-inch two-furrow and 4 inches sidraft for a 14-inch three-furrow plow. In using this hitch two horses are on the plowed ground, one horse in the open furrow and three horses on the land.

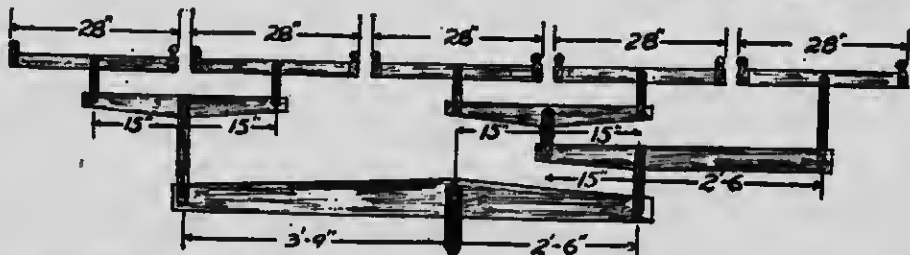


Fig. 9—Five Horses Abreast with Three on Land, One in the Open Furrow and One on Plowed Land.

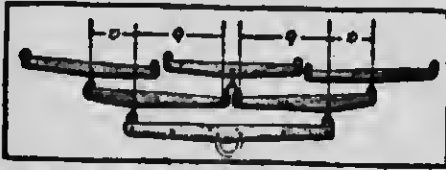


Fig. 10—The method of arranging hitch for the Wheel Team in Six-Horse Tandem (three and three). The lever arms *b* for the middle horse are twice the length of *a* for the outside horses. Pulleys are put on the ends of the single trees, and the pull equalised with each forward horse. The right hand horses walk in the furrow.

SEVEN HORSE HITCH

Seven-horse hitches are sometimes made up after the style shown in Fig. 11, but they are not very satisfactory for any purpose, and certainly not for plowing. A reference to the diagram will show that if the right-hand horse walks in the furrow, and thirty-inch singletrees are used, spaced four inches apart, the line of pull will be fifty-two inches from the middle of the last furrow placed. This is entirely too much offset for any two or three bottom plow made. If

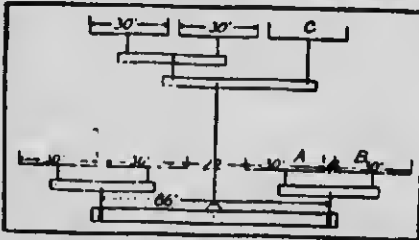


Fig. 11—A Seven-Horse Hitch with Five Horses on the Land, One in the Open Furrow and One on the Plowed Ground.

horses A and C are made to walk in the furrow and B on the plowed ground, it would be possible to get along with a two-bottom gang, but the soft footing would throw a tremendous burden upon horse B not justified by the slight increase in power. A better arrangement is the five-horse tandem hitch, and next the six-horse tandem.

EIGHT HORSE HITCH

The eight-horse hitch for plowing purposes is the best arranged tandem, as shown in Fig. 12. It is a simple hitch to figure out. A four-horse abreast hitch is used with pulleys on the end of each singletree, each lead horse pulling against its respective wheeler. Another method is to have a four-horse evener on both the lead and wheel horses, and having a single pulley at the plow by which the pulling force of each lot is equalized. The two right-hand horses work on the plowed ground, two in the furrow and four on the land. The singletrees could be 30 inches long. The doubletrees 24 inches long, and evener on the plow 54 inches long. These figures are from hole to hole without allowance for ends. With these dimensions

there will be 20 inches between each set of doubletrees. The sidedraft will only be 1 inch and it can be made by figuring closely, not to have any sidedraft at all.

We have considered this problem of hitches in relation to 14-inch two-furrow plows, because they are

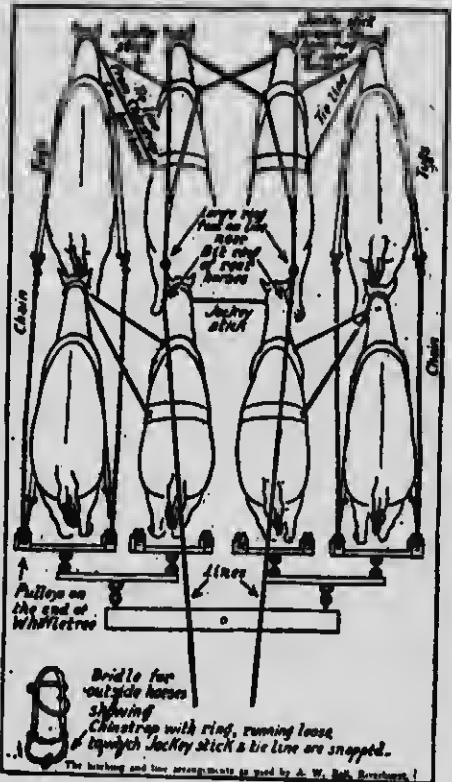


Fig. 12—An Eight-Horse Tandem Hitch, showing clearly the method of hitching and line arrangement.

most commonly in use. If we had used 16-inch two-furrow plows the load line or true line of draft would have been 30 inches from the middle of the open furrow, and in a 14-inch three-furrow plow the line of load would have been 33 inches from the middle of the open furrow. In figuring out hitches one must always keep in mind the two factors, viz., the rule of hitches and where the line of draft is located.

HITCHES FOR DRILLS

We have received a lot of enquiries about how to hitch five horses to a drill. Manufacturers of drills do not advise altering them for five horses. On most four-horse eveners it is possible to use six horses by making certain changes, and it is probably better

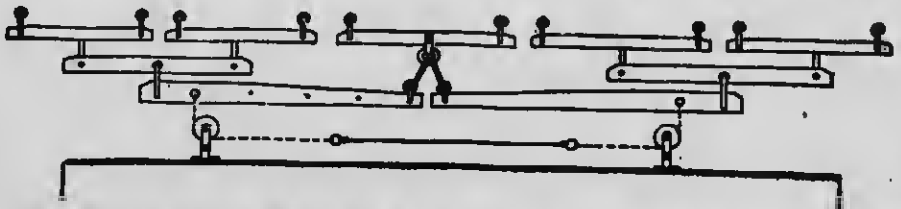


Fig. 1—Five Horses on a Four-Horse Drill with three between the tongues and two on the outside.

A 'six horse hitch' for Drill.

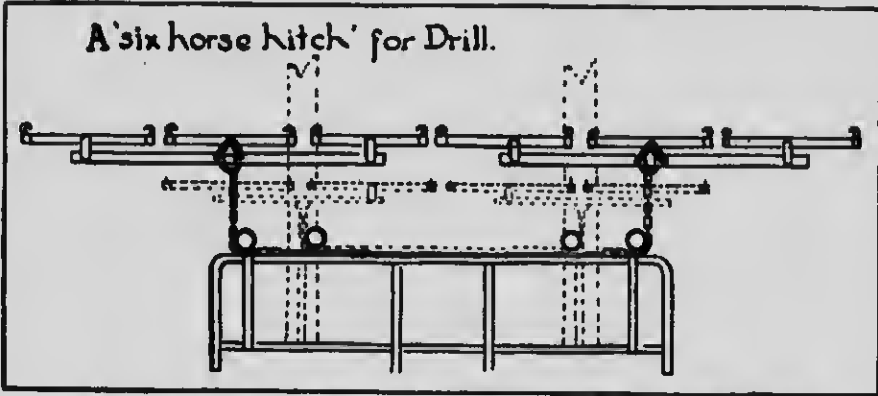


Fig. 2—Method of arranging Hitch for Six Horses on a Four-Horse Drill.

to use six rather than five where more power is desired. One of our Saskatchewan subscribers, however, gives the following method and drawing, as shown in Fig. 1 for using five horses. He claims it entirely satisfactory.

"For the benefit of those who find their 20 and 22 spout drills too heavy for four horses I give them my plan of hitching five on a drill. I bought two new pole support castings and drilled holes in the frame so that the poles could be placed two drawbar widths nearer the wheels at each side. The two outside pole braces had to be shortened also. The pulleys for chain draw required to be about five inches farther apart for five horses than for four. All the details necessary in making the five horse evener is to see that the single horse has four times as great a leverage on each side as the two horses. It is actually pulling against the four, or half a horse against two." Three horses are between the poles and two outside."

It is an easy matter to put six horses on a drill, as shown in Fig. 2. The displacement of the four-horse hitch for the six-horse hitch is clearly shown. Two extra braces should be placed in the frame at the points of draft. The drawbar or chain pulley must be lengthened and the pulleys through which the chain travels must be placed nearer the outer edge of the frame, all of which is shown in the illustration. The poles do not require to be changed as two horses are used between the poles and two on each outer side.

In any case of altering drills it is not wise to use any ordinary five or six-horse evener with a center hitch, as unless the frame is considerably strengthened for the center draft it would not stand the strain.

TWELVE HORSE HITCH

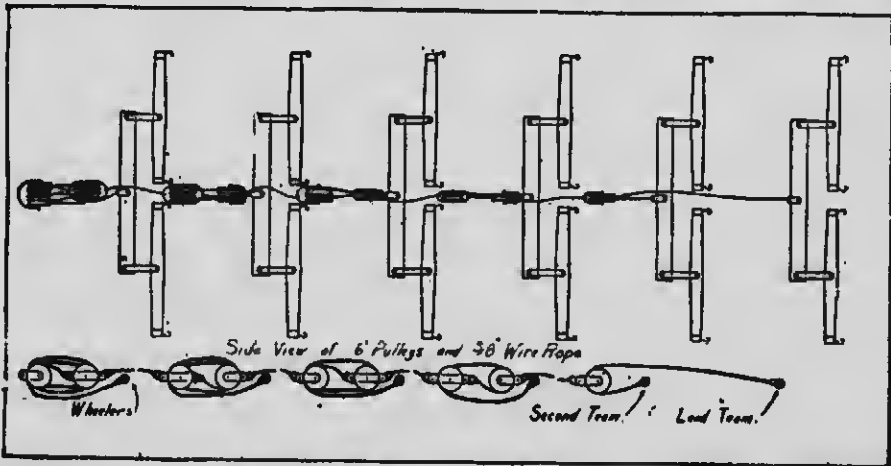
The accompanying sketch illustrates a 12-horse hitch. The pulleys used should be about six inches in diameter, and may be used either with three-eighth inch wire cable or five-sixteenth inch chain. If chain is used five-eighth inch iron rods 11 feet long, with welded eyes, should be used between each set of whiffletrees. The blocks should be threaded as shown in the diagram as this divides the draft equally between all the teams.

A SAFE RULE TO FOLLOW

Hitch long enough and high enough so that you have as much weight on the front furrow wheel as you have on the rear furrow. A long hitch will accomplish this rather than a high hitch, as the long hitch affords more room for your horses to walk.

You can test this very nicely after you have opened up your land and your plow is running at the depth you want it to run. Slip off the seat and grab the front furrow wheel and see how much effort it takes for you to slide it. Then do the same thing to the rear furrow wheel. Adjust your hitch until you have as much resistance on the front furrow wheel as you have on the rear furrow wheel.

With the vertical adjustment of your clevis right, move your evener clevis sidewise on the cross clevis of the plow, whether it be a sulky or gang plow, until your team walks comparatively straight. Do not insist on hitching directly in front of the point of the beam on a single-bottom plow, or between the point of the two beams on a two-bottom plow. If you do, and



Method for Hitching Twelve Horses Tandem

use fairly good-sized horses, they will have to walk sideways and the traces will chafe their legs. With the first hitch adjustment proper, you will have sufficient weight on the front furrow wheel so that you can get over far enough on the cross clevis to allow your horses to walk straight and free. Do not lay aside the evener recommended by a plow manufacturer who has worked for years and years perfecting such an evener and plow, for any of the new-fangled "patent" eveners that you may find offered for sale to-day, and which usually prove very unsatisfactory.

STARTING A COOL ENGINE

The most serious effect of cold weather on gas engine operation is attributable to the fact that cold retards the vaporizing of the fuel. Gasoline as a liquid will not burn; it must first be turned into a vapor and this vapor mixed with a certain amount of air. A thin spray of gasoline in warm air will quickly turn to a vapor and mix with the surrounding air, but at low temperature a considerable part of such a spray will remain a liquid, hence will not make an explosive mixture. The remedy is obvious. A greater quantity of gasoline must be furnished so as to give off more vapor in order to make a mixture rich enough to be combustible, or the air must be heated so the gasoline will vaporize more readily, or a combination of these expedients must be tried.

Priming the Engine

If the weather is only moderately cold, it is usually sufficient to prime the engine in some way, that is, inject a small quantity of gasoline (about a spoonful) into the cylinder, arbitrarily either through a petcock or priming plug, in order that more fuel may be present, hence more vapor. Whenever an engine is primed, a short time should be allowed for the fuel to vaporize and mix with the air before attempting to crank the engine. If this is not done the vapor will pass out a little at a time through the exhaust valve as the engine is cranked, and the priming will not serve its purpose.

Methods of Heating

In very cold weather, however, priming with ordinary commercial gasoline will sometimes be insufficient, and heat must be applied by some means in order to produce vaporization of the fuel. A very satisfactory way to apply heat is to put some hot water into the cooling system, thus warming the cylinders and assisting in vaporizing the gasoline that is drawn in with the charge or injected as priming. In this case also the engine should be allowed to stand a few minutes to permit the gasoline to vaporize. It is not necessary that the entire cooling system be filled with hot water; if enough is used to heat the cylinders so the engine will start, cold water may then be added until the radiator is full. This method, of course, will be practicable only with small or medium-sized engines; with some of the larger sizes of tractors the amount of hot water usually available will have little effect used in this way.

If only a little hot water is available, it may be more effective if poured slowly over the intake manifold, and the carburetor as well, if the carburetor is covered so no water can enter it. A very effective way of heating the intake manifold is to wrap a cloth around it and pour the hot water over the cloth, or dip the cloth in hot water and then wrap it around the manifold.

Heating the Manifold

If the manifold can be heated it will warm the air that touches it as it enters the engine; this warm air will cause the gasoline spray which it carries to vaporize. A greater proportion of the air passing through a small pipe comes in contact with the walls of the pipe than in the case of a large one, this method works best with engines having a comparatively small manifold. When depending upon heat from the manifold to warm the air, the engine should be cranked fairly rapidly, so as not to allow the warmed mixture to remain long in contact with the cold walls of the combustion chamber and so cause the vapor to condense into liquid again.

There are frequently occasions when an engine must be started in cold weather under conditions where hot water can not be obtained, and in such cases some other means of applying heat must be used. Some people

makes use of a blowtorch to apply the heat to the intake manifold, or, by removing a spark plug or igniter block, heat the combustion chamber itself.

The use of an open flame around a gas engine at ordinary temperatures is not to be recommended, on account of the possibility of fire. It always introduces an element of danger.

Heating Spark Plugs

One of the most effective methods of starting a cold engine, and one absolutely safe, is to remove the spark plug (or igniter block) and heat it in a fire or in the flame of a blowtorch, prime the engine, and then quickly replace the spark plug. The charge is almost sure to ignite. A drop or two of gasoline put on the inside of the plug just before replacing it insures the presence of vaporized fuel near the spark when the engine is cranked.

Where, for any reason, it is impracticable or inadvisable to apply heat in any of the ways indicated it may be possible to heat a piece of metal pipe the size of the air intake of the carburetor, then place this so all the air entering the carburetor must pass through it. This is nearly as effective as a heated manifold. Such a pipe may be made red hot if desired.

Use of Ether

Another means of starting engines in cold weather, which is practiced to a considerable extent, is to provide some very volatile fuel with which to prime it, ether or "high test" gasoline being most commonly used. If ether is used care must be exercised not to use too much as dangerous pressures may be created because of the rapidity with which it burns. There is an danger in the high-test gasoline.

BEST TYPE OF DRILL

Single disc drills are more commonly used than any others. Double disc drills come second and press drills third. Under average conditions the single disc drill does better work than the double disc. The double disc drill is superior to the single disc when the seed bed is in perfect shape; where the seed bed is a little rough, the surface uneven and considerable trash or stubble in the soil, the single disc will make the better job. The same holds for soil that is hard and also where it is wet. Hard soil requires some cultivation, and the single disc is preferable; wet soil does not cover in behind a double disc as well as behind a single disc. The single disc drill will do better work on stubble than the double disc.

Unfortunately there are no data on drills. The foregoing statements are drawn in a general way from users' experience. So far as we know, tests covering several years' work have never been undertaken to determine whether a single disc or a double disc will do the better work, and the soil conditions each is best adapted to. Generally speaking where a man is buying one drill to do all his work, and most men are so fixed that one kind of drill is all they can afford to own, the single disc will give more satisfactory service and will be most generally useful.

Press drills have been coming into use quite extensively the last few years. The press drill has a number of advantages over the single or double disc. In the first place it ensures the earliest germination of the seed. Grain comes up first where the horses' feet press the soil or where the drill wheels have run. Everybody has noticed that. This principle is made use of in the press drill and by means of a wheel behind each grain spout the soil is pressed firmly about the seed in the furrow. With an ordinary disc drill of either type the soil is not packed about the seed. Press drills save labor because the packer does not have to be used after seeding. Single disc press drills seem to work in best advantage.

SALT EXTINGUISHES BURNING CHIMNEY

When a chimney is burning out, shut all the doors of the room so as to prevent any current of air up the chimney, then throw a handful of common salt upon the fire in the grate or the stove. This will extinguish the fire in the chimney. In the process of burning the salt, muriatic acid gas is evolved, which is a good extinguisher of fire.

MAKING CONCRETE FENCE POSTS

In Fig. 1 is shown a simple, easily made gang mold. This is constructed to make a post 4 by 5 in. at the bottom, 3 by 4 inch at the top, and 7 feet long. The forms are made of 1½ inch pine, the end pieces being held in place by screen door hooks. It is seen that the posts alternate bottom with top at each end of the form. It is desirable to place triangular strips, having 1 inch faces in the bottom of each mold to cut off the sharp corners. It is not so convenient to do this at the top, though if the top is used as the face of the post it is not so necessary that the corners be cut off.

Fence posts are usually made from a 1-2-4 mixture. A 1-2½-5 mixture is frequently recommended, but failures are likely to result, and the extra cost of the richer mixture is very small when compared to the probable life of the finished post. If bank-run gravel is used, it should first be run over a ½ inch screen to remove the large pebbles and then over a ¼ inch screen to separate the sand from the coarse aggregate. No particles should be larger than ¾ inch in diameter.

A concrete post without reinforcing material is almost worthless. In fact, the post is just about as strong as this material makes it, since the concrete itself will stand but a very small bending stress. The reinforcing rods or wires should be so distributed in the post that they will be put under stress when the post is subjected to a bending stress. This simply means, in the case of a rectangular post, that they be put as near the corners as possible, being not nearer than one inch to the surface. Fig. 1 shows one way of preparing the rods for placing in the mold. Various materials may be used for reinforcing posts. Ordinary No. 8 or No. 9 fencing wire is very good. Two No. 12 fence wires twisted together make excellent material, for the twist does away with the danger of the concrete slipping on the wires. One-quarter inch round iron rods in 7 foot lengths, make perhaps the best material that it is possible to secure.

The materials should be mixed, a medium-wet mixture being best. After the forms have been thoroughly oiled, about 1 in. of concrete should be placed in the molds, leveled, and tamped. Two reinforcing wires should then be put in, about 1 in. from the sides, and the molds filled to within 1 in. of the top, the mixture being thoroughly tamped while it is being placed, or until water comes to the surface. The remaining rods should then be placed and the filling completed. The sides of the posts should be thoroughly spaded with a trowel or other tool to make them as smooth as possible, and a trowel should be used also to finish the surface of the top.

The forms may be removed on the second or third day if the work is carefully done, but the posts should

not be disturbed for at least one week. If in a dry place, they should be sprinkled daily while curing. They should not be set for at least one month after being made. There is a tendency to move the posts within a few days after they have been made, because

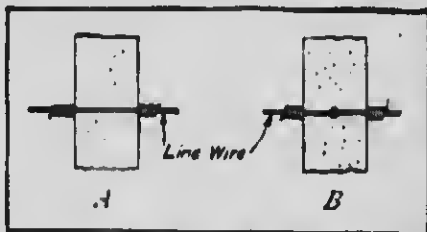


Fig. 3—This cut shows the best method for fastening wire to posts.

they seem to be thoroughly hard. This is a mistake, however, as the posts may be greatly injured by being handled too soon.

End and corner posts are usually made 3 by 3 in., or 10 by 10 in. square. They may be made in molds and set as line posts are, or they may be molded in place. The reinforcing of an end post is even more important than that of the line posts. At least ten wires or rods should be used, evenly distributed near the four sides. Gas pipe, if less than 3 in. in diameter, placed in the center of the post does not constitute adequate reinforcing.

Fig. 2 shows a form that has been used for molding end posts in place. The concrete brace is molded with the post. This is not essential, however, since the brace may be separately molded and then used as an ordinary timber brace; in this case a block should be nailed to the inside of the post form at the proper height to make a hole to take the end of the brace. The same thing should be done with the brace post. Other forms and other methods of bracing will suggest themselves as one becomes used to working with concrete. Gate hinges and gate latches may be set in the posts as they are being molded.

In most concrete fence posts the only method used for fastening the fence to the posts is that of wrapping a small soft iron wire about the post and around the line wires, as shown in Fig. 3-A. This method, in the main, is satisfactory, though there is sometimes a

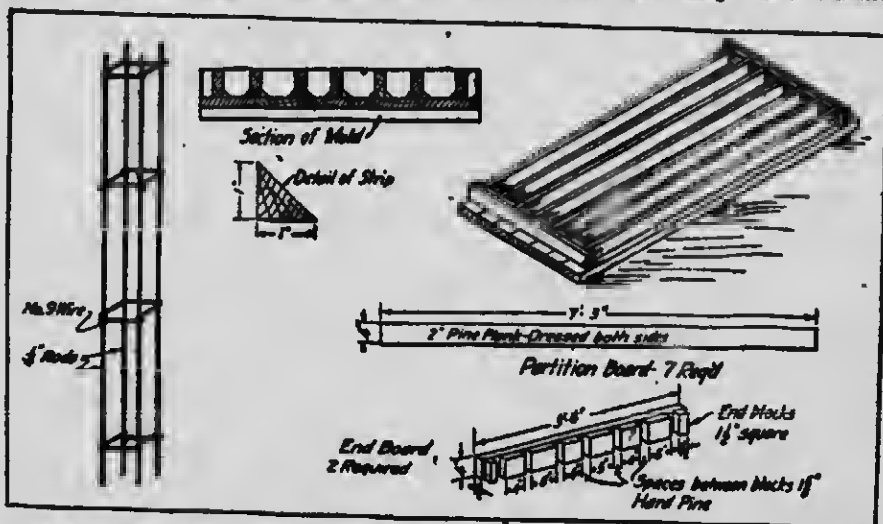


Fig. 1—Showing details of a good Mould for making Concrete Fence Posts. At the left is shown a method of preparing the re-inforcing rods.

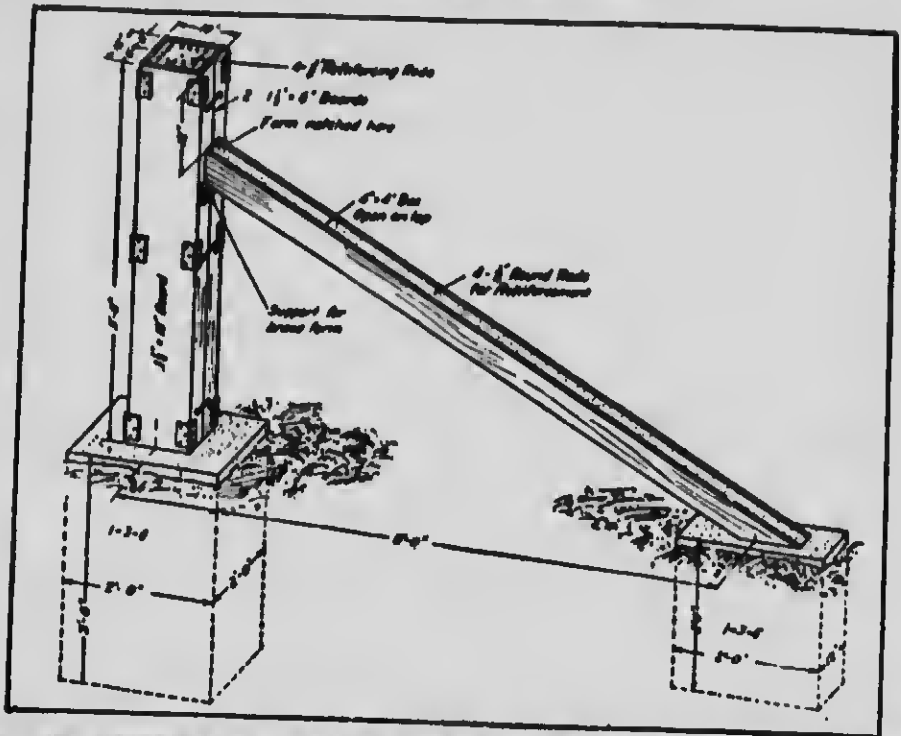


Fig. 2—The construction of a Mould for Concrete Corner or End Post with Concrete Brace in place. This Mould can be taken down and used elsewhere.

tendency for the fastening wires to slip on the post. If, while the post is being molded, short three-eighths inch greased rods are inserted in the concrete at the proper distances (the distance depending upon the spacing of the wires in the fence), and then removed after the post has hardened, one of the very best means for fastening the fence is provided. This method is illustrated in Fig. 3-B.

MIXING CONCRETE

A watertight mixing platform, large enough so that two men using shovels can work upon it at one time, is needed. This platform should be made preferably of 2 by 6-inch plank, tongued and grooved so that tight joints will be formed to prevent the loss of cement carried away when adding mixing water to the materials. These planks may be nailed to three 2 by 4's set on edge. The two outside ones may have holes bored near the end so that if necessary to move the platform from place to place, clevises and a chain may be attached so a horse can be hitched to the platform to drag it. Two sides and one end of the platform should have a strip nailed along the edge, projecting about 2 inches above the top of the platform to prevent materials from being washed or shoveled off the platform while mixing.

Whether concrete is mixed by hand or machine, a measuring box is necessary so that the sand and pebbles or broken stone can be properly proportioned. Such a device is really a bottomless box, and can be made of 1 or 4 cubic feet capacity; in the latter case, marks should be made at proper levels on the inside to indicate capacities of 1, 2 and 3 cubic feet. When used, the measuring box is set on the mixing platform and after the required amount of sand has been shoveled in and measured, the box is raised and the sand spread about in an even layer on the mixing platform.

The cement, which need not be measured, as each sack may be considered 1 cubic foot, is spread in an even layer on top of the sand. Square-pointed shovels

are used to turn the cement and sand two or three times, or more if necessary, until the streaks of brown and gray have merged.

Gravel stone with the dirt sifted out by throwing it over a one-quarter inch screen are then measured and spread in a layer on top of the cement and sand and all of the material is again mixed by turning with shovels. Then a depression or hollow is shoveled in the center and water added gently, while two or more men turn the materials with square-pointed shovels, adding water while this is being done, until the cement, sand and pebbles have been thoroughly and uniformly mixed and the quaky consistency obtained. The proportions for making foundations are one of cement, three of sand and six gravel, each measured separately. If bank run gravel is used it is not necessary to use sand. In this case one of cement to five of gravel are the proportions for a good job.

HOME-MADE SCRUB CUTTER

A reader enquires about a home-made scrub cutter and probably I can help him out in this matter. I have one on my place which the local blacksmith and myself made last year. The pattern was obtained from a friend of mine. This scrub cutter will cut willow and poplar scrub anywhere from one inch to four inches in thickness and make a clean job of it. Anything less than one inch we cut with the mower, and anything over 4 inches we cut with the axe. Of the latter kind we have very little. We have cut 15 bluffs with it this past 12 months, and it cuts a swath 2 feet wide. I have nearly 100 acres of scrub to cut and find it very useful.

The materials required are 2 pieces of 6 inches x 6 inches x 18 feet long, spruce or fir timber; 1 piece of 5 inches x 3 inches x 3 feet long oak or ash for draw bar; 1 piece of plow share steel 8 feet long, 8 inches wide, one quarter inch thick for blade; 4 brace irons $2\frac{1}{2}$ x $\frac{1}{2}$ inch to hold the blade to the 6 x 6-inch timbers; 2 draw rods $\frac{1}{2}$ or $\frac{3}{8}$ inch round iron; 2 chains, one 2 ft.

6 inches long and the other 2 ft. 6 inches to attach to doubletrees; 2 strong binder truck wheels with 6 ft. axle to fit; 1 fender about 1 ft. long, 2½ x ¾ inch in use. One piece of sheet iron, 7 inches wide, 12 gauge, and about 2 ft. long.

In making it the left hand 6 x 6 inch timber is sawn to taper to one inch at the nose. It is bolted sideways onto the other 6 x 6 inch timber. Now put on the axle and wheels so that the tail end is up, and the nose on the ground. Lay the blade on the ground just under the nose and set the heel of the blade 2 feet from the main timber. Put on 4 brass irons, all of which will need bending down. The sheet iron, 7 inches wide, 12 gauge and about 2 feet long is put around the nose to prevent brush from getting between the 6 x 6 inch timbers and blade, and to come far enough back for 2 bolts that pass through the oak or ash draw bar, the blade and the sheet iron. Two ¼ or ⅝ inch draw rods connect the draw bar to the left 6 x 6 inch timber by a yoke for bolts through them and the timber. The draw bar is connected with the double tree by two chains, one 2 ft. 6 inches long and 7 16 inch in size, the other a ¾ inch chain and 2 ft. 6 inches long. The drawing shows a little different arrangement which may work just as well. The end of the timber on the right side is 1 ft. 6 inches from the axle, and the end of the left timber is 1 ft. 8 inches from the axle. The space between the ends of the two timbers

is 6 ft. 7 in. inside measurement. The blade as before mentioned is 8 ft. long 8 inches wide and 1½ inch thick. The edge of it is hammered out sharp just like a plow share. The last inch of the cutting edge is quite sharp, and then filed up as sharp as an ear. The horses draw in line with the right timber and the wheels run in line with the left timber so as to draw the blade into out. We drive four horses tandem on this outfit, the keenest horse on the right side so as to keep well out of the way of the blade. This is particularly necessary in turning around. We put a platform on the front end 2 ft. a 3 ft. to stand on and have two 2 x 4 inch uprights with a cross bar at the right side to hold on to and keep safe from the blade when it strikes a tree. Another platform for holding stones is put on the tail end just in front of the axle and wheels to hold it down. The binder truck wheels must have a flange on them so that with the weight of stones the knife will be held up to the out, and these must be placed on the right hand side of the timbers. Flat tire wheels slip sideways. If the blade draws into the ground hammer the edge up a little and if it draws too high hammer it down. In fairly thick grass paper and willow this outfit will keep four men alive. There is a great interest in better methods of cutting scrub, especially since labor is costing so much. This home made implement has been a great saving to me, and may help out a good many others.

CALIBRATING THE DRILL

When the ordinary grain drill is used for sowing grass seed, flax and others of the small seeded crops, it is desirable to know whether it is sowing too much or too little seed per acre. Most drills of modern make are equipped with indicators marked for flax sowing, but where grass seed is sown as it sometimes is, especially hroma and western rye, with a mixture of some heavier seed to make it work through the drill, it is well to test the seeder before starting and regulate it to sow the right amount per acre.

To do this divide the number of square feet in an acre (43,560) by the width of the drill in feet. In the ordinary drill, with the furrow opener machines apart, this will be just half the number of rows. Multiply the result by the circumference of the drive wheel in feet. This will give the number of revolutions the wheel will make in sowing an acre.

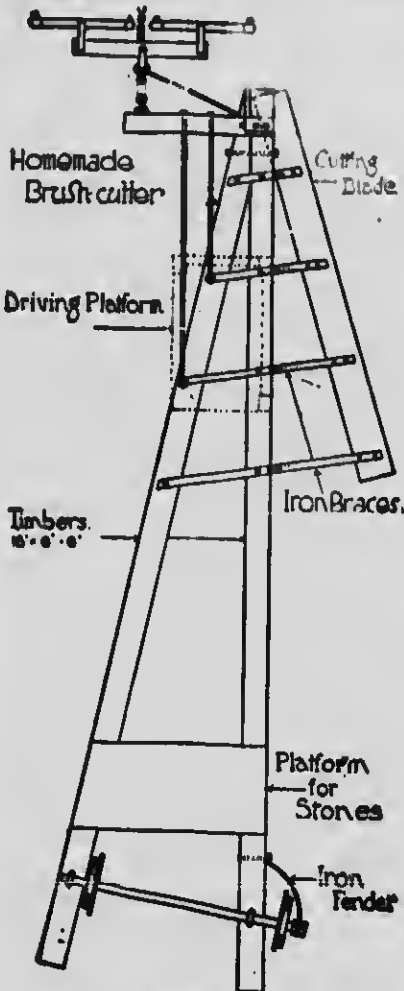
Next jack up one end of the drill and, after filling the box with the grain to be sown, turn the wheel enough times to sow one-fourth of an acre of full acre. By weighing the grain, which should be caught in a canvas or blanket, it is quite easy to determine whether the drill is seeding correctly. If not, the necessary adjustments should be made. When the feed is divided into two parts, it will be necessary to check each side separately.

A less accurate method of testing the drill is to set it in gear and run it over a smooth driveway and count the number of seeds which fall in a yard of distance travelled. By checking one or two of the drills in this manner, the experienced farmer can adjust the drill fairly accurately.

RACK UNLOADERS

Two devices for unloading hay racks are shown in the sketches. The simplest is that shown in Fig. 1. This consists of three posts on each side, to which is bolted a 2 x 6 about 26 feet long. The lower end should be just high enough so that the rail will go under the front crosspiece of the hay rack, while the other end, at C, should be about four feet higher. The distance between sides A should be about seven feet for an ordinary wagon. Blocks should be bolted to the rack, both in front and behind the rear bolster stakes.

When the wagon and rack is driven between the rails, the front crossbar of the rack will strike the smooth rails and slide up on them, thus lifting the front end clear of the wagon. As the wagon moves forward, the rear bolster stakes pressing against the blocks in front of them, will slide the racks still farther up the rails and off the rear of the wagon. When the rack has been raised enough so that these blocks no longer touch, the rack will then be high enough for the wheels to go under the cross-bars. To put the rack on, back the wagon in, the rear bolster stakes will strike



Home-Made Scrub Cutter

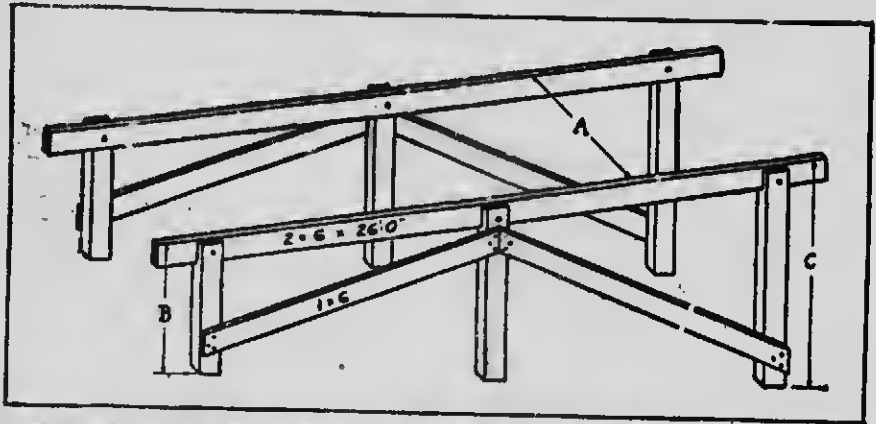


Fig. 1—Simplest Type of Rack Unloader. It lifts the Rack off the Wagon, holds it until again needed, when the Wagon is backed under the Rack and away you go.

the blocks which go behind them, the rack will be pushed down the incline and drop into the proper place with no heavy lifting.

No exact heights are given, because this will depend on what height the wagon wheels are and how the cross-pieces are cut. If it is desired to use the device for racks on both farm trucks and wagons, the lower end of rail should be extended somewhat so as to be low enough to strike under the front cross-piece when the rack is on the low-wheeled truck. If the rack seems to slide too hard on the rails, some axle grease will remedy matters. Any slight mistake in height of posts can be remedied by filling in with earth.

A somewhat similar plan is shown in Fig. 2. Here the middle posts are the longest, being high enough that when tipped level the rack will be high enough so that the wagon can be driven out from under it. The 2 x 8 rails need to be only a little longer than the rack, and are hinged into slots cut in the top of the middle posts. A heavy latch or dog is provided for locking the rails into place when they are level. In this case the rails are tilted down, the wagon driven through until the rack is partly lifted off of it, the rails leveled and locked, and then the wagon driven out from under it. These devices should be solid and well braced.

KEEPING WATER OUT OF CELLAR

It is surprising the amount of water that often enters a cellar because of the ground around the house not being graded to carry the surface water off. Probably

this is the chief cause of the trouble, and, if so, would recommend grading the surface ground to a good slope. Where surface grading does not prove effective then a tile drain should be put in below the cellar floor to carry the water to an outlet of a lower level somewhere. This can be done by grading the cellar floor to where the tile is intended to be placed. Put in three or four inch tiling, being sure of a grade so that water will run. A grade 3 inches in 100 feet will be sufficient. Lay a bed of gravel four to six inches thick over the floor and put on top of this four inches of dense concrete and three-quarter inch surface coat of cement mortar made in the proportion of 1 cement to 2 of sand. The concrete floor and finish can best be done in one operation, and it will be better to have the finish extend up the wall for at least a foot. If a cement floor is already in a drain opening can be made through it and a tile outlet with a running grade put in. In this case a new flooring of cement will have to be made on top of the old flooring and arranged with a slope to the drain. If the cellar is actually below the water level the only hope is to provide a sump in the basement floor and drain seepage water into it. From this drainage tank the water will have to be baled out or pumped out. The usual remedies, when the ground water level is near the surface, is to avoid building in such land but rather on a raised piece of ground where the water level will be more remote, or to dig a shallow basement and terrace the earth about the foundation walls or omit the basement unless necessary for a furnace.

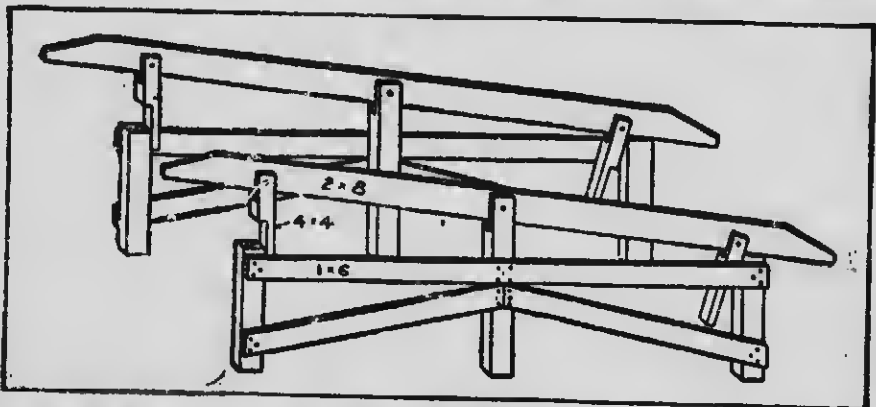


Fig. 2—Another Handy Type of Unloader, rather better than the one shown above. It works nearly the same.

A USEFUL TOOL CABINET

A corner in the barn or wagon shed, designated as a workshop, with a place for every tool and every tool restored to its place, is a valuable asset on the farm and will save many a vexatious situation when something breaks or goes awry and must be repaired in a hurry. If a $\frac{3}{4}$ -inch auger bit is wanted to bore a hole for a clevis bolt, or the outfit of a waiting team needs a nut tightened, there is seldom time to search among the boxes and odds and ends of the outholdings for the necessary misplaced tools. It were better and less strain on one's patience if this important part of a farm's equipment were assembled in an appropriate place and available for instant use.

A tool cabinet located at the back of a work bench, and so arranged that all tools are offered to view and easily accessible, is a convenience well worth the few hours required to make it. Such a cabinet is shown and may be constructed of $\frac{1}{2}$ -inch square-edge siding, or packing box material that is not too hard and brittle. It is, in reality, a box 36 inches high, 30 inches wide and 6 inches deep, which is large enough to accommodate the average set of wood working tools. The front consists of two doors hinged at either side, and used for storing the saws, squares and so on in the manner shown. Racks should be made for the hits and chisels, and screwed to the back of the cabinet; the planes, oil stone, block and oil can stand on shelves; the other tools hang on brass cup hooks or nails driven into the back or sides of the cabinet as desired. The shelf should be made about four inches wide, which will allow two inches clearance for the tools on the doors when the cabinet is closed.

Twenty-four square feet of $\frac{1}{2}$ -inch lumber is required to build the cabinet, allowing for waste. A special storage place for every tool acts as a checking system. When a job is completed a glance at the cabinet will indicate if all tools have been returned to their proper places.

Of course, the tools must be returned to the cabinet each time after use and not left where they were dropped when the job was finished.

BLASTING BOULDERS

There are different methods to be employed in blasting boulders. If a boulder is standing well out of the ground, the best method to use is what is called

"mud-capping." This means placing the stumping powder on the surface of the rock, if possible, where there is a small indentation to allow the powder to set well down, and cover the charge with damp clay, or some other tamping material. When this charge explodes, it will split the boulder and allow easy handling. This shot is also called a "sand-blast" or a "doby-shot."

Another system is "hockholing." This method consists of drilling a hole down the centre of the boulder, placing your shot, and firing in the usual manner. The only drawback in connection with this method is that it is lavish in the expenditure of time and labor. For boulders that are partially buried in the ground, it would be better to drill a hole underneath the boulder, having it right under the centre of the boulder, place your charge and fire in the usual manner.

Another way of getting rid of partially buried stones is to dig a trench around the boulder, and then use the mud-capping process as mentioned above. All a farmer needs for this kind of work is stumping powder, ordinary safety fuse and blasting caps.

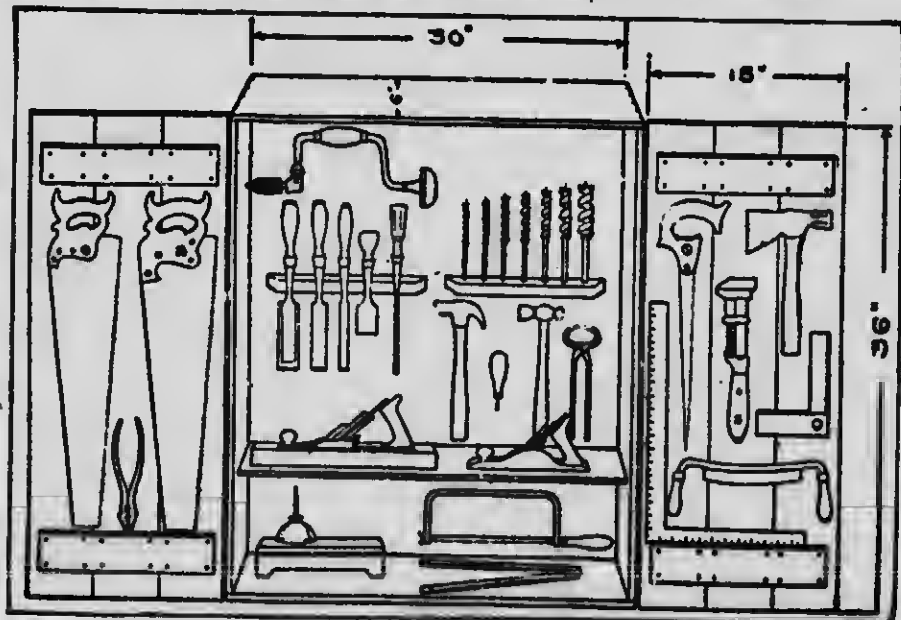
LINING FENCE POSTS

In making marks, or setting stakes, for the lining up of fence posts, a simple scheme which involves no expensive apparatus is to set a number of stakes between two points between which the fence is to run, and setting these stakes in line simply by the use of your eye. The stakes may be from 200 to 500 feet apart. When these are well lined the shovel or bar used in making the post holes can be used in sighting against these stakes.

DRYING A CELLAR

A tub of charcoal and another of lime are excellent things to keep in the cellar. They make the cellar sweeter and dryer, and the charcoal is convenient to have on hand for fuel. The unslaked lime should be put in a tub or barrel, with space for it to expand to twice its bulk. It slacks in the air and expands rapidly during the process.

When the chimney is cold it is often difficult to light a fire without making a great deal of smoke. To prevent this, burn a few pieces of paper in the chimney or smoke flue and thus start an upward current. The fire will then burn without any trouble.



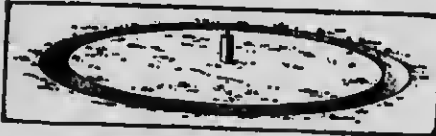
Cabinet for the Home Tool Kit

CONSTRUCTING A STAVE SILO

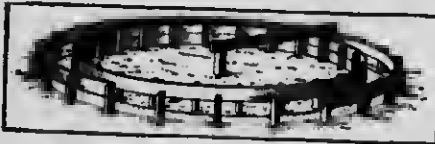
There are several different kinds of silos, but the stave and the concrete silos are the two in most common use. On account of the lack of gravel, and also on account of frost gathering on the inside of the wall, the concrete silo is not likely to become popular. Stave silos with concrete foundation are more common than any other kind in Canada, and are likely to be the kind most used. The material is easier to get, and they are more easily and cheaply constructed than any other kind of silo. If good material is used and they are well constructed they last for a number of years. Circular stave silos have proved satisfactory in all parts



Marking off the Foundation



Trench Ready for Concrete



Forms for Foundation Above Ground

of Western Canada. In square or octagonal silos the ensilage does not settle at the angles, and usually some of the feed spoils.

Native hemlock and spruce staves can be used, provided the timber is sound and free from knots, but British Columbia Douglas fir is the best material for silos in Western Canada. It is easily obtained, and, being full of pitch, which acts as a preservative, lasts considerably longer than native lumber. The staves should be 2 x 6 inches, and if tongued and grooved and bevelled, will make a strong, tight structure. The staves may be of one length, but if the silo is to be over thirty feet in height, two lengths will be less expensive. In a silo thirty-two feet high, eighteen and fourteen-foot lengths will permit the breaking of joints alternately. It should be painted.

The Foundation

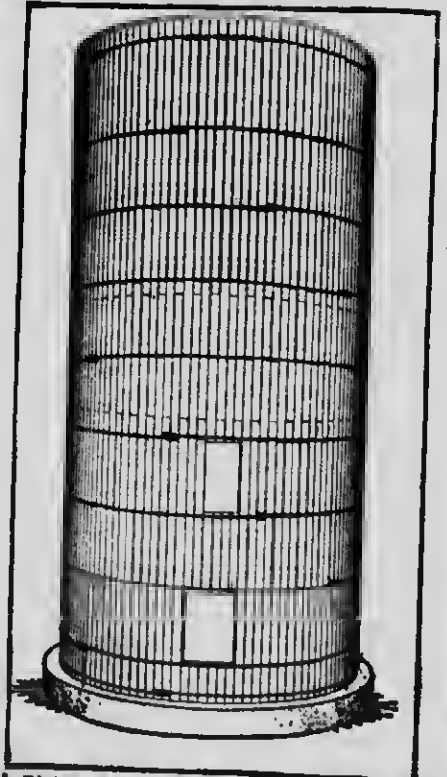
In building a silo a good foundation is necessary. It should be laid one to two feet in depth, depending on the nature of the soil, and should be a foot above the general level of the ground. The footing should be one and a half or two feet wide at the bottom, and may be tapered to eight inches wide at the top. Some farmers prefer one silo to extend four or five feet below the surface of the ground, but this means a much more expensive foundation, greater difficulty in securing drainage and greater labor in getting the ensilage from the silo. Care should be taken that the top of the foundation on which the staves are to be placed is a perfect circle. When building the wall, five or six pieces of flat iron should be put in the cement at equal distances, and should extend above the wall three or four inches to act as anchors. In these projecting ends small holes should be drilled, and the irons bolted to the staves. This will prevent the wind from shifting the silo off the foundations.

Setting Up

In setting up the staves it will be found convenient to use lath or ordinary flour barrel staves, tacked both on the inside and the outside, to hold the staves in place until the iron hoops are put on. When the points are reached where the doors are to be located, one stave should be sawed nearly through in the right place for the top and bottom of each door, cutting with the saw a bevel of about 45 degrees. When the wall is finished the saw may be inserted at these points, and the other staves sawed to secure a door of the desired width. The pieces sawed out of the staves should be used in making the doors. A circular plate made of 2 x 6 material should be nailed around the inside of the staves, level with the top, to carry the ends of the rafters and roof boards.

Band iron or round iron may be used for hoops, round iron being preferred on account of offering less friction in tightening or adjusting. Hoops of five-eighths inch round iron are recommended, and they should be in two lengths to facilitate tightening. The best way to secure the hoop is by means of patented cast-iron lugs, which can usually be secured through hardware merchants or implement dealers. The hoops should be long enough so that they can be lengthened when the silo is being filled, and should be threaded far enough back so that they can be tightened when the silo is empty.

Care should be taken to have the silo air-tight. Great care is necessary at the doors, and where the staves rest on the foundation wall the angle should be plastered inside with a light coat of cement. The staves should be set as close to the inner edge of the foundation wall as possible, so as not to leave a shoulder, as in the settling process an air space would be made which would cause the ensilage to spoil.



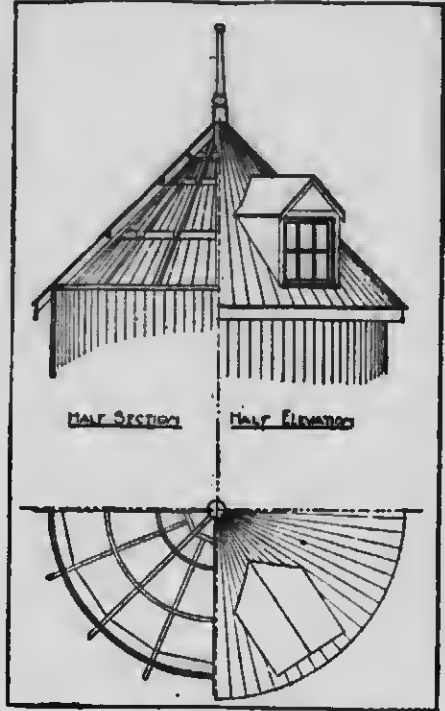
This Picture shows the Slugs by which the Rods are held. The Rods can be loosened or tightened when necessary. The Picture also shows the Doors being cut out.

Constructing a Stave Silo

Roof and Floor

A cheap and suitable roof may be constructed by taking boards the desired length and cutting them diagonally, putting the base of the board on the plate and the point at the centre, having a turned post about eight or ten inches in diameter for the points of these boards to be nailed to or to form the hub as it were. An opening should be built in the roof similar to a pediment window for the filling of the silo. In parts of the province where strong winds are prevalent it may be necessary to have rafters to give strength to the roof. These need not be close together. For a silo fifteen feet in diameter eight rafters will be sufficient. The pitch should be the same as that of the barn.

A satisfactory floor for the silo in this province is clay well tamped. Concrete may be used but it increases the cost. It is necessary to provide drainage for the silo. This is sometimes provided for by making a saucer-shaped floor, from the centre of which a tile drain is laid. Surplus moisture may also escape at the foundation where the staves rest on the concrete foundation. If there is a lot of moisture being carried away, the ensilage has probably been put in too green; if there is no moisture, it is too dry.



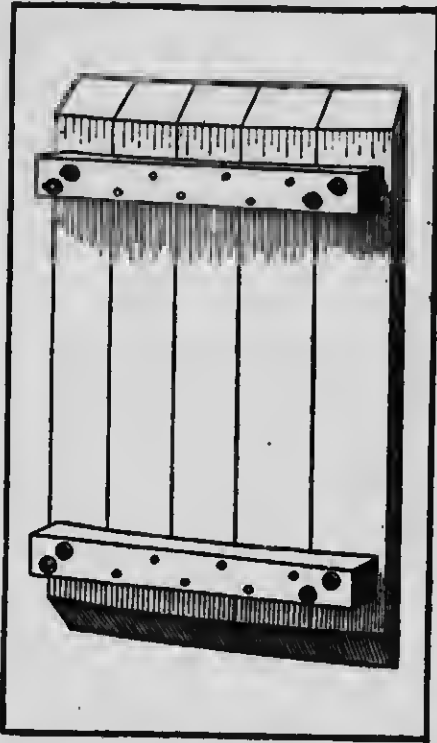
Plan of the Roof

AMOUNT OF SILAGE TO FEED

The size of the cow has a lot to do with the amount of silage she will eat. A cow may be fed as much as she will clean up without waste when consumed along with her hay and grain. The amount of silage fed should be raised or lowered until the proper quantity is ascertained. Generally speaking, a small cow will eat 25 or 30 pounds of silage per day, a large cow 40 or more.

Figuring the Quantity of Silage Needed

In figuring the size of silo to build ascertain first the approximate requirements. Say there are 20 head of cattle of all ages in the herd—6 cows, 6 yearlings, 6 two-year-olds and two other mature cattle. Figure an average daily consumption of about 25 pounds or 500 pounds of silage per day. The feeding season should then be figured out, say it runs from November 1 to May 15, a total of 196 days. The daily consumption is 500 pounds, therefore, a silo is needed that will provide 49 tons. But this estimate covers minimum requirements only and for the cattle alone. Silage may be fed to sheep, pigs and in small quantity to horses. Besides it is wise to figure on a longer feeding season and have some silage in reserve for summer in case the pastures dry up. It would be advisable to build a silo of a capacity one half larger than estimated for the cattle only or of a capacity of at least 72 tons. Reference to the table below shows that this capacity may be got nearest by building a silo 24 feet high and 15 feet in diameter.



The Door cut nut and fastened together so that it can be put in again.

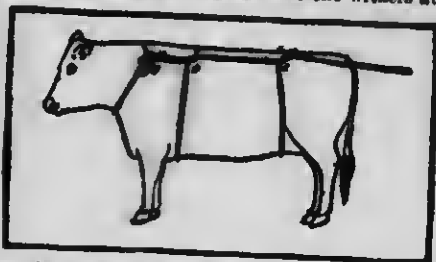
Table of Capacity of Stave Silos for Corn Silage in Ton

Depth in Feet	Inside Diameter in Feet									
	15	16	17	18	19	20	21	22	23	24
20	Tons 58	Tons 66	Tons 75	Tons 84	Tons 94	Tons 104	Tons 115	Tons 126	Tons 138	Tons 150
22	67	76	86	96	107	119	131	144	153	172
24	78	87	97	109	122	135	149	163	179	194
26	85	97	109	123	137	151	167	183	200	216
28	94	106	122	136	152	168	186	204	223	243
30	105	119	134	151	168	186	205	225	246	268

HANDY FARM DEVICES

HITCH FOR THROWING COW

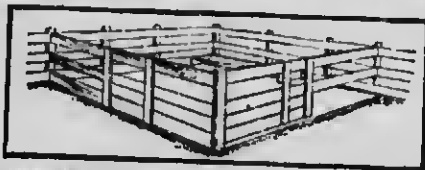
This is the simplest way to throw a cow, and one that will not injure the animal. Put a halter on the cow and lead her out. Use a rope 40 feet long. Tie one end around the neck and fasten with a bowline at A. If you cannot tie a bowline tie a knot that will not slip. Pass the rope around the body, back of the front legs, making a half hitch over the withers at B.



Carry back the rope and pass it around the body a second time just forward of the hook bones, drawing it well up into the flank, making a half hitch as at C. To throw the animal pull to the rear and a little to one side. The man on the halter should pull forward at the same time. The cow will fall on the side to which you pull. She will go down gently and will not be able to get up until the rope is loosened.

A CREEP FOR YOUNG PIGS

This illustration shows a creep for little pigs. It is made in the corner of an outside yard. The same idea may be made use of in a pen. A creep is simply a small corner of the yard or pen partitioned or fenced off, with a small opening that the pigs can get through but the cow cannot. A small trough is placed inside



the creep and the pigs fed by themselves while still sucking. Feeding in this fashion is a good way to crowd the pigs along.

GUARD RAIL IN FARROWING PEN

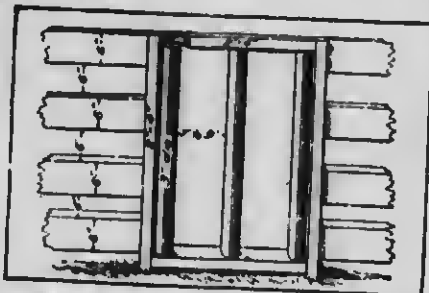
The use of a fender or guard rail made of 2 by 4 inch pieces set 2 inches from the sides of the pen and 10 inches above the floor will prevent the sow from



squeezing young pigs against the wall. The sow cannot lie against the wall and the little pigs soon learn to creep under the guard rail when she lies down.

CREEPS FOR FEEDING LAMBS

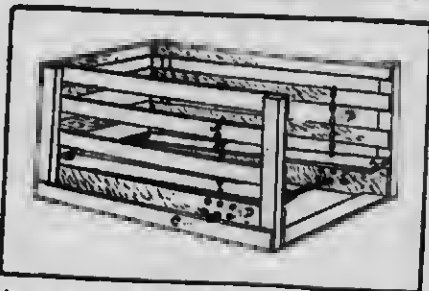
It is usually desirable to feed grain to young lambs while they are still suckling. A device for this purpose is shown in the cut. It is made by cutting a 12-inch opening in the wall of one pen so that the lambs can pass through and the sheep cannot. Upright posts or



rollers placed from 8 to 12 inches apart admit the lambs. There should also be a sliding door to close the creep.

BREEDING CRATE FOR SOWS

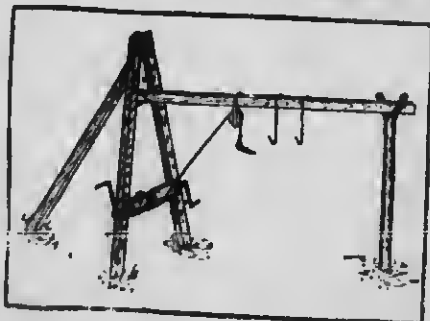
This crate is useful in breeding a rather small sow to a heavy boar. The dimensions are: Length, 5 feet 6 inches; width, 2 feet; height, 2 feet 4 inches. The uprights at the corner are of 2 by 4 inch stuff and the sides of 1 by 4 inch boards with a 10-inch board at the bottom. The supports for the boar's feet, marked A in the cut, are hinged at the front end



of the crate and can be raised or lowered by means of the chains, B. There is a hook on the outside for holding the chains. C is an iron rod which slips through holes, D, in the bottom side of the crate. The rod should come just above the sow's hooks, and there should be enough holes to permit of adjusting the rod to the size of the sow. If it is desired to breed a small boar to a large sow this crate may be made to answer the purpose by simply placing a cleated platform at the rear of the crate.

HOME-MADE BUTCHERING GIN

The legs of this tripod are 4x4 inches, 14 feet long. The side beam is placed 10 or 11 feet from the ground. It may be of any length, but must be of sufficient size to support the weight put upon it. A single block pulley, as shown, will do for suspending a hog. With a beef animal a double block and tackle is necessary suspended from the centre of the derrick. An inch rope is needed to swing a full grown beef animal. The

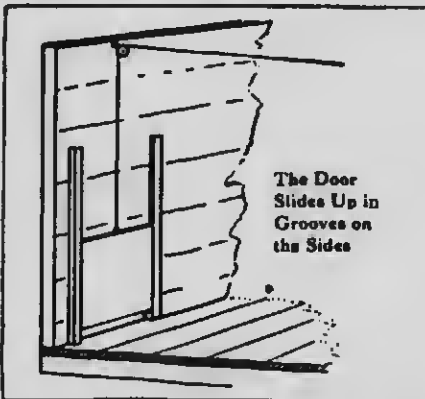


side beam is a convenience in butchering hogs where more than one is to be hung up at a time. When butchering hogs the scalding barrel and scraping table may be placed under the side beam, and the carcass hoisted directly from the table.

The drum should be about five inches in diameter and about five feet long. A worn-out threshing machine will furnish the shaft and the iron boxings. The legs of the tripod may be spread to fit the shaft. The drum should be the whole length of the distance between the tripod legs in order to stiffen the shaft. The windlass should be placed rather low down so the cranks can throw their weight on the handles. An outfit of this kind is easily made and is a great convenience on a farm where a few cattle or hogs are butchered every year.

HOGE PEN CONVENIENCE

The illustration shows a door lifter that can be used in a pig pen for opening the small door that lets the pigs into the yard. These doors are made to slide up and down. A light rope is connected to them as shown, carried up and over a pulley and across the pen



The Door Slides Up in Grooves on the Sides

to the alley or front of the pen high enough up to ha out of the way. A rope the size of a clothes line is about right. The pulleys are small iron pulleys of the right size for the rope. The whole equipment can be bought for very little at almost any hardware store. A door of this kind will last much longer than a hinged door.

A HANDY STRAW CARRIER

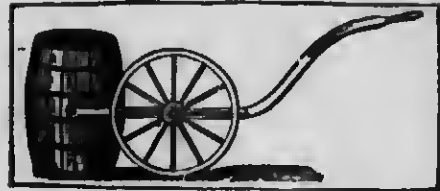
In making the straw carrier shown in the illustration a lath is fastened at each end of a piece of hurlap nine or ten feet long, to one end of which a rope is attached



and to the other end a ring. Place the straw upon the hurlap, slip the rope through the ring, and then draw tightly. This protects the straw from the wind.

HANDY SLOP BARREL

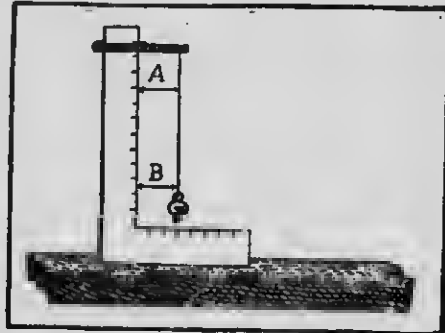
The cut shows a handy way to mount a harrel on wheels. The frame may be made of iron bent to the proper shape to permit the harrel to be tipped for emptying. A pair of handles are provided as shown. When not in use the harrel rests on the ground, and may be raised by bearing down on the handles. The harrel may be made to rest in notched bearings upon



the frame, so that by raising the handles the wheels may be drawn away from the barrel and the latter left in any convenient place until it needs removal. This is a handy way to handle slops from the house in warm weather.

LEVELLING WITH A SQUARE

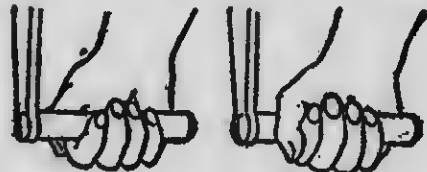
The square can be used as a level in the absence of the regular level by fastening a clamp to the vertical arm as shown and attaching a plumb bob to the clamp.



When the distances between the string and the vertical arm at A and B are equal, the surface upon which the lower arm rests is level.

CRANKING THE FORD

Almost every local paper tells of some one getting a wrist or some bones in the hand broken by cranking a car. If you will take hold of the crank in the right way the chances of an accident are greatly lessened. The illustration shows the right and the wrong way of



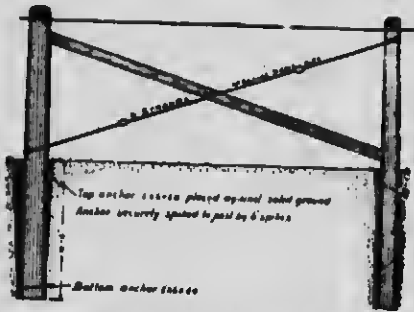
Right Way

Wrong Way

gripping the handle. A very little practice will enable you to crank as well this way as by taking hold as a "kick back" is sure to break a bone. Keep the thumb back of the crank handle, then if the engine "kicks" the handle is jerked out of the hand and no damage done.

BRACING END POSTS

The accompanying diagrams indicate the best methods of setting wooden, corner, end, brace and gate posts and this method should be followed to the letter to give strength, durability and usefulness. It will be noticed in the illustration that each brace post is provided with two anchors which are made of good solid wood, 2 inches thick, 6 inches wide and 2 feet long. These are spiked to the post—one near the top of the ground on the side of the post in the direction of which the wire is to be stretched and the other at the bottom on the opposite side. Stones

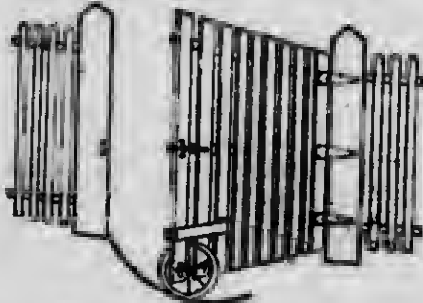


at the bottom or better, concrete, then earth well tramped and concrete at the top will give satisfactory results. Brace posts are placed about 11 feet apart.

Wooden braces are made of clear, straight 4 inches by 4 inches about 12 feet long. The upper end of the brace is cut so as to fit flat against the first brace post about 10 inches from the top. The post is cut a little to admit it but not mortised enough to weaken the post. The brace is fitted to the other brace post in a similar manner at about 10 inches from the bottom and both ends should be securely spiked.

AN EASY-OPENING GATE

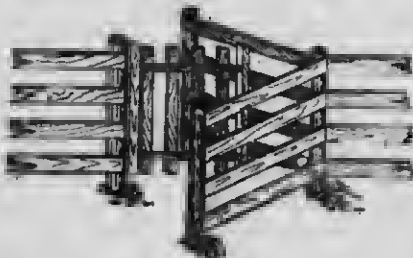
By fitting a wheel from an old wheelbarrow to the corner of the gate, as shown in the drawing, the weight is largely removed from the hinges. Any wheel could be used, but the one pressed into service was



about 16 inches in diameter. This was affixed in position by means of two pipe straps around the axle at each end, the straps being bolted through the gate. The gate as fitted is easily opened and sagging is practically done away with.

HANDY GARDEN GATE

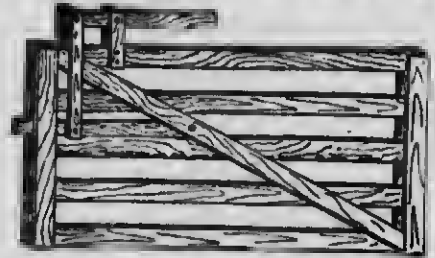
This gate is always open to a human and always shut to an animal. Everyone knows how easily the cows or sows seem to break into the garden, the garden gate



having been carelessly left unfastened, so that a gate that will always be closed is a very handy one to have. The cut shows how such a gate may be made.

HANDY GATE LATCH

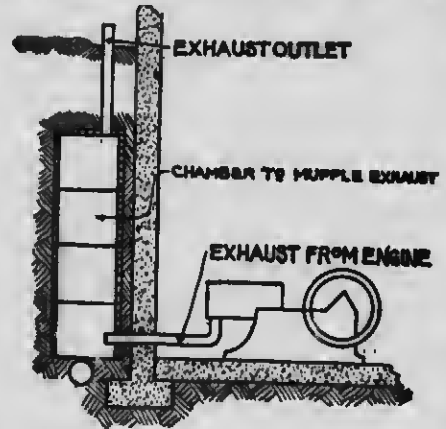
This cut shows a gate latch that can be worked from horseback. The latch is lifted automatically as the gate swings shut, by sliding up the incline of the stationary catch until it drops into the notch that holds the gate. The latch is then supposed to remain



in place by its own weight until it is lifted by human effort. This is not a good fastener for a stock gate because young cattle and young horses learn to lift the latch with their noses. It is easily opened by a man on horseback.

SILENCING AN ENGINE

A good way of completely silencing the exhaust of the small stationary engine is to dig a hole in the ground about three feet square and three feet deep. It is better, but not essential, to line the sides with concrete and the bottom with gravel. Make a plank



cover for the top, with a 6-inch hole for ventilation in the centre. A cover should be placed over this hole, so constructed as to shed rain without interfering with the free escape of the exhaust gases. If the exhaust of the engine be piped into this pit, the sound will be scarcely noticeable.

FIGURING COST OF FRAME HOUSES

In the following outline for estimating the idea is to give a general method for calculating what materials and labor are needed in putting up a frame building of the balloon type of frame, the ordinary type built in this country. The total cost for labor and material may be estimated on the basis of local costs.

The sills will cost for labor, framed and placed in the building from 15 to 20 cents per lineal foot, figuring at present day wages for carpenters.

Joists are ordinarily placed at 16-inch centers. To find the number needed on a given floor, take three-quarters of the length of the building, adding one joist where they are placed on top of the sill, and deducting one where the end sills are used in place of joist.

Two men will frame and place 600 lineal feet of joists, in size from 2 x 6 to 2 x 14, in 8 hours.

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Studding in balloon frames is usually placed 16 inches from center to center. In an ordinary building two men will lay out and raise 80 lineal feet of 2 x 4 studding, or 750 lineal feet of 2 x 6 studding in 8 hours.

A short rule for estimating the number of pieces of outside studding, including plates, and doubling all corners and for windows and doors, is to allow one piece of studding for every foot of outside measurement. Three-fourths of the number of lineal feet of all partitions will give the number of pieces of studding required for partitions. Their length, of course, will depend on the height of the rooms. The cost of labor is the same as for outside studding. Three-fourths of the width of the building, less one, gives the number of pieces of studding required for gables. The average length of each piece is the distance from the plate to the ridge of the roof.

The length of a common straight rafter can be found as follows: If the roof is one-quarter pitch, the square of one-quarter the width of the building add the square of one-half of the width of the building. The square root of this sum will be the length of rafters required. If the roof is one-third pitch, take one-third the width of the building. If one-half pitch, square one-half the width, etc., and then proceed with the balance of the rule.

Example: Find length of rafters in a building 24 feet wide, gable roof, one-quarter pitch. One-fourth of 24=6; half of 24=12. The square of 6 is 36, of 12, 144; 36 + 144=180. The square root of 180 is 13.416 feet, which is the length of rafter required.

Two men in one day will frame and place in the building 600 lineal feet of 2 x 4 or 2 x 6 rafters, plain gable roof. The number of feet of drop siding is found by multiplying the outside measurement of the building by the height of the posts, to which add for gables, if roof is a gable roof, the product of the width of the building by the height from the plate to the ridge of the roof. This gives the number of surface feet, to which add one-fifth for lapping, and you have the number of feet board measure.

Two men will put on 700 ft. in one day of drop siding when the window-casing and corner-boards are placed over the siding. When joints are made against casings and corner-boards, 400 to 500 feet is a day's work of eight hours. Two men will put in 2,000 feet of rough barn boards, or 1,500 feet of surfaced barn boards in eight hours and will put on 2,000 feet of dressed battens or 3,000 feet of rough battens.

To find the area of the roof multiply the length of the rafters by the length of the building, including the cornice. This gives one side. Double it gives the total square feet of the roof.

Each 100 square feet of roof will require the following number of shingles laid, the given number of inches to the weather; 4 1/2 inches, 800 per square; 5 inches, 70; 5 1/2 inches, 655; 6 inches, 600 per square.

One man will carry up and lay on the roof 1,500 to 2,000 shingles per day of 8 hours.

The number of feet, board measure, in a given floor is found by multiplying its length by its width and adding one-fifth for lapping. For flooring not matched omit the lapping.

Two men will lay 1,300 feet of plank flooring per day, or will lay 2,000 feet of common rough inch flooring. Two men will lay and dress 600 feet of matched flooring per day.

Two men will lay and dress about 500 feet of ceiling per day and place about 200 feet of wainscoting per day.

It is impossible to give estimates for stairs since they vary so much in style and finish. Labor for ordinary rough stairs will cost about 80 cents per riser; for more elaborate stairs the labor cost may run to \$5 or more per riser.

One man will cut the openings and set five window frames of average size per day. One man will case 12 or more windows per day.

Trimnings, balustrades, etc., can hardly be estimated in a general way. These must be figured for individual jobs.

Plastering is estimated by the square foot. The total area is the area of all walls and ceilings.

One hundred yards of plastering will require 1,400 laths, 4 1/2 bushels of lime, 18 bushels of sand, 9 pounds of hair and 5 pounds of nails for two-coat work. Two

men and one helper will put on 450 yards in 8 hours of two-coat work, and will put on a hard finish for 300 yards.

Painting is done by the day or the yard. One coat, or priming, will take for 100 yards of painting, 20 pounds of lead and 4 gallons of oil. Two-coat work, 40 pounds of lead and 4 gallons of oil; three-coat work the same proportion. One hundred yards of three-coat work would require 60 pounds of lead and 12 gallons of oil. A day's work for one man is 100 yards of first coat, and 80 yards of second or third.

One thousand feet of inch lumber require 10 pounds of 10-penny nails; 1 square of siding or ceiling, 2 1/2 pounds of 6-penny nails; and the same for a square of roof boards or sheathing. One thousand shingles take 6 pounds of shingle nails.

The price of doors and trimmings may be had from dealers. One man will set about 5 door frames per day putting on ordinary casing. He will also hang and finish 5 doors per day. This is for ordinary swinging doors. Sliding doors cost more for labor of hanging, while folding doors cost still more.

Window sash and glass may be figured at dealer's prices. The glass comes in the sash. If new material is being used throughout there will be no charge for glazing.

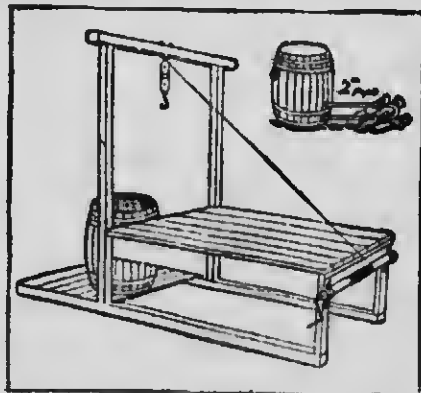
There remains a few odds and ends to be figured in before the cost of the home is complete, such as pantries, porches, chimneys, plumbing and ironwork.

The cost of these will vary with different buildings, and no general rule for estimating costs is possible. In figuring up brick work, one bricklayer it is estimated will lay 1,500 bricks per day in straight work and about half this number in chimneys. The following is given as an illustration of the cost of furnishing and laying 1,500, or one day's work: 1,500 brick, three-quarter barrel of lime, 9 bushels of sand, one day's work for bricklayer, one day's work for helper.

To find the number of single rolls of wall paper required for a room multiply the distance around the room by the height, taking out 20 square feet for each opening, and divide by 30. The answer is the number of rolls. To find the number of rolls required for the ceiling, multiply the length by the width and divide by 30. To find the number of yards of border take the distance round the room and divide by three.

BUTCHERING PLATFORM

The illustration shows a butchering platform that is simple and easy to make, and will last a life time. It is one in use by an American farmer for killing hogs or beef, and he claims costs less than \$5.00 to build. The foundation is made of 4x6 inch timber 10 feet long, the uprights of 4x4 inch 11 feet long, the cross piece at the top of 4x4 inch 8 feet long, the braces and table legs of 2x4 inch timber, and the table is of 2-inch lumber. The windlass can be made of a round pole about two inches in diameter and fastened by an iron cuff to the table legs so that your rope will have room to turn as shown.



Construction of Butchering Platform

Farmer's Manual

In the small cut you can see how handy it is to heat the water in the barrel as compared with using the open kettle. Bore two 2 1/4 inch holes in the barrel, one at the bottom and the other about eight inches above it; then take two pieces of 2-inch pipe and screw them into the holes and connect them outside with a union. After filling the barrel with water build a fire under the end of the pipe. You will have scalding hot water as long as you want it.

CHARRING FENCE POSTS

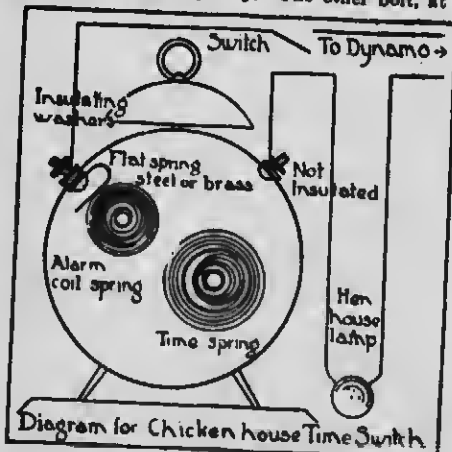
Charring is probably one of the oldest and most efficient of the old-time processes of preserving fence posts. The application of the fire dries the outer layers of the wood very effectually. This in itself is a big step toward preservation. In addition the fire burns up the sugar that the fungi feed on and transforms the outer layers of the wood into almost pure carbon, on which most of the fungi cannot subsist. Hence: as long as this layer of carbon remains unbroken, the timber is almost perfectly protected. The heat of the fire opens up any cracks that may have been starting and their inner surfaces are charred. Large checks are unlikely to open after this treatment.

At the Wyoming Experiment Station a variation of the charring process was tried, with the result that posts so treated were entirely sound after being set seventeen years and were good for thirteen years more, while untreated posts had rotted off after being set twelve or fifteen years. The lower ends of the posts, to six inches above the ground line, were dipped in crude petroleum and the oil was burned off. This drove the hot oil into the post and with the charred exterior, prevented decay. The objections to the charring process are: the time required, the difficulty of obtaining a thorough and even charring and the danger of burning the posts so deeply as to impair their strength. Such posts, moreover, should be used only where there is not much danger of the carbon being battered off, for when this occurs the inside of the post is susceptible to rot. Charring is usually done by the open fire method. One is liable to burn the posts too much by this method but by using care can make a very good job of the charring.

CLOCK TURNS ON LIGHT

The cut herewith shows how to fix a clock so that it will turn on lights in a hen house or any place at a given time. An alarm clock is necessary.

Drill holes in clock shell at each side where small bolts are shown. Use two small bolts with nuts and washers for terminals. Insulate the bolt on the alarm spring side with cardboard or rubber washers, taking care not to allow the bolt to touch the clock shell. Make a small, flat spring out of a piece of sheet brass or steel. Drill a hole near one end and slip it over the bolt before passing through the shell. This spring must be in contact with the bolt, but must not touch the clock body in any way. The other bolt, at the



right, is fastened to the clock shell with nuts and washers, and is not insulated.

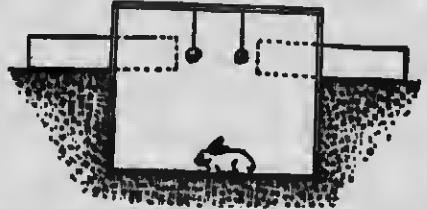
To set the clock wind up the alarm coil spring until it is clear of the flat contact spring. Set alarm indicator in usual way at time desired. Then close switch on light wires. When alarm goes off the spring will expand and make the necessary contact. If you don't want to be awakened by alarm, you can muffle the hammer or take off the bell.

CLEANING PLOW SHEARS

A good way to clean plow shears that are badly rusted is to bolt them on to the back end of a stone boat on the bottom of the runners, pile on a few stones and drag them back and forth to your work three or four times. This puts the sand polish on them. Some farmers do this with all newly sharpened shears and have no troubles with them from the start.

BOX RABBIT TRAP

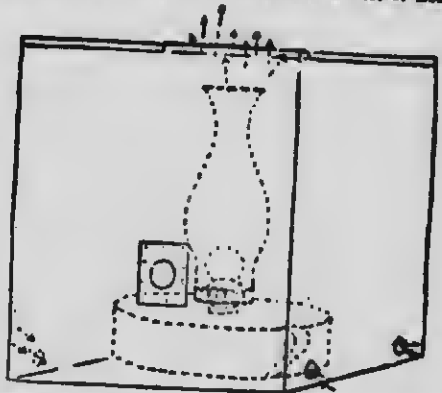
A box trap made by sinking an ordinary dry goods box in the ground to within 6 inches of its top. A hole 6 or 7 inches square is cut in each end level with the earth's surface, and boxes 18 inches in length that will just fit in these holes are set in and hung on pivots, with the longest end outside, so they will be horizontal. A rabbit may look through two tubes at the bait,



which is hung on a string from the top of the larger box so that it may be seen and smelled from the outside. The rabbit naturally goes into the end of the small, long-slanted box, and just as soon as he enters far enough to overbalance this, it turns up and precipitates the rabbit to the bottom of the large box. There should be a trap door in the top of the large box for taking out the rabbits.

HOME-MADE EGG TESTER

A simple home-made egg tester is shown below. It consists of a box 12 inches square and 18 inches high. Half-inch holes are bored near the bottom of each side to admit air, and a three-inch hole cut in the top of the box to carry off the smoke and fumes from the lamp. On the front side of the box and on a level with the flame of the lamp another three-inch hole should be cut. Over this hole a piece of felt or heavy



Home-made Egg Tester devised from a Box and a Lamp.

which is tacked. A small, oval hole is cut in the felt against which the egg is held when being inspected.

To use this tester place it over a lamp of suitable height in a dark room and hold the egg against the hole in the felt. The contents of the egg can then be readily seen. In hatching in an incubator it is desirable to test the eggs from the seventh to the ninth days to separate fertile from infertile eggs. In from seven to nine days the germ in the larger end of the egg will be visible. These eggs should be put back in the incubator and eggs not showing a germ removed. Likewise remove eggs showing blood rings, dark spots or with a cloudy appearance. By the sixteenth or seventeenth day it is possible to determine whether an egg contains a living or a dead chick. Testers are useful also for testing eggs for domestic use.

LOOSENING A NUT

Sometimes when it is desired either to tighten or to remove a nut from a hinder or mower, it is found to be stuck so tightly to the bolt that it is impossible to turn without danger of twisting off the bolt. In such a case, the nut can usually be loosened by holding an anvil or heavy piece of iron against one face and striking the opposite face with a hammer. The other sides should be struck in the same way and then loosened by working in around the nut. In working such a nut off after it has been loosened, plenty of oil and patience should be used, and the nut worked back and forth until it is finally gotten off.

EQUIPMENT FOR SLAUGHTERING

The equipment shown in the cut is for butchering hogs. For rapid and skillful work at killing time the tools shown will be found useful. By the letters on them these tools are as follows: A, meat saw; B, 4-inch steel; C, 8-inch scraping knife; D, hog hook; E, cutting knife; F G, bell-shaped stick scraper; H, hambrel stick. The 8-inch knife is used for sticking; the shorter knife for opening the hog and cutting up

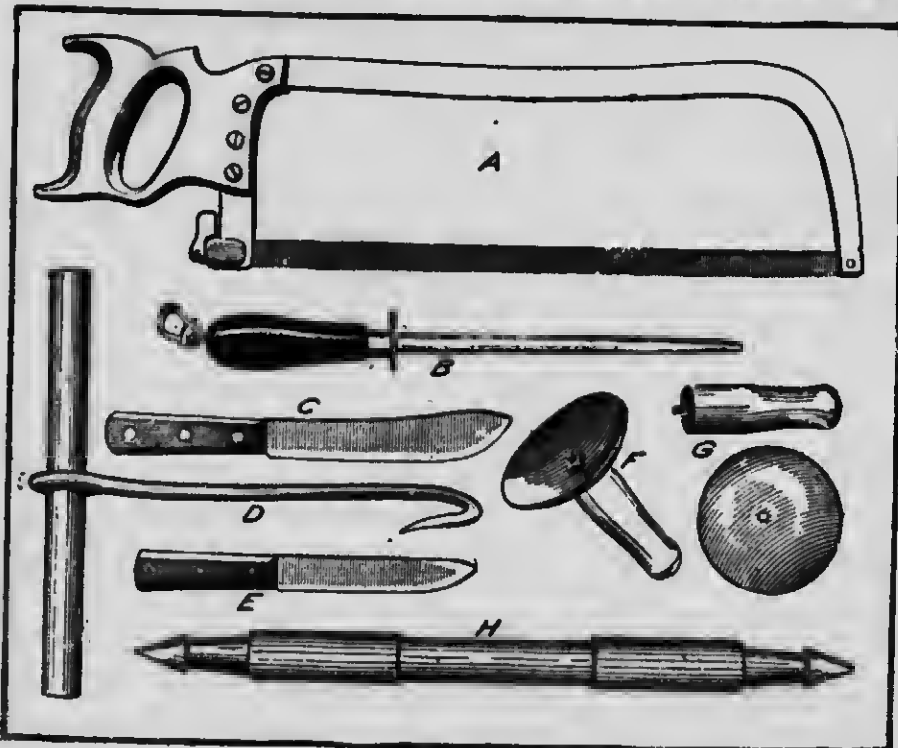
the carcass. The hog hook is used in scalding, being inserted into the lower jaw. The hog hook is handy, also, for removing the dew claws, when the carcass is pulled from the scalding barrel. The bell-shaped scraper is used to remove the hair from the rear and front ends of the hog.

STORING POTATOES

Dry potatoes keep best. Potatoes stored in a moist condition rot more readily than dry tubers, and offer more favorable conditions for the development of disease in storage. A dark, cool cellar makes the best place to keep potatoes. The most favorable temperature is between 32 and 40 degrees F. in an atmosphere of normal humidity, that is neither dry nor damp. These conditions, where a large quantity of potatoes are stored can be controlled by ventilation. A slatted floor in the potato bin, open windows in the cellar, or a ventilator leading outside are the ordinary means for keeping cellar conditions right. High temperatures in the potato cellar must be avoided if the potatoes are to keep well and not go off in quality. Too warm a cellar causes evaporation, loss of weight, lowered vitality and loss in value.

FITTING IN THE FIELD

Where one has no cellar under the house, and does not choose to go to the expense of putting up a root cellar of the kind shown on this page, the potatoes may be stored in pits and kept quite satisfactorily over winter. A sandy knoll or high location should be chosen for the pit. If there is no danger of soil water accumulating in the pit dig the earth out so as to make a trench, 2 feet deep, 4 feet wide and as long as needed. The pit may be lined with straw or not. Put in the potatoes, piling them above the surface to a ridge like a roof, and cover with about 6 inches or a foot of straw. Leave the pit in this condition for ten days or more if the weather is favorable, opening the straw daily to provide ventilation and dry out the potatoes. A few shovelfuls of earth will keep the straw from blowing



Complete Equipment for Home Butchering.

Farmer's Manual

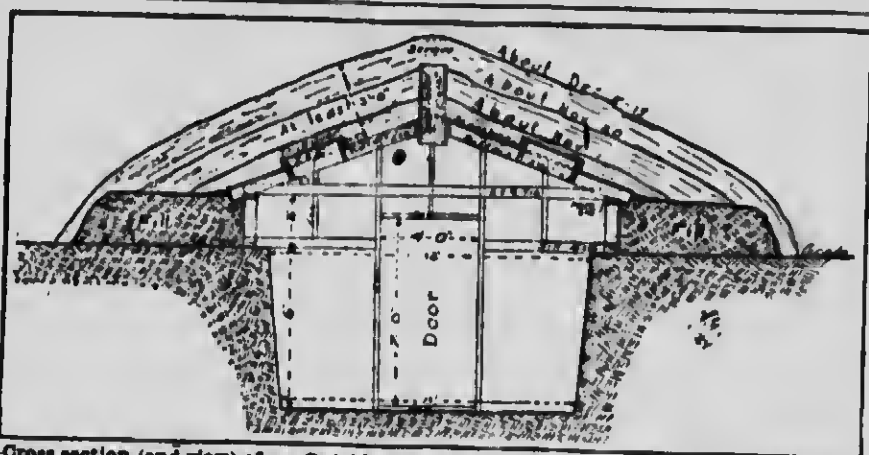


Fig. 1—Cross section (end view) of an Outside Potato Cellar built on level land. It is covered with straw and soil to a depth of four feet or more.

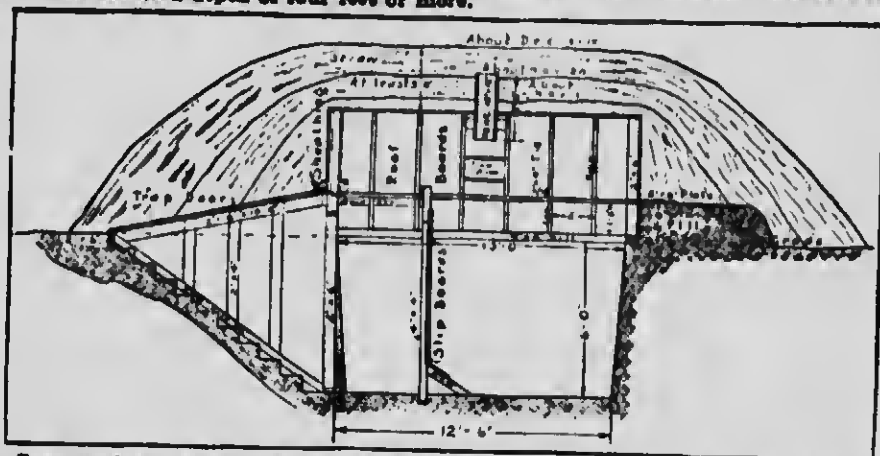


Fig. 2—Cross section (side view) showing method of construction in an Outside Potato Cellar with entrance and stairs.

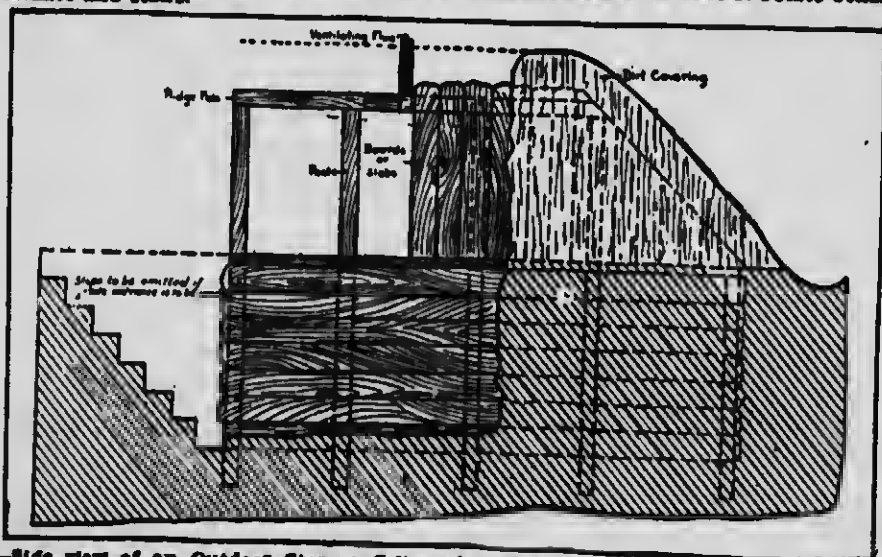


Fig. 3—Side view of an Outdoor Storage Cellar of another type. If this cellar were built in a side hill no steps would be required; the door would open directly into the cellar.

away. When ready to cover for winter put on more straw, and before covering with earth a ventilator should be built in. A ventilator made of boards, with a face 6 inches square, may be placed every 10 or 12 feet. These may be closed with straw in cold and left open if there is no danger of freezing. Now put 8 inches of earth over the straw, then another 1 1/2 inches of straw and about 18 inches of earth. In an ordinary winter this is enough covering. In an extreme winter, particularly if the cold weather is prolonged, the pit would be better if covered with straw manure.

BUILDING A LEVEL LAND POTATO CELLAR

The two cuts, Figures 1 and 2, show a method of building a potato cellar on level land. A cellar of this type large enough to hold 1,000 bushels of potatoes should be 14 feet long, 11 feet wide at the bottom and 12 feet wide at the top. The pit should be 6 feet deep with the sides built up 2 feet from the surface, thus giving a storage space 8 feet deep. When the sides are boarded up 2 feet a 4x6 inch sill is laid on the surface about 6 inches outside of the top of the pit. On 2x6 inch pieces of studding is placed a 2x6 inch plate on which the roof is constructed. Where the inside width between the sides is 13 feet with the ridge of the roof 10 1/2 feet above the bottom of the pit, the rafters require to be 8 feet to extend over the plate several inches. The rafters should be 2x6 spaced 2 feet apart. A ventilator 12x12 inches should extend 2 feet above the roof and one foot below it. Two trap doors, 2x2 feet should be placed on each side of the roof about 1 1/2 feet from the lower edge. These are for dumping the potatoes into the cellar. Sides and roof should be covered with inch lumber.

The door at the end is 4 feet wide and 7 feet high, made of two thicknesses of matched lumber with tar paper between. Inside the door is an entry place 4 feet square. The outer door at the head of the stairs should be of two thicknesses of lumber with paper between. The rear end and gable are boarded up with matched lumber and the front gable, both inside and out with paper between. The cellar is covered with soil on both sides, the rear end and on both sides of the passageway down to the doorway at the front end, as high as the plate or base of the roof to a depth of 3 feet and extending out from the building at least 6 feet.

SIDE HILL CELLAR

A cheap side hill cellar may be built as follows: Dig into the hill to the approximate size of the cellar. Set up a frame by setting two rows of posts of uniform height in the bottom of the pit near the dirt walls and a third line of posts about 3 feet higher through the centre of the pit. These posts serve as supports for the planks or poles forming the roof of the structure. The door is placed on the inside end as shown in Figure 3, and a ventilator put in the roof. The cellar is covered with earth and sods.

STORAGE ROOM IN BASEMENT

In providing cellar storage it is desirable to partition off one corner of the room and use it exclusively for potatoes and vegetables. The cellar should be cool and well ventilated and at least one window located in the storage room. The size of the room must be determined by the space available and the quantity of roots or potatoes to be stored. The best way to build such a room is to lay 2x4 flat on the floor for sills for the partition securing them with pegs driven into the floor or by nailing them to the top of short posts set in the ground. Studding of 2x4 spaced 18 inches apart should be nailed to this sill and to the ceiling. Leave space for a door at the most convenient point, making it large enough to admit barrels and good sized boxes. A good size is 2 1/2 feet wide and 6 1/2 feet long. Cover the studding with tongue and groove material. Ventilation may be secured by opening the windows or by means of an air duct through the wall or window.

The illustration, Figure 4, shows a suggested arrangement for a storage room. On one side are bins for potatoes or roots, on the opposite side shelves for crates and boxes and wall shelves for canned goods. The storage room shown is small and intended only to

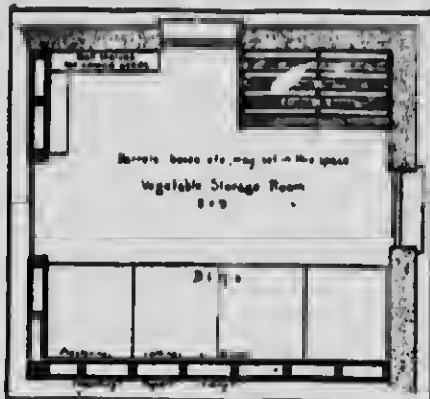


Fig. 4.—Plan of Storage Room in a corner of the basement of the dwelling house. The arrangement of the shelves and bins may be changed to suit the conditions.

meet the needs of an ordinary household. It will hold all the potatoes required for family use and the other garden vegetables usually carried into winter.

A HANDY GRANARY

Here is a description of a movable granary of a capacity of 1,200 bushels. This is a substantial type of movable granary: On nine 4 by 6 inch sills 14 feet long, placed two feet apart, nail a rough board floor 12 by 16 feet. Make the studding 8 feet long from 2 x 4's. Side with drop siding. Put on a one-third pitch shingle roof. Lay a matched fir floor, make a trap door in roof. Two men can put up such a granary in two days. It will hold 1,200 bushels of grain. Such a granary can be pulled with four horses. The moving can be made easier by putting wheels under the sills. Four old threshing machine cylinder pulleys put on shafts, long enough to reach across two sills and one piece at each corner will reduce the pull, so that the granary can be moved with two horses. A granary of this kind will stand a lot of wear and last for years.

SIZE OF GRAVEL BOX

A box to hold two yards of gravel requires to be 12 feet long, 3 feet wide and 1 1/2 feet deep. These dimensions multiplied together give 54 cubic feet, and any other dimensions which come to 54 when multiplied together would also hold two cubic yards.

CLEANING BARRELS

It is sometimes necessary to cleanse barrels and other wooden vessels so that they can be used to hold cider, wine or food. A solution of sal soda should be used. The barrel should be filled half full of water, and a solution of about two pounds of the soda in a gallon of water poured in and the liquids thoroughly mixed by shaking the barrel which should then be filled to the bung with water and allowed to remain twelve hours or longer, then the barrel should be emptied, filled with pure water, left a few hours, and then thoroughly rinsed, when it will be ready for use.

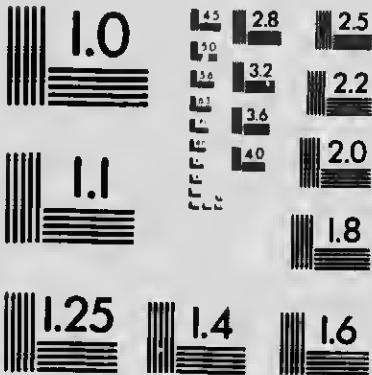
PRESERVING ROPE

An authority on ropes states that to make a rope that will stand the weather, steep it in a solution of sulphate of copper, one ounce to each quart of water used, soaking it three or four days, then drying and tarring it. For tarring it is advisable to draw the rope through boiled pine tar which should be hot, but not boiling, at the time the rope is drawn through it. The rope should be drawn through a ring of proper size, which will remove the surplus tar and allow it to drain back into the kettle. The rope is then strung up on a sort of staging to dry and harden.



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MILLERS' KNOT

Comparatively few people who tie bags can make the millers' knot, the handiest knot there is for this purpose and the quickest made. Most people tie up a sack by making a simple bow knot or tie the old-fashioned granny knot. The diagram will describe how the millers' knot is made better than any words. For convenience in the illustration the knot is being tied around a post. Notice the position of the hands in the left hand diagram, figure 4. Hold the standing part of the rope in the left hand while the right hand passes the free end around the post so that the loop passes the rope Y held in the left hand. The free end in the

the square knot and indicate clearly how the latter should not be tied. Notice carefully these three knots in figure 5 and learn to make the square knot, the one shown in the center of the figure. The square knot can be easily and quickly tied, it is easily and quickly untied and reliable except when made of ropes of different sizes. It is a good knot to use in fastening the ends of binder twine when the twine breaks or one bell has to be connected with another in the twine.

THE EYE SPLICE

This splice is a handy one to use in fastening halter shanks into the ring on the halter. It is the simplest

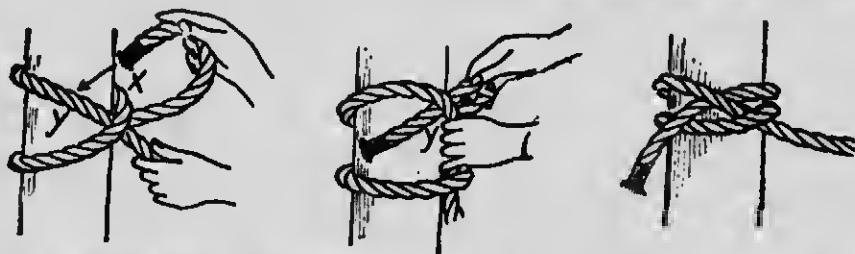


Fig. 1—The Millers' Knot. A good Knot for tying Sacks. It is easily and quickly tied and is reliable.

right hand is brought over the loop at X and under the standing part at Y as indicated by the arrow in the first diagram, the movement being shown complete in the centre diagram. When the strands are drawn tight you have a knot as shown in the third diagram and one that will hold. Try this knot once or twice and get used to making it. You will use nothing else for bags once you have caught on to making this simple and reliable hitch. This is a hitch, in fact, and not a knot at all, though it is generally called the millers' knot. It is one of the handiest and best.

THREE COMMON KNOTS

Everybody knows how to make a granny knot, a practically worthless knot that will slip, draw tight and do anything except what we want it to do. It is one of the originals and should be forgotten by any one in the habit of using it and the square knot substituted. Nothing need be said about making it. The upper diagram in figure 5 shows clearly enough how the granny is made. The centre diagram, figure 5, shows the square or reef knot and the lower diagram shows a knot somewhat similar in the granny, called the thief knot which is a worthless knot also. It and the granny are shown here to distinguish them from

splice there is for this purpose. It is useful also where ever an eye is needed in the end of a rope. To make the splice proceed as follows: The strands are unlaidd for a distance equal to three times the circumference of the rope and laid down on the rope after having shaped or fitted the eye to the required size. The strands of the rope are now prised open and the unlaidd strands passed through as shown in the diagram. This weaving should be continued over and under as shown until the length of the unlaidd strands (three times the circumference of the rope) are used up. To taper the splice the unlaidd strands should have a portion of the fibers cut out after the first or second weaves has been made. The whole may then be whipped if desired. A tapered round stick of hardwood should be used to pry open the strands. The diagrams show clearly the making of the splice. Follow them carefully and when the job is done you will have an eye similar to that shown in the lower illustrations and one that will be strong enough for any purpose. The first effort, of course, may not result in as neat a splice as you may desire, but neither did your first effort at anything produce as neat a job as results when greater experience is gained. It is very much thus in splicing rope.

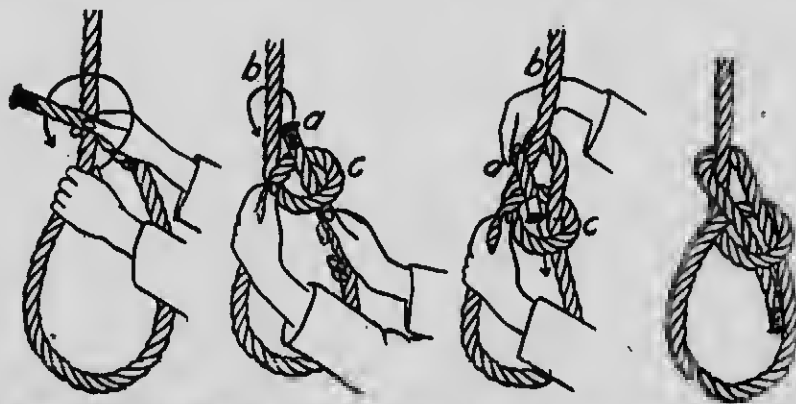


Fig. 2—The Overhand Bowline. The Diagrams from left to right show the way it is tied. This Knot will not slip.

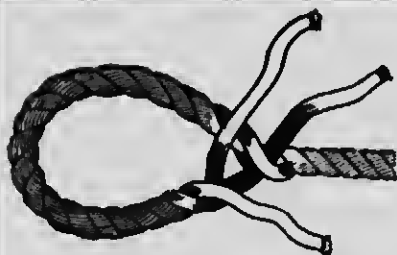


Fig. 3—Beginning the Eye-Splice.

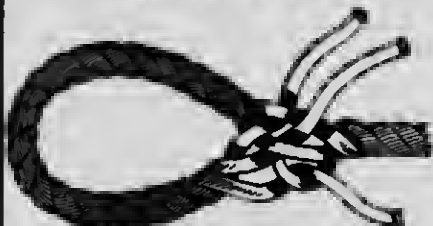


Fig. 4—The Eye-Splice being fashioned and complete.

LIVE STOCK ON SHARES

The plan usually practised by stockmen in this country is for the owner of the cattle to furnish the foundation stock including the herd bull, place them with another party who is required to furnish the feed and shelter and necessary labor in connection with the care and management of the breeding herd. In return for his work he will receive one-half of the increase and be required at the end of the time agreed upon, namely, three or five years, to return to the original owner mature animals equivalent in number or value to the original herd. With regard to the stock which is lost the farmer in whose care the herd is placed should withstand all of it, although arrangements sometimes are made whereby half of the loss is borne by each party.

THE CROP AND STOCK SHARE LEASE

With the development of farming, the necessity and value of more live stock is becoming more and more appreciated.

(1) In the common form of crop and stock share lease the tenant supplies the machinery, the work is done, and the labor. The sales from crops are

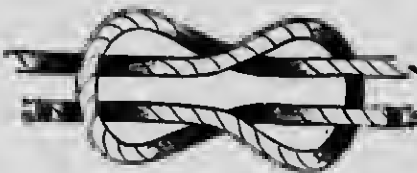


Fig. 5—Upper Diagram shows the Granny Knot; the center, the Square or Reef Knot, and the lower, the Thief Knot. The Granny and Thief Knots are worthless.

divided on a half-and-half basis as already described;
 (2) For beef cows, steers, hogs, sheep, or young cattle, growing in value, the most satisfactory and equitable arrangement is for the two parties to own them in common and to divide the proceeds from sales equally;

(3) The owner furnishes the pasture, which is offset by the tenant's labor, and each furnishes one-half of the other feeds, whether raised or purchased;

(4) Often the tenant does not have capital to buy his share of stock and the owner furnishes all, but charges him interest on one-half the value and deducts the purchase price of the stock when sold before making a division;

(5) Most landlords have a clause in the lease requiring the tenant to get the consent of the landlord before selling any live stock owned in common;

(6) Other cash items of farm expense are usually divided equally between landlord and tenant.

HIRING OUT WITH IMPLEMENTS

A fair wage to be received for man labor, horse labor and implements on a day basis would be according to the cost and the custom prevailing in the locality where the work was being done. The best information available indicates that the annual cost of keeping a horse ranges from \$175 to \$225, where feed is charged at average farm prices. On the assumption that the cost per year for a horse is \$200, and that 1000 hours work are done each year, the cost per hour would be 20c. Other figures indicate that the average cost per hour for man labor is from 30 to 40c per hour. Machinery costs vary with the character of the machine used, and the number of hours that the machines are ordinarily used during the year. If a machine is used only a few hours each year its cost is higher per day than if used frequently during the year. Using the best figures available for the cost of machinery and horse labor at 20c per hour, and man labor at 35c per hour the following figures are suggested for an eight-hour day:

	Per Day
Two horses, man and wagon.....	\$0.50
Two horses, man and rake.....	6.50
Two horses, man and mower.....	6.50
Four horses, man and sulky plow.....	9.50
Four horses, man and harrow.....	9.50
Four horses, man and seeder.....	9.75
Four horses, man and cultivator.....	9.75

These figures are based on figures for an average day's work of eight hours under ordinary farm conditions.

THE FARM WELL AND WATER SUPPLY

LOCATING THE FARM WELL

It has not been proven to the satisfaction of scientists who have investigated the matter that water can be located by the crocheted stick. Scientific opinion holds that there is nothing in the claim that water can be found by this means. A great many persons, apparently sincere and honest in their convictions, claim to be able to locate underground water by using the crocheted stick. We are not in position to say whether or not they can. The United States Geological Survey after an exhaustive investigation of all devices and instruments for locating underground water states that no means short of digging down and finding out actually exist for locating water.

A water finding instrument of rather elaborate design has been perfected in England and tried out in various parts of the world. Some success is reported from India and Australia. On this continent, according to the U.S. Geological Survey, experiments have not been satisfactory. It is claimed by this authority that certain peculiar conditions underground are necessary for the success of this instrument and that these conditions do not exist anywhere on this continent. The underground water, they say, must be in motion, an underground stream if the instrument is to work satisfactorily. In this part of the world underground water occurs in beds or layers of sand and gravel and not in streams as in parts of India.

There are no reliable surface indications of underground water. There is an old saying that water will always be found beneath an ant hill and another that the best place to dig a well is on the top of a hill. Naturally neither an ant hill nor a hilltop are unfailing signs of underground water, in fact so far as known they have no significance whatever, though, perhaps, as many people have faith in these signs as in the crocheted stick or any other. It is generally thought that water is more likely to be found in a low spot to which quite a surface area slopes than on a side hill or hill top. But again experience shows that a dry hole is as likely to be the result if a well is sunk in a hollow as on a hill, the underground strata of soil or rock not following the surface contour.

The only conclusion to be drawn is that nothing has been proven about locating underground water, at least nothing that expert opinion will accept as sufficient evidence that the device, instrument or surface indication is reliable enough under all circumstances to suggest that it will locate a successful well oftener than one could be located if a person just took a chance and dug where he thought water might be struck.

CLEANING DUG WELL

The first step should be inspection of the curb, which, if weak or defective, may make entrance dangerous. This examination may be made more thoroughly, and even the bottom of the well may be observed by the aid of a beam of sunlight reflected into the well by a looking glass. Next, lower a lighted candle to determine if carbonic-acid gas has accumulated in the bottom of the well. Complete or partial failure of the candle to burn indicates that it is dangerous to enter the well. If found safe to enter, a ladder should be lowered and the curb from top down scrubbed with wire, or other stiff brushes, and rinsed thoroughly. The well then should be pumped as low as possible, and any mud, moss, or other debris should be scraped up into pails and removed. After thorough cleaning the well should be allowed to fill and then be pumped out rapidly. This operation may be repeated to advantage two or three times, and often the whole results in a freer, a larger-yielding well. Many wells can be drained by hand pumping, but in other cases a power pump is necessary.

The top of the well should be carefully protected to prevent small animals and insects from getting in. Quite often dead geckos are found floating around on the surface of the water in wells. It is quite easy to prevent gophers from getting in. The top of the well should be a little higher than the surrounding land surface, and stock, including poultry, kept from making a standing place or roosting place of the well cover.

CRIBBING OUT QUICKSAND

If it is a round well, make a crib about 6 ft. long out of 2 x 6 lumber, sharpen each piece at the lower end flat ways (not edge ways), make it as you would a cistern without a bottom in it. Put on two iron bands made of 1½ or 2 inch band iron. Make the crib about 6 inches larger at the bottom than at the top, so the bands will tighten without dropping off. The bands should be made to fit about one foot from each end of crib. Make the crib small enough to drop down freely inside the present crib. When it is in the well, go down with a sledge hammer and drive the crib into the sand, driving each stave down about six inches at a time. Go around the crib a sufficient number of times till you have it down about 2½ or 3 feet into the sand. Then take out all the sand you can till you find the sand is running in again. Then drive the crib down again as before. The main thing to do is to always keep the drive crib down into the sand so it is below the level of where you are digging. A well cent thus be put down several feet through quicksand. Of course, you must have plenty of help and stick to the job.

If, however, it is a square well, the following plan should be adopted. Take the 2 x 6 lumber sharpened as before; fit them closely as possible in the bottom of the well, lapping inward at the bottom, about six or eight inches. Make a square rim of 4 x 4 timber (or something similar), making it the correct size that when dropped inside the drive crib in the bottom of the well it will tighten about half-way down the crib. Then drive crib down with sledge hammer same as the round one, only be sure and keep the rim always in its place or the crib might hudge in and cause trouble.

SOFTENING HARD WATER

Hard water, on a small scale, can often be somewhat remedied for domestic use by various treatments. To do this intelligently one should understand that hardness of water is of two kinds, namely: (1) Temporary hardness; (2) permanent hardness.

Temporary hardness is caused mainly by the bicarbonates of calcium magnesium and iron. This is the kind of hardness which causes a water to form a whitish scum on top when boiled for a short time, or which produces a sediment in the bottom, or on the sides, of a vessel after boiling for a short period.

This kind of hardness can, fortunately, be easily remedied. If a gallon of water be boiled until about a quart of it has boiled away, it will usually be found that it has lost all its temporary hardness; and if a water so treated had nothing but temporary hardness in it originally, straining now to remove the scum and sediment will give a water almost perfectly "soft."

Permanent hardness is a kind of hardness which is caused principally by the dissolved chlorides, nitrates and sulphates of calcium, magnesium and iron and can only be easily detected after the temporary hardness has been removed by boiling. If the water is still hard after boiling and straining it is quite safe to conclude that it contains permanent hardness. Or if a water is hard, and on test is found not to contain temporary hardness, it is then safe to assume that its hardness is of the permanent variety.

There is no simple method for removing permanent hardness. The only way to remove it is to treat the water with some kind of chemical, such as washing soda or phosphate of sodium, and the amount of these chemicals to use can only be determined by a rather complex chemical analysis. Boiling for a short time, after the addition of a small spoonful of either of these to two gallons of the water, will probably be about the average amount to use to remove the permanent hardness more less or completely from most water. After this treatment straining will give a water practically soft.

Most hard waters have both kinds of hardness, particularly waters to be found in limestone formations or districts, or in districts containing rocks with considerable calcium in their makeup. Usually, in this case, the hardness is about equally divided between the other. In the case a combination of the boiling and and chemical treatment will completely soften the water.

Many elaborate methods have been worked out and put into operation for softening water on the large scale. But these are only available to large industrial concerns that can employ a chemist to oversee the work or to constantly advise them. The farmer needing much soft water should aim at providing means for catching rain water and storing it in sufficient amount to supply his need.

FILTERING

For filtering rain water into a cistern a charcoal filter is convenient. Make a galvanized iron or concrete box two or three feet square with the bottom sloping to the outlet to the cistern. A screen of small mesh galvanized iron wire should be put over the outlet, and then about six inches of rather fine charcoal put in, after which about two feet of clean sand put on top of this. Plenty of surface must be allowed, as it is necessary to have enough sand so that filtration will be rather slow. It will be necessary to remove the upper two or three inches of the sand occasionally and wash it and return, or else supply fresh sand. Every season the whole filter should be cleaned out and the sand and charcoal thoroughly washed or else new stock put in. The charcoal used should be comparatively fine.

PURIFYING WATER

Polluted water may be rendered fit for use by boiling or by the addition of a suitable disinfectant. The disinfectant most suitable for the purpose may be prepared as follows:

- (1) Mix $\frac{1}{2}$ pound of chloride of lime with 1 pint of water.
- (2) Then add sufficient water to make one gallon.
- (3) Dissolve 13 ounces of sal soda crystals in 2 quarts of lukewarm water.
- (4) Add sufficient water to make one gallon.
- (5) Mix these two solutions in a harrel or crock and allow the milky solution to settle over night.
- (6) Pour off the clear liquid from the white sediment into a jug and fill into bottles, well stoppered, and keep in a cool dark place. This "stock hypochloride" will contain approximately the equivalent of 3 per cent of chloride of lime or 1 per cent of available chlorine.

To make use of the mixture mix one ounce of this stock solution to 5 gallons of water that is to be used for drinking purposes. After mixing allow to stand for half an hour before using. The solution may be added in small quantities to water after it has been drawn from the well or the quantity of water in the well may be estimated and the necessary amount of the solution poured directly into the well and stirred in. This treatment gives the water an odor of chlorina at first, but this finally passes off on standing or can be removed by boiling for a few minutes.

Care must be used in the preparation of the chloride of lime and sal soda solutions, and be careful all through to measure the quantity of solution used and to use the right amount for a given quantity of water. Water purified by this means is said to be clean and pure and to have no ill effects.

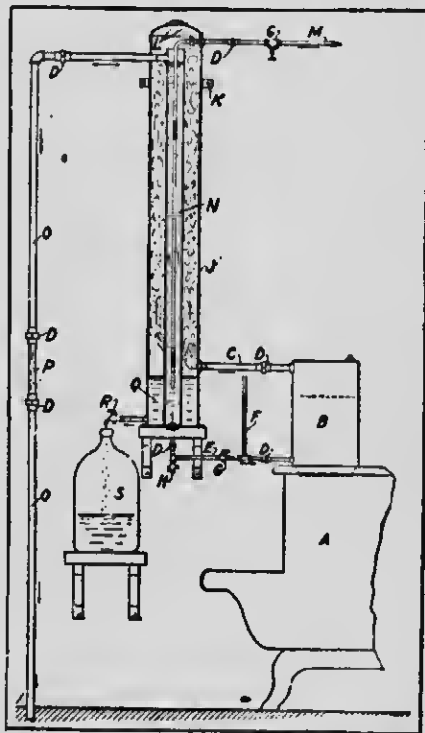
DISTILLING ALKALI WATER

How to procure pure drinking water is a problem on many farms. The problem is largely one of purifying the water of alkali. The salts of alkali being very soluble exist in well water in a form that is very hard to deal with. An ordinary filter, or, indeed, any kind of filter, will not remove alkali from water. It exists in too fine a solution, if that is the right term, to be separated from the water by mechanical means. Gravel, sand or charcoal filters have no effect on it. Nothing can be put in the water to cause the precipitation of the alkaline salts. The only possible way for removing the salts of alkali is to distill the water. But distilling water by the use of the ordinary household still is not only a slow process for getting water, but before one can use a still one must apply to the Department of Inland Revenue and for a still of more than three gallons capacity must take out a license from the department, and pay an annual fee for the privilege of using the still. This restraint on the use of stills is necessary for the reason that the same type of still that may be used for distilling water can be used to distill alcohol, and the distillation of alcohol is hedged round with many restrictions.

Since a still of 3 gallons capacity is of very little use in an ordinary household it clearly follows that where distillation is employed to purify the water one will require a license, and will have to pay an annual fee for the privilege of owning a still.

Distillation completely softens and purifies water. The water that distills over is pure water and nothing else. But the process is a slow one; it involves boiling the water until it passes off as vapor and then the condensation of the vapor back into water by bringing it into a special tank or cooling chamber. The distillation of water is hardly a practical means of ridding it of alkali but it is the only process that will completely separate the alkali from the water.

Anyone thinking of installing a still should communicate first with the Department of Customs and Inland Revenue, Ottawa, or the nearest branch of the department. Having an unregistered still in one's possession is a serious offence these days when inland revenue officers are keeping a sharp look out for illicit stills used in the production of alcohol. Collectors of inland revenue are located at Winnipeg, Moose Jaw and Calgary. Application for registration of a still, or for a license may be made to the nearest collector.

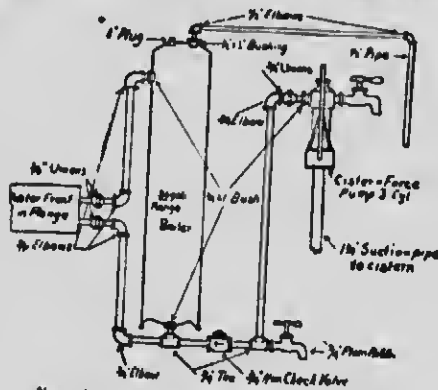


HOT WATER FOR HOUSEHOLD USE

The cuts herewith show how to construct and install a system for supplying hot water on the farms. Hot water is required summer and winter. It is required every day where cream cans, separators and dairy utensils are much used, and almost as regularly where dairying is not the special line of farming followed. Every housewife knows how convenient it is to have a supply of hot water always at hand for washing clothes, scrubbing, washing the dishes and doing the innumerable jobs that call for the use of hot water about the house.

This system consists of a 30-gallon tank connected with the cistern and the kitchen stove, the water being heated by circulating through the water-front in the fire box of the stove. It is a simple system that can be erected by any man handy with a wrench and

pipe cutter. The water is obtained from a cistern. The only drawback to compactness is that it is necessary to operate the kitchen pump each time that water is required. Little troubles will be experienced



Note - All pipe 1/2 except where otherwise noted

Details of a Simple Water System

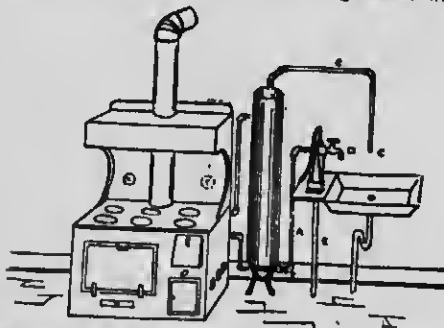
in this respect, however, if a good type of pump is installed and both the check valve and suction valve are replaced occasionally. Besides it is much easier to operate the pump than to make the trips from the kitchen range to the sink each time water is wanted to a tea kettle or other vessel.

The piping is all exposed and no openings need to be cut in the walls. The heating coil may be simply a pipe passed through the fire box of the range, using the opening usually provided for this purpose, or if convenient a fire-back may be secured. In both cases the pipe running from the bottom of the range boiler to the top of the range boiler is of practically the same construction.

The principle of heating water is that the water when heated in the coil becomes lighter and rises to the top of the water range boiler while the cold water settles to the bottom and flows through the lower part of the piping to the heater.

Referring to Fig. 1, a range boiler is shown connected with the water-back in the range in the usual manner from the bottom of the range boiler, and pipe "A" extends up to half inch pipe, connects with the top of the range boiler, and extends over the sink. This pipe "C" should be left open and a faucet should be attached as steam must escape through this pipe, should any form. Pipe "E" extends to the cistern.

First fill the range boiler, but close "D" and pump until water comes out of "C." To get cold water,



Showing a Range Boiler Connected with Water-back in the Range

open "D" and pump. The check valve "F" prevents hot water from flowing from the range boiler through "A" and out of "D." To assist in the construction of this simple system, a detailed drawing is given in Fig. 2

MATERIAL REQUIRED

Below is an itemized bill of material, the cost of which varies in different localities, but which is great for the complete system:

- 1 30-gallon range hoiler and stand.
- 1 Water front.
- 1 Cistern force pump, 3 inch cylinder with bibb.
- 3 1/2-inch unions, galvanized.
- 5 1/2-inch elbows, galvanized.
- 2 Tees, galvanized.
- 1 1/2-inch horizontal check valve
- 3 1/2x1-inch bushings.
- 1 1/2x1-inch bushing.
- 1 1-inch plug.
- 1 1/2-inch plain compression bibb.
- 2 1/2-inch elbows.
- 3 1/2-inch short nipples
- 1 1/2-inch short nipple.
- 16 feet (approximate) 1/2-inch galvanized pipe.
- 8 feet (approximate) 1/2-inch galvanized pipe.
- 10 feet (approximate) 1/2-inch galvanized pipe

REPAIRING LEAKY CISTERN

Where the water soaks through a new concrete cistern proceed as follows: Paint the inside of the cistern, both side walls and floor, with three or four coats of silicate of soda, commonly called water glass, mixed in the proportions of one pound of silicate of soda to a gallon of water. Examine the cistern thoroughly before applying this solution and whether or not there are any cracks through which the water might be leaking. If any cracks are discovered they should be filled with neat cement first and then the silicate of soda wash applied. This solution should be applied with an ordinary whitewash brush.

POISONOUS GAS IN WELLS

Every now and then accounts are published of persons descending into wells containing foul air, and becoming suffocated in consequence. The reason is because of the presence of carbonic acid gas, which is considerably heavier than common air, and which, when contained in large proportions in the atmosphere, is fatal to all animal life. The only safe course with such wells is to lower a light into the bottom. If that burns clear the well is safe. If it goes out, a bucket should be lowered to the bottom, in a minute or two drawn up and carefully turned bottom up some distance away. The apparently empty bucket gets filled with the foul air, which can in this way be drawn up and replaced with pure air that contains the proper quantity of oxygen. An open umbrella may be used instead of a bucket. It holds more gas than a bucket and will clear out the well in less time. A light lowered after a few repetitions of this process will directly show that it has been effective if carefully done.

TO THAW OUT A PUMP

Cut a 12-foot length of 1/2-inch gas pipe into three or four lengths. Thread each piece at each end except the bottom piece, which needs thread only at one end. The other end should be split open a little by driving a punch into it. Get couplings enough to connect the pieces and one for the top. Into the extra one for the top solder a tin funnel, one that will hold about a pint, and have this coupling loose so that it will go on and off easily. When the pump is frozen put into it the length with the split end having the funnel on top. Pour in boiling water from a tea-kettle. As soon as the pipe has sunk the length of the first section unscrew the funnel and add another. The split end should always go first and the spread should be enough to let the couplings go down through the hole in the ice. A hole can soon be thawed down through 8 or 10 feet of ice. If the pump is not badly frozen and is an iron one, an old blanket saturated with coal oil may be hurled around it. If a wooden pump, the blanket may be saturated with boiling water.

SIMPLE REMEDY FOR BEE STING

An old fashioned and effective remedy for the sting of a bee or other insect is the juices of a raw onion. This should be applied immediately to the part stung.

Painting and Whitewashing

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COLORS FOR THE HOUSE

This is a question that confronts every builder of a new house, and those desiring to repaint the old one. Most people have their favorite color combinations, but for the benefit of those who are undecided in this matter, we would suggest the following:

Whites with green trimmings, white with slate trimmings, buff or pale yellow with white trimmings, slate with white trimmings, buff with brown trimmings. If a house has a gable roof, or is finished off with shingles part way down the sides of the house, or on the verandah, a pretty combination is produced by painting the house buff and staining the shingles brown.

There is nothing less pleasing to the eye than the unpainted house that has been beaten upon by rain and snow until it has assumed that greyish-black appearance. No amount of work in the grounds around such a house can make it anything but unattractive.

Paint your house if at all possible. A good coat of paint not only turns a house into a thing of beauty, but preserves the wood, and consequently keeps a house in good condition for a much longer period.

REPAINTING IMPLEMENTS

In these days, when ready made mixed paints have been brought to such perfection there is little excuse for the sight which too frequently meets the eye on the farm—that of good implements and wagons, representing capital expenditure, covered with rust and dirt and falling into decay. Everyone who studies true economy, and who likes to see his property kept in a neat, bright and clean condition, will find time to overhaul his implements and wagons every year or so, and freshen up and preserve them with a coat or two of paint.

The best kind of paint for this purpose is that falling under the class of coach or wagon paints, which contain good proportion of varnish, dry hard in a short time and look smart and brilliant.

The following condensed instructions are quite simple to follow, and will enable one to make a good job of repainting old implements or wagons:—Before repainting such work all mud should first be washed or brushed off. Then all traces of oil and grease should be removed, using for this purpose the stump of an oil brush and a plentiful supply of gasoline or benzine, finally wiping clean with a handful of rags.

All rusted parts should receive particular attention. These should be scraped off well before repainting and for implements badly rusted a good wire brush will be found to be very effective. All badly rusted pieces on iron and all bare spots on wood should be touched up and allowed to dry before applying the finishing coat all over.

It will pay the farmer to purchase a good brush, or brushes, for this work, as a far more satisfactory job can be obtained with a first-class brush, and so it will do more work it is therefore cheaper in the long run.

In applying the paint it should not be slopped on, just a fair flowing coat. The first coat should be allowed to dry hard before applying the second coat, generally about two days. Do not apply over a greasy or oily surface, and expect the paint to dry satisfactorily, because it won't. Neither will it last very long under such conditions, but will peel or skin off rapidly when applied on such a surface.

The main points to be observed may be summed up thus: Work on a clean surface; use good brushes; apply two well brushed coats rather than one heavy one; beware of grease or oil, and allow plenty of time for drying between coats.

ORDINARY WHITEWASH

This is made by slaking about 10 pounds of quicklime with 2 gallons of water. The lime is placed in a pail and the water poured over it, after which the pail is covered with an old piece of carpet or cloth and allowed to stand for about an hour. With an insufficient amount of water, the lime is "scorched" and not all converted into hydrate; on the other hand, too much water retards the slaking by lowering the heat. "Scorched" lime is generally lumpy and transparent hence the use of the proper amount of water for slaking

and an after addition of water to bring it to a brush consistency.

INTERIOR WHITEWASH

For walls, ceilings, posts, etc. (1) Sixty-two pounds (1 bushel) quicklime, slake with 15 gallons of water. Keep barrel covered until steam ceases to rise. Stir occasionally to prevent scorching. (2) Two and one-half pounds rye flour, beat up in half gallon of cold water, then add 2 gallons of boiling water. (3) Two and one-half pounds common rock salt, dissolve in 2½ gallons of hot water. Mix (2) and (3), then pour into (1) and stir until all is well mixed. This is the whitewash used in the large implement factories and recommended by the insurance companies. The above formula gives a product of perfect brush consistency.

WEATHERPROOF WHITEWASH

(Exteriors). For buildings, fences, etc. (1) Sixty-two pounds (1 bushel) quicklime, slake with 12 gallons of hot water. (2) Two pounds common table salt, 1 pound sulphate of zinc, dissolved in 2 gallons of boiling water. (3) Two gallons skimmed milk. Pour (2) into (1), then add the milk (3) and mix thoroughly.

LIGHTHOUSE WHITEWASH

(1) Sixty-two pounds (1 bushel) quicklime, slake with 12 gallons of hot water. (2) Twelve pounds rock salt, dissolve in 6 gallons of boiling water. (3) Six pounds of Portland cement. Pour (2) into (1) and then add (3). Alum added to a lime whitewash prevents it rubbing off. An ounce to the gallon is sufficient. Flour paste answers the same purpose, but needs zinc sulphate as a preservative. Molasses renders the lime more soluble and causes it to penetrate the wood or plaster surface; a pint of molasses to 5 gallons of whitewash is sufficient. Silicate of soda solution (about 35 degrees Beume) in the proportion of 1 to 10 of whitewash produces a fireproof cement. A pound of cheap bar soap dissolved in a gallon of boiling water and added to about 5 gallons of thick whitewash will give it a gloss like oil paint.

WHITE HOUSE WHITEWASH

An old recipe for whitewash, issued by the Bureau of Lighthouses of the United States Department of Commerce, said to be very good for outdoor exposure is as follows:

Slake half a bushel of unslaked lime with boiling water, keeping it covered during the process. Strain it and add a peck of salt dissolved in warm water; three pounds of ground rice put in boiling water and boiled to a thin paste; half a pound of powdered Spanish whiting and a pound of clear glue, dissolved in warm water; mix these well together and let the mixture stand for several days. Keep the wash thus prepared in a kettle or portable furnace; and when used, put it on as hot as possible, with painters' or whitewash brushes.

The washes which contain milk, flour, or glue are not to be advised for use in damp, interior places, owing to danger of decomposition of the organic matter. For such locations it is better to use one of the formulas containing none of these ingredients. Whitewash is applied with a broad whitewash brush and is spread lightly over the surface, no attempt being made to brush it in as is the case with an oil paint.

Whitewash should always be applied hot. It penetrates the wood better when hot and is a better disinfectant.

CALCIMINE

Cold water paints or calcimine have as their basis whiting or carbonate of lime instead of caustic lime as in whitewash. This material itself does not adhere and it is necessary to use a binder of some kind, generally glue or casein. Scott also gives the following directions for making calcimine:

ORDINARY WHITE STOCK. (CALCIMINE)

(1) Sixteen pounds dry Paris white (whiting) mixed until free of lumps, with 1 gallon boiling water. (2) One-half pound white aising glue; soak 4 hours in one-eighth gallon cold water. Dissolve in a water-bath (glue-pot) and pour into (1).

The above recipe makes about 2 gallons of stock, weighing $12\frac{1}{4}$ pounds per gallon. It is of proper brush consistency and may be used at once, but is better after standing half an hour. Any tint may be given the white stock by stirring the desired dry color in a little water and adding sufficient liquid color to the base.

The following data in regard to the covering capacity and time of applying were obtained as an average of several years' work from shop records:

One gallon covers on plaster=270 square feet.

One gallon covers on brick=180 square feet.

One gallon covers on wood=225 square feet.

A man in 1 hour, using a 5-inch brush will coat the following amount of surface:

Rough walls=22 square yards (198 square feet).

Smooth walls=28 square yards (342 square feet).

Brick walls=20 square yards (180 square feet).

Flat surface (6 inch or floor)=40 square yards.

Ceiling (with stepladder)=25 square yards.

DAMP PROOF CALCIMINE (WHITE STOCK)

For plastered walls. (1) Sixteen pounds Paris white or extra gilder's whiting, 1 gallon boiling water.

(2) One-half pound white sizing glue, soak 4 hours in one-half gallon cold water, then dissolve on a water bath.

(3) One-fourth pound phosphate of soda, dissolve in one-eighth gallon boiling water.

Mix (3) with (1), then add (2).

If a thick white stock is wanted, use half a gallon of water with the 16 pounds of Paris white instead of 1 gallon. For tinting, use colors that are not affected by lime, namely, yellow ochers, sienna, umbers, Venetian red, persian red, maroon oxid, ultramarine blue, ultramarine green, chromium oxid, bone black, etc.

If lampblack is used for tinting, it must be stirred up in hot water containing a little soap or in cold water containing a little borax, the alkali overcoming the greasy nature of the lampblack.

PASTE FOR PAPERING PLASTERED WALLS

Soak $\frac{1}{2}$ lb. of glue for several hours in cold water, then dissolve in 1 pint of boiling water, and while hot add, stirring briskly, $\frac{1}{2}$ lb. of turpentine. In another vessel make 2 lbs. of flour into a paste with 1 quart of cold water; beat up the paste until it is free from lumps, mix the glue and the flour paste together, and thin down with 1 gallon of boiling water, stirring briskly during all the mixing operations. This is a very strong paste, suitable for many purposes.

BULGES IN LINOLEUM

Oilcloth and linoleum always stretch after they have been down on the floor a while. When measuring them, an allowance of half an inch should be made on all sides for stretching. After they have been in place a few weeks, it may be found necessary to trim the edges an inch or more. If the linoleum begins to bulge up anywhere, immediately examine the edges, and you will find that they are pressing against the walls. The trimming of the edges should be done at once, for if the covering lies too full, even for a short time, it will begin to crack, and its durability will be greatly diminished.

TO CLEAN WHITE WOODWORK

Woodwork painted white is a continual source of worry, as when once soiled it is so difficult to clean. It is much better to enamel it, as the enamel will wear longer, and when soiled can be washed quite easily.

The following recipe is designed for white-painted surfaces that are much soiled. Simmer gently on the fire, stirring constantly, one part, by weight, of pulverized borax, and 15 parts of brown soap of good quality, cut in small pieces, in 100 parts of water. The liquid is applied by means of flannel and rinsed off at once with pure water.

FILLING FLOOR CRACKS

Cracks in floors, while being unightly in appearance, harbor an unbelievable quantity of dirt. A new floor, if properly laid, is free from this disagreeable feature, but in the course of time, these cracks will begin to appear due to the shrinkage of the wood. If all floor cracks are filled with "crack filler" the accumulation of

dust and dirt will not be in evidence. Thus you may be assured of a sanitary floor surface and sickness may be avoided.

It is a simple matter to remedy; just clean out the dust and dirt from the cracks with some sharp pointed instrument and then thoroughly clean out with a scrubbing brush, soap and water. When dry, the crack filler may be applied. It is made in stiff paste form and should be applied with a putty knife in much the same manner as putty. To make the job complete the floor should then be waxed, varnished or painted, depending, of course, on the present finish and the effect desired.

TO CLEAN WALLPAPER

Cut into eight half-quarters a stale loaf. With one or two pieces, after having dusted the walls lightly with a soft cloth, begin at the top of the room, holding the crust in the hand and wiping lightly downward with the crumb about half a yard at each stroke till the upper part is completely cleaned all around, then go around with the light sweeping stroke downward, always commencing each successive course a little higher than the upper stroke had extended till the bottom is finished. This operation if carefully performed, will frequently make very old paper look almost equal to new. Great caution must be used not to rub paper hard nor to attempt clearing it the cross or horizontal way. The dirty part of the bread, too, must each time be cut away and pieces renewed as soon as at all necessary.

INSERTING A PANE OF GLASS

The chief cause of failure in the amateur glazing of windows is often the faulty cutting out of the old putty, the pressure of the new glass on the old irregular lumps of putty leading to breakages. This means that the proper tool for the cutting out of the hard putty is absolutely essential to success. This tool is called a heck knife, and it consists of a blade of steel, with a piece of leather on each side to form a handle. The blade is thickened at the back, and the knife is used by holding the sharp edge against the putty, and tapping the thick heck with the hammer. The only other special tool required is a glazing knife which differs from an ordinary putty knife only in the stiffness of the blade. Cheap as both of these tools are, they can both be easily made, the heck knife out of an old file, and the putty knife from a broken table knife.

When the glass is in place it is surrounded by putty and this putty must be removed, not left in the corner of the rebate. At the same time care is necessary to avoid cutting away the wood, especially so in the case of the bars or narrow strips dividing the glass.

After cutting away the old putty the rebate must be filled with new soft putty. The glass is then pressed in evenly, rubbing it near the edges with the fingers of each hand at the same time, until it squeezes the putty out at the back, leaving a thin layer only between itself and the wood.

The front of the glass can next be filled in with putty, smoothing it all around with the glazing knife, and bringing the highest part on the face level with the wood at the back. When this is finished, not before, run the knife round against the glass and wood at the back, thus cutting away the surplus putty which squeezed out in the bedding in of the glass.

In sliding sashes it will be found that the top part of the glass in the bottom sash fits into a groove in what is called the meeting rail, and this groove often forms a stumbling-block to the beginner in glazing; but there is no reason why this should be so, as the putty must be cleared from this groove equally as well as from the rebates.

Should the pane be of fairly large size, it requires something besides the soft putty to hold it in place. Small brads are often used; but small triangular pieces of zinc are much prefer, as they can be pressed into the wood close to the glass easily, and are covered by the front putty. All at two at each side and end of the pane are sufficient.

In getting the glass cut to size, do not have it too large. It should be at least $\frac{1}{8}$ -inch smaller each way than the actual opening, so that it rests on putty everywhere. If the wood touches it there is a danger of breakage, not only when putting it in, but afterwards if the window is opened or closed sharply.

Pointers on Painting and Papering

95

There is probably no one point more neglected by the average farmer than the judicious use of paint, not only on his house and outbuildings, but also on machinery and various agricultural implements. It is, perhaps, the rule rather than the exception in some sections to see houses and agricultural implements on the farm sadly in need of paint. The idea seems to be prevalent that paint is used solely for ornamental purposes, and its use is regarded as a luxury rather than a necessity. While paint does, of course, serve the purpose of improving the appearance, it is far more useful for protection than for ornament. A small amount of money and work expended in keeping a valuable piece of machinery properly painted will add greatly to the length of its life. The same may be said of buildings. Another useful object which is accomplished by painting is the improved sanitary conditions of buildings and outhouses. It is not proposed to give instructions for artistic painting, or even for doing the class of work which would be expected of a first-class master painter, for such work can not be expected of one engaged in another business. But any man can do an average job of painting, and can thereby not only improve the appearance of his place, but can add greatly to the durability of all articles painted.

BRUSHES AND OTHER IMPLEMENTS

The only absolutely necessary implements are brushes. Probably the most useful brush is a round one with bristles about 6 inches long. Oval brushes from 2 to 2½ inches wide are also very good for general use, and a great deal of painting is done with 4 or 5-inch flat brushes. Of these three types it is difficult to say which is the best, different painters having their own individual preferences. The advantage of a flat brush is that a greater amount of surface is covered at a stroke, with the disadvantage that the paint can not be as thoroughly rubbed in. On the whole, therefore, it is best to use a round brush. The 6-inch bristles are too long for proper working, and before being used a piece of cloth should be tied around the brush about 4 inches from the end of the bristles and 2 inches from the binding. As the bristles are worn off this sleeve or bridle, as it is called, may be pushed back, thus materially lengthening the life of the brush. For painting sashes and other small surfaces smaller brushes are necessary, the most satisfactory being the small oval brushes with a chiseled end. For varnishing oval or flat brushes with somewhat shorter bristles are generally used. For the application of whitewash and calcimine a very much larger brush may be used, since these are applied lightly to the surface and are not rubbed in. A flat 8 or 9-inch whitewash brush may be used with practically as much ease as a smaller one. In addition to the paint brushes, dusting brushes made of stiff bristles are useful for cleaning the surface before painting. For cleaning rusted metal surfaces, steel-wire brushes (2 or 3 inches wide and 6 inches long with wires about 3 inches long) are frequently necessary.

If ready-mixed paints are bought the cans may serve as buckets, but if the paint is mixed from the paste a strong tin bucket large enough to allow for stirring the paint will be necessary. Scraping knives and putty knives are necessary tools for the painter, and it is well to have one or two of each, but a very good scraper can be improvised from a piece of sheet iron, and an old kitchen knife may be ground to a square end and converted into a very serviceable putty knife. A paint strainer is useful, but two thicknesses of cheesecloth tied over the top of a bucket answers practically as well. Paint should be strained before using it.

EXTERIOR PAINTING

Three coats at least are generally necessary to make a good piece of work. The effect of the priming coat if properly applied, is to fill the pores of the wood and furnish a foundation on which to apply the subsequent coats. Owing to the different porosity of different parts of the surface, it is almost impossible to completely fill with one priming coat, and an attempt to get a good effect by applying the finishing coat immediately on top of the priming generally results in failure. A second coat will not penetrate to any very great extent into the wood. It should not, however, dry with a gloss, because a glossy surface

does not furnish a good foundation for the next coat. In order to prevent the gloss, most painters add turpentine to the paint for the second coat; the amount used, however, should be small; to each gallon of paint about a half pint of turpentine in hot weather or a pint in cold weather, is sufficient. The second coat, which, of course, should have been evenly spread and well rubbed in with the brush, should be allowed to dry somewhat longer than the priming coat. The third, or finishing coat, should be one which will dry with a gloss, and for this purpose there should be an turpentine or thinner added to the paint at all. This method is one which is advocated by a large majority of authorities on the painting of wood, but is seldom carried out by painters, the tendency being to add excessive amounts of turpentine, or benzine, unduly thinning the paint and making it possible to spread it in thin, even coats with less labor than would be required for the same thickness and evenness when paint of a proper consistency is used.

INTERIOR PAINTING

For interior work the same directions apply as to outside painting, but it is so important to have the final coating contain such a large amount of oil as to give a glossy finish. A dull finish is preferred by many people, and since this paint is not to be exposed to severe weather conditions, a larger amount of thinner may be used than for outside work. Also, paint for inside work should dry faster than one for the outside and a somewhat larger amount of japan drier is generally used.

PASTE FOR PAPER HANGING

The cementing agent employed for securing wall paper to the wall is good flour paste—best of wheat flour—prepared as follows: Beat up two pounds of white flour into a stiffish paste with cold water. Crush out all the lumps with a spatula, and then add one and a half ounces of powdered alum. Neat pop on the mixture about two gallons of boiling water, stirring the batter round from left to right continually, while the water is gradually poured in from the kettle. If the water is boiling and the batter is effectually stirred whilst the water is added, at first slowly, and then rapidly as the paste thickens, which it will soon do, the result will be a bucket of good paste, quite free from lumps, and strongly adhesive. It is well, after the paste is made, to pour on the top a pint of water. Some people assert that the alum keeps the paste from moulding so rapidly. However this may be, it is certain that the strongly astringent properties of this alkali tend greatly to obviate wrinkles, especially in thin papers which are most liable to show them. The alum also helps the paste to thicken, and is probably preservative in hot weather. But it is not advisable to use alum in paste which is intended to fix gold papers, for alum has a tendency to discolor and turn black all papers which have a metallic lustre. The object of pouring cold water upon the newly made paste is to prevent a skin forming over it. To prevent the often sickening odor that pervades a newly-papered room for some time, add to the paste a small quantity of oil of cloves, salicylic or carbolic acid, either one of them being a remedy for the nauseous and unhealthy odor of sour paste.

The paste, prepared in the above-mentioned manner, either with or without the addition of alum, answers for general purposes, but for the sake of completeness a few additional recipes are here given.

First, heat water to the boiling point; then add flour while constantly stirring. To prevent the formation of lumps the flour should previously have been passed through a sieve. Agitation is continued until the heat has rendered the mass of the desired consistency, and after a few moments' further boiling it is ready for use. In order to increase its strength, add powdered resin in proportion of one-fourth to one-fifth the weight of the flour. Prevent moulding by adding a few drops of oil of cloves or carbolic acid.

Another paste is made by mixing flour paste 100 parts, alum water 3 parts, solution of dextrine 5 parts. The object of adding solution of dextrine is to give more adhesive power to the paste, that of the alum water to prevent the paste from spoiling, and the wall paper from becoming mouldy in case the wall is not entirely dry.

NAMES FOR FARMS

Every farm worth owning and worth living on is worthy of a name. The list of names given below is to offer suggestions that readers may make use of in selecting a name for their place. After a name is selected there are various ways of making use of it. Most farmers use the name on their stationery, some put it on the products sold, when the products are such that they can be enclosed in a special box or carton, like butter or eggs, and a good many use the name somewhat as is shown in the small cuts at the top and bottom of this column.

Another way to use a farm name appropriately is at the main entrance to the farm or on the roof of the barn as is done in the picture at the foot of this article. This is a good way, too, to use the name. Strangers passing along the road see the name and remember it, besides a named farm is one in which the owner is sufficiently interested to induce him to keep it looking up to something. A named farm always looks better than the ordinary run of farms that are numbered like convicts instead of named like honest men.

Having decided on a name, a board may be put up at the gate bearing the name of the farm and that of the owner. If everyone had his own name on the gate-post, or at the main corner of the farm, it would be a great convenience to people driving along the roads. Everybody likes to know who everybody else is and where he lives; well, just simply naming the farm and putting up the name goes a long way toward giving that information.

Any reader of the *Nor-West Farmer* or of this book who would like to have a few appropriate farm names suggested for his farm may send a description of his place to the *Nor-West Farmer*, Winnipeg, and the best names possible will be suggested.

In describing a farm so that a person who has never seen it may decide upon an appropriate name, the following information is essential: area of the farm, where it lies, that is, is it near a river, lake, range of hills, woods, lowland, highland or other natural features; whether the land is level or rolling; what trees you have planted, where they are, and the species; what kind of buildings you have and where they are located; in brief, just describe the farm as you would to a person who had never seen it before.

ENDINGS FOR FARM NAMES

In selecting a farm name take as the first part of the name the most conspicuous, suitable, natural feature of the place. For example, suppose you have a grove of maple or poplar trees near the buildings, or a plantation of trees for a windbreak, the remainder of the farm being open prairie.

The trees in such case would be the most prominent natural feature and the first part of the name could be Maple or Poplar.

Endings for name also should be appropriate.

Here are a few endings with their meanings:

Dale, a space of level or gently rolling ground between hills of no great height with a stream flowing through it. **Dell** has the same meaning.

Glen, a narrow valley between hills, more secluded than a dale.

Holme, a low flat tract of land by the side of a stream.

Brace, a stretch of sloping ground.

Moor, an area of marshy, level land.

Wold, high, rolling land, bare of woods.

Vale, a shallow valley between low hills.

Croft, a small field of high, dry land.

Green, a narrow valley or a flat of land between low hills.

Lea, a grassy plain or level tract of land.

Flat, a level tract of land without elevation, relief or prominence.

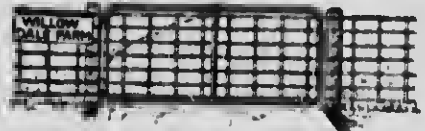
Down, a flattish topped hill or ridge, or a tract of open upland, chiefly used for grazing sheep.

Ridge, a stretch of low lying hills.

Hollow, a low spot surrounded by higher land.

Nook, a secluded, out-of-the-way place.

Glade, an open place surrounded by trees.



Another Way to Use the Name at Entrance Gate

APPROPRIATE FARM NAMES

Acrefair	Bonny Doon
Airy Hill	Bonny Mains
Airy Knoll	Bonnieview
Aldernoor	Boulder Hill
Alderwood	Bowling Green
Alfalfa Bank	Braching Brook
Alfalfa Lawn	Braehurn
Algonquin	Braehud
Allandale	Braelea
Altamont	Braemar
Alta Vista	Bramwoods
Ambrose	Branford
Applegate	Breezy Point
Arden	Bridgeview
Arrowdale	Bridgewater
Ashdale	Brierwood
Ashgrove	Brightside
Ashland	Brightview
Atglen	Brightwood
Atwood	Broadacres
Auchengoiach	Broadhurst
Avondale	Broad Meadows
Ayremft	Broadview
Ayredale	Brookdale
Ayrmont	Brookfield
Balsam Lodge	Brooklands
Banner	Brookmend
Bannerland	Brookside
Barclay	Brookwood
Bayside	Brushwood
Bay View	Buck Hill
Beachside	Buena Vista
Beacroft	Burnbrae
Beaumont	Burnside
Beaverbrook	Burnview
Beaver Creek	Burr Oak
Beaver Dam	Butterfield
Beaver Meadow	Butterside
Beechgrove	Byrne Hill
Beechland	Carnation
Beechwood	Cassils
Belleview	Castle Gore
Bellwood	Cedar
Big Creek	Cedar Brook
Blackwood	Cedar Crest
Black Hall	Cedar Croft
Black Park	Cedar Grove
Blackwood	Cedar Hedge
Bloomfield	Cedar Hill
Bloomingdale	Cedar Lane
Blossomdale	Cedar View
Blue Grass	Cedar Wood
Blue Spruce	Center View
Bluff Point	Charter Oak
Bonnie Brae	Cherry Bank
Bonnybrook	Cherry Croft



A Method of Using the Farm Name

Names for Farms

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Cherry Grove
Cherry Lane
Clear Brook
Clear View
Clover Crest
Clover Dairy
Cloverdale
Cloverdell
Cloverland
Clover Lawn
Clover Leaf
Clovernook
Clover Patch
Clover Point
Coldbrook
Columbine
Cool Creek
Corsehill
Cottonwood
Craighurst
Craigtelus
Craiginbros
Creekside
Crestmont
Creston
Crestwood
Cropwell
Cross Hills
Crossway
Crystal Springs
Daleland
Dahnony
Dairy Down
Daisy Meadow
Deepdale
Deer Foot
Deer Lodge
Dellwood
Diamond Willow
Doughoregan
Doveland
Drumcross
Eagle View
East Field
Eastover
East View
Echo Farm
Echo Glen
Edgehill
Edgmont
Edgemere
Edgemoor
Edgewater
Edgewood
Ehlerwood
Eldorado
Elkhurst
Elmbank
Elmhrae
Elmbrook
Elmelad
Elmoreek
Elmcrest
Elmeroft
Elmdale
Elmendorf
Elm Glen
Elm Grove
Elmburst
Elm Lane
Elm Leaf
Elm Shade
Elm Side
Elm Valley
Elm View
Elmwood
Eminence
Enoch Glen
Eureka
Evergreen
Eveslior
Fairacres
Fairdale
Fairfield
Fairholme
Fairlee
Fairmont

Fairmoor
Fairmount
Fair Oak
Fairview
Far Hills
Fatland
Fernbank
Fernbrook
Fern Hill
Fernwood
Fieldhead
Fillmore
Findsene
Flinstone
Foothills
Forest Hill
Forest Hill
Foxwood
Freehold
Freelands
Friendship
Fruitvale
Furbrook
Gate House
Gleda
Glenby
Glencalm
Glendale
Glendell
Glenfield
Glen Gable
Glengray
Glenholm
Glenhurst
Glenview
Glenwood
Glimmergen
Golden Fool
Gold Medal
Good Hope
Gracefield
Grand Ridge
Grand View
Grassland
Grayhurst
Graiser
Green Aero
Greendale
Greendell
Green Farm
Greenfield
Greenhill
Green Knoll
Green Leaf
Green Meadow
Green Valley
Greenway
Greenwood
Greystone
Greystone Lodge
Groveland
Hallowell
Happy Creek
Happy Hollow
Hawkeye
Hawthorne
Haycroft
Hoystack Hill
Hazel dell
Hazel dene
Hazelhurst
Hazel Land
Hazelook
Heart's bloom
Heart's Delight
Hedge Grove
Hedgewood
Helendale
Herefordale
Hickory
Hickory Grove
Hidaway
Highash
Highbass
Highfield
Highland
Highland Park

Highlawn
High View
Hilwood
Highworth
Hillcrest
Hillcroft
Hill Grove
Hillhead
Hillhouse
Hillhurst
Hillsdale
Hillsdale
Hillsdale
Hillsdale
Hilltop
Hillswohl
Hillyview
Hinterland
Hollywood
Homescroft
Homeland
Homestead
Homewood
Hopland
Hops
Hurd
Ideal
Idelwick
Idliss
Iugewood
Interlake
Intervale
Iron Springs
Iroquis
Jersey land
Juniper
Justimere
Kenwood
Lackawana
Lakemeadow
Lakeside
Lakeview
Lakewood
Landholm
Laurel Heights
Laurel Lea
Laurel Lodge
Lawnview
Leaffield
Level Lea
Lime Ridge
Lindengrove
Linwood
Loandlands
Loch Lomond
Locust Lane
Londerry
Lone Maple
Lone Oak
Lone Pine
Lone Rock
Lone Spruce
Lone Trail
Lone Tree
Longacre
Long Beach
Longdell
Longfield
Longridge
Long Valley
Longview
Longwater
Longwood
Lookabough
Lookout
Lot Valley
Loveland
Low Hill
Lowland
Luck Low
Lupton
Lyledak
Maryland
Madina
Manor
Maple Avenus
Maple Brook
Maple Clad

Maplecrest
Maple Court
Maple Crest
Mapledale
Maple Dell
Maple Glen
Maple Grove
Maple Hill
Maple Home
Maplehurst
Maple Lane
Maplelawn
Maple Lea
Maple Leaf
Maple Lodge
Maple Meadows
Maplemont
Maple Ridge
Maple Shade
Mapleton
Maple Vale
Maple Valley
Mapleview
Maplevue
Maplewood
Maplewood Heights
Marbrae
Maywood
Meadowbrook
Meadowdale
Merry Dale
Merryland
Middledale
Milvale
Milledale Mill Grove
Millstream
Meadowcreek
Meadowcroft
Meadowgore
Meadowhurst
Meadow Lawn
Meadow Lea
Meadows
Meadowside
Meadowvale
Meadow View
Minnawaska
Modern Method
Morning Glory
Morningside
Mossfield
Mount Lawn
Mountain Meadow
Mountain View
Mount Pleasant
Mountvale
Newpath
Norlauc
North Drive
North View
Northwood
Onkeroft
Onkdale
Oakgrove
Oakhurst
Oakland
Oaklano
Oaklawn
Oak Park
Oak Ridge
Oakwood
Okeby
Old Home
Old Homestead
Orchard
Orchard Hill
Orchard Knob
Orchard Lake
Overlook
Park Hill
Park Place
Pine Beach
Pine Bluff
Pine Corner
Pine Glen
Pine Grove
Pinhurst

Publications for Farmers

The following list gives the title and date of issue of certain bulletins, circulars and pamphlets issued by the Dominion Department of Agriculture. Readers may obtain copies of any of these publications on application to the Publications Branch, Department of Agriculture, Ottawa. Give title of bulletin wanted.

Buttermaking on the Farm	(Issued)	1917
Cheese, Coughmiser		1911
Cheese, Cream		1916
Cheese, The Manufacture of Cottage and Buttermilk		1917
Cow, The Dairy		1917
Cow Testing, Good Reasons for		1913
Cow Testing, with some notes on the Sampling and Testing of Milk		1913
Cows, Profits from Dairy		1911
Cream for Buttermaking, Care of		1919
Cream, Causes of Variation in the Percentage of Fat in Hand Separator Cream		1915
Cream Cheese and Butter		1911
Dairy Herd Records, Keeping		1918
Milk, Clean		1911
Milk Production in Canada		1913
Alfalfa Growing in Manitoba		1917
Barley, Varieties of		1916
Beans in Canada		1917
Clover, Sweet—The Truth		1911
Corn for Ensilage		1918
Corn for Ensilage		1911
Crop Production		1916
Crop Rotation		1916
Cutworms, The Army		1919
Drainage on the Farm, Tile		1913
Flax for Fibre, Cultivation of		1916
Flax for Fibre, Grow		1918
Gopher Destruction		1916
Grain on the Prairies, Growing		1917
Grain, The Best Varieties of		1919
Grain Crops on the Prairies, Preparing Land For		1913
Grain, Seed		1918
Grain Crops, How the Ripening of, May be Hastened		1914
Grass, Awlless Brome Versus Western Rye		1914
Mangel Seed Growing		1916
Oats, Varieties of		1916
Potatoes, Digging and Storing		1918
Potatoes, Factors Influencing the Profitable Production of		1916
Potatoes, Importance of Planting Good Seed for High Yields		1918
Potato in Canada, Its Cultivation and Varieties		1918
Potatoes, When Should They Be Planted to Obtain Maximum Crops		1918
Rod Cultivator, The		1919
Seed, Cleaning		1917
Seed Corn		1917
Seed Testing, Sending Samples		1912
Seed, Selection and Wintering of Biennial Vegetables for		1918
Seeds, Growing Field Root, Vegetable and Flower, in Canada		1915
Smut, Seed Treatment for Grain		1914
Tobacco Culture in Canada		1914
Wheat, Varieties of, Oats and Barley		1916
Cutworms and Their Control		1918
Cutworms and Their Control		1915
Cutworms, The Army		1916
Cutworms, The Control of, in the Prairie Provinces		1916
Date to Reseed Fields Devastated by Cutworms		1920
Fly, the Hessian, and the Western Wheat-stem Saw-fly		1915
Insects and their Control, Common Garden		1917
Locust, Control in the Prairie Provinces		1920
Locusts, or Grasshoppers, How to Control		1918
Maggot, The Cabbage Root, and its Control in Canada		1916
Pea Weevil, The		1918
Potato Canker		1912
Potato Diseases Transmitted by the Use of Unsound Seed Potatoes		1914
Potato Scab		1915
Potatoes, Late Blight and Rot of		1916
Potatoes, The Black-leg Disease of		1916
Potatoes, Spraying for Late Blight and Rot of		1916
Potato Diseases, Control of		1915
Potatoes, Black-leg, Disease of		1916

Potatoes, Powdery Scab of	(Issued)	1913
Rats and Mice		1918
Wheat, The Black or stem-blast of		1917
Iron Hog and the British Market, The		1916
Best Cattle, The Feeding of		1916
Beef Raising in Canada		1913
Bulls, Distribution of Pure Bred		1919
Castration and Docking, Value of		1912
Cow, The Dairy		1917
Directory of Pure-bred Sheep and Goat Breeders		1919
Dairy Cattle, The Feeding of		1916
Ewe and Lamb, Care of		1918
Farm Buildings, Ventilation of		1913
Feeding Stuffs, Purchasing		1918
Finish the Feeders in Canada—Keep the Heifers at Home		1916
Foxes, Care, Sanitation and Feeding in Captivity		1918
Goat, The Angora		1915
Hog Cabin, Cheap Portable		1916
Hog Feeders		1913
Hogs, as Self Feeder for		1916
Hogs, Self Feeder for		1918
Horses, Poisoning by the Common Blackfly		1917
Horses and Cattle, Mangement of		1911
Horses, Feeding of		1916
Horses for Summer Work, Preparing Farm		1917
Lands, Finishing for the Block		1917
Lands, Hutlouise or Winter Raising upon Canadian Farms		1913
Piggery, The Farmer's		1916
Ram and Ewes During the Breeding Season		1916
Care of		1916
Screenings, Reclaimed Elevator, as a Food for Live Stock		1918
Selection of Breeding Stock, Advice to the Beginner		1915
Sheep Account and Record Book		1919
Sheep, Karakul and Persian Lamb Fur Production		1918
Sheep Barn, The		1916
Sheep—Castration and Docking		1915
Sheep-Dipping		1916
Sheep-Dipping, Advantages of		1911
Sheep, The Feeding of		1916
Sheep, Feed Racks and Troughs for		1916
Sheep Husbandry in Canada		1913
Sheep, Raise More		1915
Swine, The Feeding of		1916
Swine, The Feeding of		1917
Swine Husbandry in Canada		1915
Swine, Feeding and Housing		1917
Wool Price Calculator		1916
Wool and Its Manufacture		1911
Asparagus, Celery and Onion Culture		1919
Bush Fruits		1920
Cabbage and Cauliff Culture		1913
Cabbage and Cauliff Culture		1919
Garden, The Home Vegetable		1917
Garden Making on Vacant Lots and The Home Vegetable Garden		1917
Garden Insects and Their Control, Common		1917
Garden Crops, The Manuring of Market		1917
Homes, Beautiful, and How the Farmer May Make Them		1915
Horticulture in Saskatchewan		1916
Hut-Bed and Cold Frame, How to Make and Use		1919
Medicinal Plants and their Cultivation in Canada		1915
Plum Culture		1903
Roses, Hardy—Their Culture in Canada		1915
Seed Grower, Every Farmer His Own		1918
Seed Grower, Every Gardener His Own, Part II		1919
Tomato Culture		1919
Strawberry, The, Its Cultivation in Canada		1919
Chicks, Brooding and Rearing		1914
Crate Feeding		1916
Duck Raising		1914
Egg Case Plan, The		1916
Eggs in the Home, The Preserving of		1915
Eggs, The Care of Market		1912
Eggs, The Candling of		1913
Eggs, Candling Appliances for Electric and Kerosene Lamps		1913
Eggs, The Payment for, According to Quality		1914
Eggs, Rules for the Production and Marketing of New Laid		1914
Eggs, Limewater for the Preservation of		1915

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Eggs, Standard for Canadian..... (Issued) 1915
Egg Production, Winter..... 1913
Feeds and Feeding..... 1913
Flock, The Farm..... 1913
Geese, The Management of..... 1914
House Construction, Principles of Poultry..... 1914
House, Plan of Permanent Laying, for Poultry..... 1914
House, The Farmer's Poultry..... 1914
House, The Utility Poultry..... 1914
Incubation, Artificial..... 1916
Incubation, Natural..... 1914
Intestinal Parasites of Poultry, Their Prevention and Treatment..... 1917
Nests, Trap..... 1915
Poultry Keeping, In Town and Country..... 1916
Poultry, The Crata Fattening of..... 1916
Poultry Marketing Calendar..... 1916
Poultry Yard, Twelve Months In the (Calendar)..... 1918
Produce for Market, Preparing Poultry..... 1916
Products, Produce More Poultry..... 1917
Turkeys, The Management of..... 1914
Turkeys, Biological Laboratory, System of Raising..... 1916
Barn Truss, Framing the..... 1914
Bee-Keeping in Canada..... 1914
Bees and How to Keep Them..... 1916
Farm Feeds..... 1919
Fly Nuisance, How to Deal with the..... 1915
Grains, the Use of Coarse, for Human Food..... 1920
Honey, Facts About..... 1916
Labour Saving on the Farm..... 1918
Lime in Agriculture..... 1914
Machinery, Care of Farm..... 1920
Manures and Fertilizers..... 1915
Manure, Barnyard..... 1918
Maple Sugar Industry in Canada, The..... 1920
Preservation of Fruits and Vegetables for Home Use..... 1919
Poisonous Plants..... 1920
Rabbits, The Rearing of..... 1920
Rice, Wild..... 1920
Trees, The Care and Planting of Shade..... 1914
Well, The Farm..... 1914

PROVINCIAL PUBLICATIONS

The following bulletins and circulars may be obtained freely making application to the respective addresses. Manitoba publications—Publications Branch, Dept. of Agriculture, Winnipeg; Saskatchewan publications—Dept. of Agriculture, Regina; Alberta publications—Dept. of Agriculture, Edmonton; British Columbia publications—Dept. of Lands, Victoria, B.C. The B. C. bulletins deal only with building construction, being specially prepared for prairie conditions.

Manitoba

- Trees, Flowers and Fruits for Manitoba
- Hatching, Brooding, Rearing and Feeding Chicks
- Better Farm Homes
- Rusts and Smuts of Grain Crops
- Control of the Sow Thistle in Manitoba
- Fattening, Killing and Dressing Chickens for Market
- Common Breeds of Poultry
- Management of the Brood Mare and Foal
- Canning by the Cold Pack Method
- Common Diseases and Disorders of the Foal
- Poultry Houses for Farm and Town
- Vegetable Storage
- The Gas Engine
- Cheese Making on the Farm
- Asparagus
- Our Friends the Birds
- Hot-Beds and Cold Frames
- Gophers and Squirrels in Manitoba
- Flax Growing in Manitoba
- Lessons on Weeds
- The Live Stock Trade of Manitoba
- Poultry Diseases
- Barn Ventilation
- Protection from Lightning
- Agricultural Society Activities
- Farm Buttermaking
- Practical Cookery
- Books for Farm and Home
- Home Dressmaking
- Observations on Rust Control
- Sewage Disposal for the Country Home
- The Pure-Bred Poultry Industry

- The Cream Separator on the Farm
- Beekeeping in Manitoba
- Summerfallow Competitions in Manitoba
- Hay and Pasture Crops in Manitoba
- Plans for Farm Buildings
- Alfalfa in Manitoba
- Soma Forage Crops for Manitoba
- How to Spot Potato Top Disease in July
- Potato Top Disease in July and August
- The Potato
- Corn for Ensilage
- Buying Dressed Poultry
- Getting Rid of the Loafer Hen
- How to Preserve Eggs
- Eggs from the Farm to the Consumer
- Pointers on Pig Raising
- Hog Raising
- Standards for Judging Vegetables
- Sweet Cream for Butter-making
- Care of Milk and Cream
- Care of Cream for Creameries
- Silo Construction and Ensilage Production in
- Repairing Farm Equipment and Roads (Manitoba)

Saskatchewan

- Corn Growing in Saskatchewan
- Seed Grain, Seed Treatment and Seeding
- Varieties of Small Grains for Saskatchewan
- The Value of Rusted or Shrunken Wheat for Seed
- Gardening in Saskatchewan
- How to Kill and Dry-Pluck Poultry
- Hay and Pasture Crops for Saskatchewan
- The Best Varieties of Farm Crops for Saskatchewan
- Lessons from the Rust Epidemic of 1916
- Alfalfa in Saskatchewan
- Alfalfa Seed Production
- Lessons Learned from the Drouth, Wind and Frost
- Fencing the Farm [of 1918 in Saskatchewan]
- The Summerfallow
- The Control of Sow Thistle
- Winter Rye
- Hints to Flax Growers
- The Culture of Flax in Saskatchewan
- Potato Growing in Saskatchewan
- The Problem of Crop Production
- Durum Wheat
- Wheat Growing in Saskatchewan
- Poultry Houses for Prairie Farms
- Poultry (The Care of Breeding Stock)
- Fleshing Chickens for Market
- Fattening, Killing and Dressing Chickens for Market
- Co-operative Marketing of Eggs
- Poultry Management, and the Preservation of Eggs
- Killing and Dressing Pork, and Curing Pork and Mdk and Cream Testing [Beef on the Farm]
- Plows and Plowing
- Implement Sheds and Granaries for Prairie Farms
- Farm Forestry and Horticulture
- Fencing the Farm

Alberta

- Suitable Varieties of Small Grains for Alberta
- Winter Rye
- Seed, Preparation of Seed, Seeding
- Meat Curing on the Farm
- Native Grasses of Alberta
- The Production of Timothy Seed in Alberta
- Potato Growing in Alberta
- Studies in our Common Grains
- Successful Poultry Raising
- The Housing of Swine
- Preparing for the Pig Crop
- The Use of Pasture in Pig Raising
- Vegetable Gardening
- Causes of Contamination and Care and Preservation
- Dairies and Milk [of Milk and Cream on the Farm]
- Guarantee of Loans Raised by the Municipal Hail In-
- Milk and Cream Testing [Jurassic Board of Alberta]

British Columbia

- Sheep Barns
- Farm Houses
- Horse Barns
- Beef Cattle Barns
- Granaries
- Dairy Barns, Ice and Milk Houses
- Get Your Own Gent and Be Your Own Dairyman
- Combination or General Purpose Barns
- Piggeries and Smoke Houses
- Protect your Farm Machinery
- Poultry Houses
- Silos and Root Cellars
- Implement Sheds and Granaries

Organizing a Beef Ring

A beef ring organization may be composed of from sixteen to forty members representing as many families. Usually the most successful rings are those composed of twenty members, and which operate during twenty weeks, beginning May 1st or May 5th each year. This covers part of the summer season, and in that way each member may furnish one animal during the season. Where the distances are great, or the families large, a sixteen-member ring can be successfully operated, and where the distances are not so great and the families small, a twenty-four member ring will prove the most successful.

For a twenty-member ring the animals slaughtered should weigh from 750 to 800 pounds each, thus dressing out about 400 pounds, and giving each member 20 pounds of beef each week. The carcass is so cut up and distributed that each member gets a holling piece, a steak and a roast each week. In case of small households two families may take one share, and thus supply only one animal between them. Should a member require and secure more than one share per week, the matter may be adjusted at the end of the season according to the price per pound decided upon by the society at the beginning of the season. This, of course, necessitates weighing the dressed carcass of each animal, keeping a record of it and the weighing of the meat and keeping a record of that.

The following simple constitution and by-laws have been used by many beef rings and have proven highly satisfactory. With a few alterations they can be used by any beef ring. In bringing about the organization of a beef ring it is, of course, necessary for one or two individuals to solicit memberships and call a meeting of those interested, for the purpose of organizing.

CONSTITUTION OF BEEF RING

- (1) The association shall be known as _____ Beef Ring, and shall consist of _____ members. The purpose of the association is to furnish each member with a portion of fresh beef weekly during the specified season.
- (2) The officers shall consist of a president, secretary and treasurer, whose duties shall be such as usually pertain to those officers; also, a managing committee of three members, whose duty shall be to provide a place suitable for slaughtering, settle all differences in regard to weight and quality of animals provided, and have the general oversight of the work. Any vacancy occurring in any office, shall be filled by a vote of a majority of the society as hereinafter provided.
- (3) The officers shall continue in office for one year, unless otherwise determined by a majority of the society.
- (4) The president and secretary shall be, and are hereby empowered to convene all meetings considered

necessary by them, and any special meetings, at the request of any five members given in writing.

(5) _____ members shall constitute a quorum for the transaction of business.

(6) All persons becoming members of this beef ring shall subscribe to the articles and by-laws of this constitution and be governed by them.

(7) The annual meeting shall be held at a place and on a day agreed upon, for the purpose of closing up the business of the current year, enrollment of members, election of officers, making arrangements for the succeeding year's operations and for the transaction of such other business as may be brought before the meeting. Notice of said meeting shall be given each member of the society by the secretary, at least five days prior to the date for the meeting.

BY-LAWS

- (1) The society shall elect one of its members to the position of butcher, whose duties are hereinafter defined. The butcher may engage some suitable person to do the slaughtering and cut up the meat.
- (2) Each member shall furnish one steer or heifer the age of which shall not exceed _____ years and weight not less than _____ lbs. Each member shall supply his animal in his proper turn, during the season, as determined at regular meeting of the society.
- (3) The time at which each member shall furnish his animal, shall be determined by lot at the annual meeting, or at a meeting held at least two months prior to the date of the first killing.
- (4) Each member shall deliver his animal to the place of slaughtering by or before 9 o'clock a.m. on the day of the week appointed by the society for the slaughtering of each animal.
- (5) Each member furnishing an animal shall be entitled to and receive the roughs: low, head, heart and liver of the same.
- (6) The butcher shall be the judge of the suitability of all animals furnished, and may reject unsuitable animals, subject to an appeal to the managing committee.
- (7) The butcher shall weigh each carcass when dressed, and keep an account of the same, giving proper credit to the member furnishing said carcass. He shall also cut and distribute weekly to each member of the society, an equal portion of the same as near as he can judge in the division, and keep strict account of the amount furnished each member each week. At the end of each season, settlement shall be made with the members of the society in accordance with the account kept by the butcher, and the price per pound agreed upon by the society.

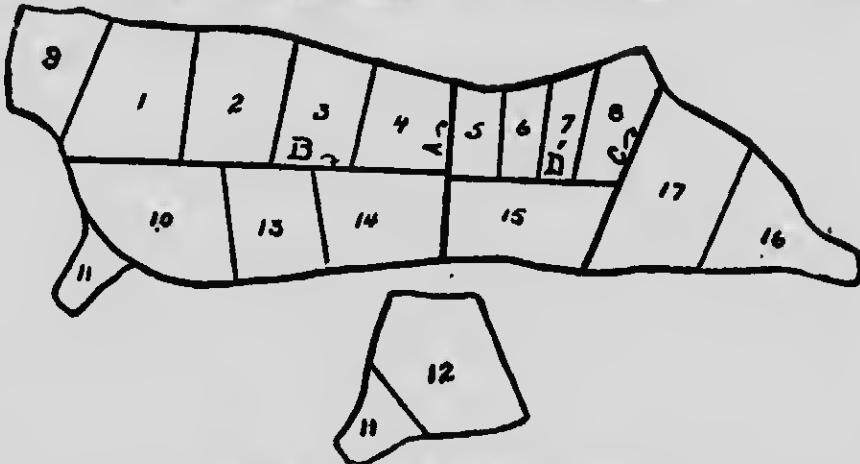


Chart No. 1—For a Sixteen Share Ring

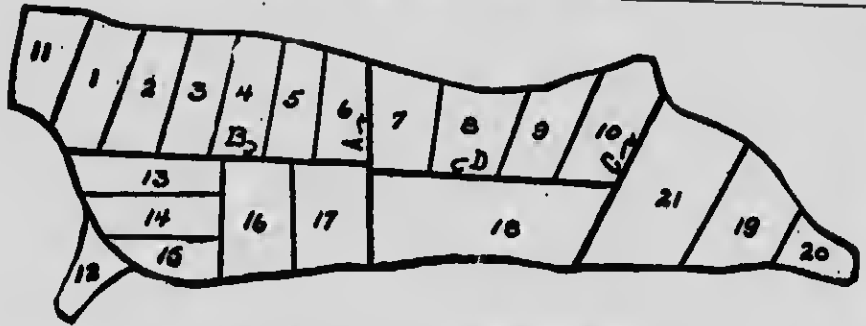


Chart No. 2—For a Twenty Share Ring

(8) The distribution of the beef in accordance with the foregoing rules shall be accomplished by placing each member's portion on hooks under their respective names, at the place of slaughter, or at such other place as may be agreed upon by the society.

(9) The huteher shall market all hides and pay over to the treasurer the money obtained by him for the same and shall receive for his services the sum of _____ dollars per head for all animals slaughtered, cut up and distributed by him.

(10) The money obtained by the huteher for hides shall remain as a fund in the hands of the treasurer, for the purpose of defraying the necessary expenses of the society, paying the butcher and settling the difference in accounts between memeoers at the end of each season.

(11) No member shall have the privilege of withdrawing from the society without the consent of the majority of the said society, and in no case will a member be allowed to withdraw until his accounts are settled with the society.

(12) The above articles and regulations governing this society shall remain in full force and virtue unless amended by a two-thirds vote, after a notice of such amendment has been regularly given.

METHOD OF DIVIDING THE CARCASS

In cutting up a carcass of beef, it is first split down the centre with a cleaver or saw. The forequarter is then removed from the hind quarter at the line A, as shown on the charts, leaving two ribs on the hind quarter. In cutting up the forequarter, it can best be cut first, at the line B, as shown on the charts, and thereafter may be cut into smaller pieces in any manner most convenient to the huteher.

In cutting up the hind quarter, they can best be cut first at the line C, as shown on the charts, and then at the line D, and thereafter may be cut in any manner to suit the convenience of the huteher, the object being to get all pieces as near the same weight as possible.

Chart 1 shows the method of cutting one-half the carcass for a sixteen-share ring. The other half, of course, is cut in exactly the same way. In distributing the carcass, a roasting piece, a boiling piece and a slice of steak goes to each member as follows, for the first week:

Member—	Boil-Roast	Steak from 17
No. 1 & 9.....	1 10	1 slice
No. 2 & 10.....	2 13	1 slice
No. 3 & 11.....	3 14	1 slice
No. 4 & 12.....	4 16	1 slice
No. 5 & 13.....	5 12	1 slice
No. 6 & 14.....	6 15	1 slice
No. 7 & 15.....	7 11	1 slice
No. 8 & 16.....	8 9	1 slice

The second week member No. 8 moves up to take the place of No. 1, and the others all drop down one place, and so on through the season, so that each member gets a different combination of cuts each week. The other half of the carcass is divided between the other eight members, in the same way.

Chart 2 shows the method of dividing the carcass for a twenty-share ring, the cuts being distributed as follows:

Members—	Boil-Roast	Steak from 21
No. 1 & 11.....	1 14	1 slice
No. 2 & 12.....	2 13	1 slice
No. 3 & 13.....	3 19	1 slice
No. 4 & 14.....	4 16	1 slice
No. 5 & 15.....	5 17	1 slice
No. 6 & 16.....	6 18	1 slice
No. 7 & 17.....	7 15	1 slice
No. 8 & 18.....	8 12	1 slice
No. 9 & 19.....	9 20	1 slice
No. 10 & 20.....	10 11	1 slice

Chart 3 shows the method of cutting up the carcass for a twenty-four member ring, the cuts being distributed as follows:

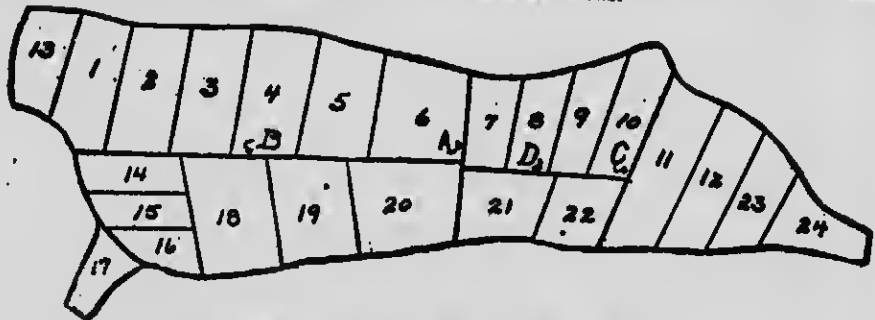


Chart No. 3—For a Twenty-four Share Ring

Organizing a Beef Ring

Member—	Roast	Boiling
No. 1 & 13.....	1	14
No. 2 & 14.....	2	15
No. 3 & 15.....	3	13
No. 4 & 16.....	4	16
No. 5 & 17.....	5	17
No. 6 & 18.....	6	18
No. 7 & 19.....	7	19
No. 8 & 20.....	8	23
No. 9 & 21.....	9	24
No. 10 & 22.....	10	20
No. 11 & 23.....	11	21
No. 12 & 24.....	12	22

Chart 3 shows the method of cutting the carcass for a twenty-four ring. It will be noticed that when a carcass is cut for a twenty-four aharo ring, the round is used for two roasting pieces instead of being cut into steak, as for the sixteen and twenty-share rings. The twenty-four member ring is rather large, and should only be organized where most of the families are small or where animals that will dress 550 or 600 pounds can be used.

MANAGEMENT OF THE WORK

It is possible to successfully operate a beef ring without a cold storage or cooling room. Some rings now in operation are managed without cooling rooms. The animal is slaughtered in the evening of one day (usually Thursday) and allowed to cool over night. With animals that dress 400 to 500 pounds, all the animal heat will leave the carcass overnight. It is then cut up early the next morning and the portions for each member placed in a cotton bag and hung on a hook under his name, the weight being marked on a ticket pinned in the bag. The members then come and get their meat on Friday morning.

Animals to be slaughtered should be delivered to the place of slaughter at least twelve hours before the time for slaughtering. They should be deprived of feed for at least twenty to twenty-four hours before being killed, but should have all the water they care to drink during this time, especially if the weather is warm.

The success of the beef ring depends largely upon quality and condition in which the animals are presented for slaughter by the various members. The drawing for turas or dates upon which each member is to supply his animal, should be done not later than January 1st each year. Then the members who must supply heaves early in the summer will have ample time in which to condition them.

It is difficult to formulate a rule that will insure the presentation of suitable cattle by all members, but authorizing the butcher to refuse any animals not suitable is the nearest one can come to it.

Matters in that direction can be much simplified if the butcher will make a trip around the circuit in April, visiting those farmers who are to supply animals and advise them as to what animal in their herd will be most suitable for the beef ring.

STORING ICE FOR SUMMER

The storage of a few blocks of ice for summer use is a very simple matter where the ice is readily available. Any unoccupied corner of a shed will serve for the purpose. A rough board enclosure 10 feet square and 8 feet high will hold enough ice to provide 50 pounds per day for 130 days, after allowing for a reasonable amount of wastage. The smaller the quantity stored the larger is the proportion of waste.

The bottom of the enclosure should be covered with about 1 foot of sawdust. If the soil underneath is impervious clay it will be all the better if there is a few inches of gravel under the sawdust. In putting in the ice the boards can be taken away from one side and replaced after the ice is in position. A space of 1 foot should be left between the ice and the boards to be filled with sawdust, and the ice should be covered with about the same thickness. It is the sawdust which keeps the ice from melting. The drier the sawdust is the better the ice will keep, and it is a good plan, as the ice is removed during the summer, to throw out from time to time the driest of the sawdust where it will be under cover and continue to dry out and thus be in

better condition to be used again the following year. The ice should be cut in blocks of uniform size and packed as closely together as possible.

If it is necessary to erect a special ice house the roughest kind of a shed that will keep out the weather is all that is necessary. Poles may be driven into the ground and lined up on the inside with rough lumber, or slabs, leaving a space of about one-half inch between each board, and the whole covered with a roof to keep out the rain. Of course, the ice house may be built with a regular frame, lined inside with rough lumber and, if a more finished appearance is desired, it can be covered on the outside with clapboards or other siding. There should be plenty of ventilation above the ice.

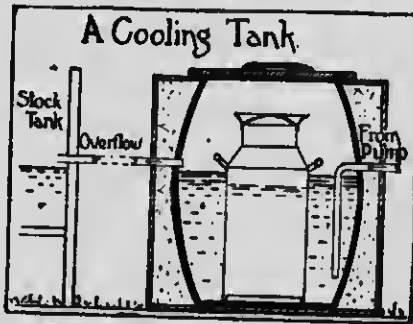
If sawdust cannot be obtained, planer mill shavings may be used for packing the ice, or in cases where neither is available hay may be used. The ice should be covered by about two feet of hay.

REPAIRING A CONCRETE TANK

In almost every case where a concrete tank develops a leak the fault lies in the way in which the tank was made. If concrete is made sufficiently rich and in one homogeneous mass it is practically waterproof even under low pressure. In making concrete stock tanks provision should be made for the mixing of enough concrete so that the bottom and sides can all be placed in one continuous operation, thus effectively preventing any such separations as were just described. When once the crack has occurred it is rather difficult to remedy it. Sometimes the following method will work satisfactorily: Drain the water from tank. Clean the entire interior very thoroughly with water, then go over the surface with a dilute hydrochloric wash, the purpose of which is to expose the original aggregate. The hydrochloric should then be thoroughly cleaned off so that no trace of it is left upon the surface. Apply a plaster of rich mortar mixed to a consistency such that it can be applied without running. This should be put on carefully and continuously, and should effectively seal any cracks. A second method, but one which is not likely to work satisfactorily because it has to be done with extreme care, is to chisel out a channel on the inside of the tank following the crack. The channel should be about one inch deep and should be wider at the bottom than at the surface so as to provide a key for the rich mortar used to fill the crack. This method is simple and takes less material than the preceding method.

COOLING TANK FOR CREAM

Cream tanks can be bought from several of the dairy supply houses, but if not too big a quantity of cream is produced a home-made tank will do what is required. First take a barrel and around it make a box about 3 feet x 3 feet the height of the barrel. When this is made, fill up the corners (left between the barrel and the box), with sawdust or straw. Make a lid to fit exactly over the box. The whole box can be painted white, which helps to prevent the sun from heating the tank too much. Be sure to have the intake pipe extended to the bottom of the barrel as the warm water then rises and overflows. When an empty can is set in the tank, a stick across the barrel, above the can will hold it down.



Homemade Cream Cooling Tank

FARM DAIRYING

TEMPERATURE FOR CHURNING

The temperature of the cream should be such that the butter comes in the correct granular stage at or about 30 minutes. The correct temperature for churning varies with the thickness, sourness, and richness of the cream, the temperature of the room and similar influences. A good average temperature for churning is 60 deg., but this may be varied from 55 deg. to 68 deg., depending upon the season of the year and the above-mentioned conditions. Study the individual conditions. Too high a temperature is very unsatisfactory and produces butter which forms in lumpy masses in place of an even grain. On the other hand cream churned too cold forms the butter very slowly and is equally unsatisfactory.

WILL THUNDERSTORM SOUR MILK?

There is a widespread belief that thunder sours milk, for testimony is not lacking that after a severe electrical storm, milk that should have been sweet is found to have soured. It is quite natural that the souring should be attributed to the thunder but we shall need to look elsewhere for the cause of this phenomenon. Souring is caused normally by the acidity which results from bacterial growth and sterilized milk will not sour in a thunderstorm. Neither will milk that is kept on ice sour during a thunderstorm. The probable explanation lies in the fact that during storms of this kind the temperature is raised sufficiently to favor the multiplication of milk-souring bacteria where the temperature is not regulated by the use of ice.—W. H. Feldman.

PRESERVING BUTTER FOR WINTER

Butter that is to be kept for several months should be made from cream that has not been kept more than two or three days before churning. The quicker it is churned the better. The churning should be stopped when the butter is in small granules so that as much butter-milk as possible can be worked out. It should then be worked and salted and packed in a glazed crock or jar. A layer of about one inch of brine as strong as can be made should be kept over the butter. The jar should be kept cool in the basement or other place that is fairly cool. Special attention should be given to keeping the butter entirely away from light and air, because light and air cause butter to spoil rapidly.

SELLING THICK OR THIN CREAM

The question often arises whether it is advisable to sell a comparatively low testing cream or one very high in fat content. If cream very rich in fat is separated, more skim-milk is retained on the farm, the cream is somewhat less quickly tainted by fermentation, and less labor and storage space is required to transport a given quantity of butter fat to market than would be the case if a thin cream were produced; while on the other hand, there will be a greater loss of fat in handling, and probably with most separators a greater loss of fat in the skim-milk. There will certainly be a much greater loss from fat adhering to the separator parts and utensils, especially in cold weather, than would be the case if a thinner cream were separated. Taking all these factors into consideration, it is probable that the selling of a cream testing within the range of 80 to 40 per cent will combine more advantages and fewer losses.

The question is frequently asked, "Which is the more profitable, making butter at home, or selling cream to the creamery?" So many factors are involved that no one answer can be given to fit all cases. In general it may be said that, when a uniformly fine quality of butter can be produced on the farm, and a ready market at good prices is available, and the making and marketing of the butter affords useful employment for members of the farmer's household but does not inflict hardship on any of them, the making of butter at home is advisable. If, on the other hand, trouble is experienced in making a uniformly good quality of butter, if the butter must be sold at a comparatively low price at the local stores, if extra help must be hired in order to make and market the butter, or if these operations impose an unreasonable burden on any member of the farmer's family, it would be advisable for the farmer to allow the creamery to manufacture and market his product.

FARM CHEESE MAKING

For cheese-making it is extremely important that the milk be produced under the most sanitary conditions, and that it be cooled as low as possible without freezing immediately after it is milked. It is also important that the milk be made into cheese at least once a day. It is best if the cheese can be made at once after milking.

Coagulate Milk with Rennet

A clean, sanitary tub, or even a wash boiler, may be used. The milk should all be strained through two thicknesses of cheesecloth as it is poured into the cheese tub. Then bring the whole amount of milk to a temperature of 80 deg. F. If the milk is heated on a stove, great care should be taken not to heat rapidly nor to too high a temperature. A good way is just to warm a small amount and then mix it with the whole. No part of the milk should be heated to a higher temperature than 120 deg. F.

If the milk from a whole day is made into cheese, then it is sufficiently ripe to "set" as soon as the proper temperature has been obtained. On the other hand, if the milk is made into cheese shortly after milking, then the milk should stand not less than an hour at the 80 deg. F. temperature in ripe before the rennet is added. In case this cannot be done, a small amount of good sour milk or buttermilk may be mixed with the milk from which the cheese is to be made. Do not add more than 2 per cent or more than 2 lbs. of the good sour milk to each 100 lbs. of cheese-milk. The next step is to add the color. Butter color will not do for this. It must be cheese color. The amount



Equipment Needed for Making Cheese at Home

to add will vary with the strength of the color and with what is wanted. The cheese should not be red, nor should it be white. A medium yellow color is liked by most cheese consumers. Add from 1/2 to 1 teaspoonful (1 1/2 to 1/2 ounce) to each 100 lbs. of milk, and mix thoroughly. The amount of rennet added should be such that the milk curdles in 20 to 30 minutes. This amount will be about 1 ounce to 250 lbs. of milk. When the rennet has been measured out, it should be mixed with about 40 times the amount of cold water. When ready to add the diluted rennet, stir the milk.

Cutting the Curd

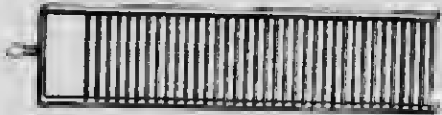
The curd should not be cut till it is reasonably solid. In test when it is ready, insert the forefinger into the curdled milk at an angle of 45 degrees, then slowly lift the finger straight up. If the curd splits smoothly over the finger, then it is ready to cut; while if it breaks into small pieces and ragged, then it is too soft to cut. Usually the time required for the curd to set, from the time the rennet is added, is from 45 to 60 minutes. About 20 minutes is required for the milk to curdle. Fully as much time will be required for the curd to set until it is ready to cut.

Special cheese knives are made for cutting the curd into small squares. For making cheese on a small scale

on the farm these are not necessary. A home-made long-bladed wooden knife may be used. The curd should be cut lengthwise and crosswise into small cubes. A wire toaster is a convenient tool for completing the cutting of the curd into cubes not over one-half inch in diameter. The particles should be as uniform in size as is possible, to obtain an even cook or even heating.

Heating the Curd

The curd is not "cooked." It is gradually heated to expel the moisture and to make the curd firm. At this stage there will be considerable whey. Dip some



Curd Knife

out and heat it to a temperature of 135 deg. F. Then gradually pour it back and mix it very gently with the contents of the vat. Do not allow the curd to mat. Keep the particles separate by gently stirring. If roughly handled, while the curd particles are soft, much of the fat will be lost in the whey.

Pour in only enough hot whey to raise the temperature of the whole 3 or 4 degrees, then gently stir for 5 minutes. Add hot whey again to increase the temperature 3 or 4 degrees more and stir 5 minutes. Continue this until the temperature has reached about 100 deg. F. It will thus require about 30 to 40 minutes to bring the temperature from 86 deg. F. to 100 deg. F. Allow the curd to remain at this temperature till the curd is cooked through. When this is done, the curd is so hard that when a handful of it is squeezed, and when the grip again is released, the curd particles will not stick together.

After the curd has reached this stage, allow it to remain in the whey for about 30 to 45 minutes more. This is done to develop acid in the curd. The curd may be tested occasionally on a piece of hot iron.

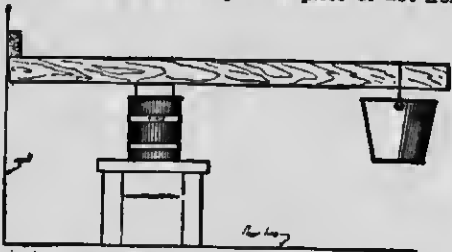


Fig. 2—Homemade cheese press

Easily Made Device for Pressing Cheese

When it strings about one-half inch, then draw the whey from the curd. While the curd is developing acid in the whey it must not be allowed to mat.

Preparing the Cheese for the Press

The curd is ready for the salting as soon as it has been well stirred and the whey is thoroughly drained off. About 1 lb. of salt should be added to the curd for each 300 lbs. of milk used.

If the cheese is regularly made on the farm, special hoops should be purchased. These hoops make a cheese that is 7 inches in diameter. The height is variable. The most suitable weight to make cheese is about 10 lbs. If a cheese is made only now and then, a hoop may be made from a small tin pail having straight sides and a diameter of about 7 to 8 inches. There is no objection to a hoop of greater diameter. If such a hoop is used, holes should be made in the end to permit draining of the whey during pressing. The pail should first be thoroughly cleaned. Then place some cheesecloth within the pail. Make the folds as

smooth as possible. The curd is then put in. Care should be taken to keep the curd warm. Do not expose it too much to the cold air. Cold curd will not unite. When the curd has been placed in the pail then put the follower (circular board) on and press.

Pressing the Cheese

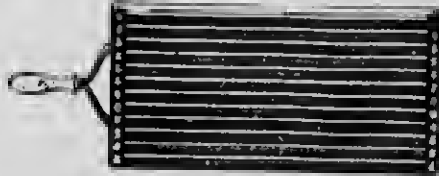
If much cheese is made on the farm, one of the regular cheese presses should be purchased. If only a small amount is made, a home-made press will serve the purpose. An old wagon tongue will do for a lever. One end may be just inserted under a block of wood fastened to the wall and extending out over the pail of cheese.

When the cheese is first put into press, very little pressure should be applied. The weight should be close to the cheese. The pressure is gradually increased by moving the weight toward the end of the lever. In case the curd should be a little cold, greater pressure should be applied when first put into press.

When the cheese has been in press about one hour it should be turned and the bandage or lining should be adjusted. If the cheese does not unite well, apply a little warm water. In another two hours turn the cheese again. The cheese should remain in press not less than 24 hours. In case the cheese does not unite well in pressing, it may be soaked in warm water while still in the handages, then put back in the press.

Curing the Cheese

If it is desired to have the cheese cure quickly, then the temperature may be kept at about 70 deg. F. The best cheese, however, is obtained from slow curing in a cold room. A temperature between 50 deg. F. and 60 deg. F. produces good results. A cellar is probably the best available place for a curing room on the farm. When the cheeses are first put in the cellar they should



Curd Knife

be turned daily; and during the ripening process, should they become moldy on the surface, the cheese and shiving should be washed thoroughly with a strong salt brine. If the cheese appears dry and about to crack, then moisten the floor each day. At a temperature of 60 to 70 deg. they will ripen in two or three months, and at lower temperatures they will ripen in four to six months.

CREAM CHURNS HAND

Where one has a number of cows in the herd, some of which are more nearly fresh than others, the milk from the strippers mixed in with that from the other cows, does not give any difficulty in churning because there is enough of the milk from the more nearly fresh cows to overcome the trouble, but where one has only one cow it is not so easy to overcome the trouble. About the only remedy that can be suggested is to mix the milk with some cream, from a fresh cow, with that from a stripper.

SALTING BUTTER

The amount of salt usually put into butter is from half to three-quarters of an ounce per pound of butter. If butter for storage, that is, what is known as packed butter, you would use slightly more than this, say, an ounce of salt per pound of butter. The best kind of salt to use is the ordinary dairy salt. The coarse salt, which is used for putting on hay, or given to stock, is too large, in particle, and salts rather unevenly. Salt should be worked evenly into the butter. Uneven salting causes butter to have a streaked or mottled appearance. Butter that is cold and hard cannot be as evenly salted as when of the proper consistency.

HINTS ON TRAPPING FUR-BEARING ANIMALS

Trapping is an occupation that can be engaged in by farmers very easily, for during the trapping season work on the farm is slack, and his remuneration in this line will depend only on the amount of work he expends and the knowledge he has or can gain, properly used.

Some trapping writers maintain that one or two or three methods are sufficient for the taking of any animal, and such writers are a stumbling block to novices who are trying to make money along this line. Anyone who understands even in a small way the habits of such an animal as the fox, or the mink, knows there is no one method, or any three methods, that can be successfully used at each time. As their range is in the water, on land, up in the mountains, and in the valleys, it can easily be seen that the nature of the country varies so, it requires many different sets, and sets that would work along a stream would be useless up in the mountains. There are, however, certain sets that are much in use, and in these we have the fundamental principles on the making of sets. The trapper himself can easily adapt them to the requirements of the country in which he is trapping and the animal to be trapped.

HUMAN ODOR

Another theory that was formerly used a good deal in trapping writers' articles was that mink were afraid of human scent, and that traps must never be set with the bare hands; rather gloves must be used, and these gloves as well as the traps must be dipped in blood to kill the human odor. The novice who believes in and practices this is greatly handicapped; moreover, it takes so much extra time and trouble that frequently he pays too much attention to this part and neglects the making of a good set—and he wonders why he doesn't catch more mink. There are, to be sure, some animals that are very suspicious of human odor, and every precaution must be used in setting for them; but the mink is not one of these animals. While mink are not afraid of human odor, they are cunning, and care must be used in setting traps to see that the surroundings are the same after the set is made as it was before. Mink are suspicious of old surroundings that have been made new or strange looking by the trapper.

TAINTED BAITS

There are fanatics and extremists in every line, and trapping is no exception. There are writers (I am doubtful as to whether they are trappers) who claim that mink, fox and all such animals prefer old, partly decayed, water-washed bait to fresh bait. With the exception of the skunk, perhaps, which are fond of tainted flesh, there are none of the commoner fur-bearing animals that prefer old to fresh bait, and especially to bait that has been soaked in water for a week or so, or even a day, to kill the civilized odor. Any person can have this amply proven by offering a tame mink, a fox, or even a cat both fresh and stale meat and see which they take the quicker. The reason is simple: the reason flesh attracts and is liked by animals is because it contains certain odors that are present only when the meat is fresh. As this flesh gets older these attractive odors leave it, and in its place comes a taint, finally ending in a decomposed state that is unattractive to any animal. Even if the bait is fresh, if it is soaked in running water for only a day the meat loses these natural odors.

These are not wild, senseless theories; rather they are plain, everyday facts that a person will find out for himself when he has followed the trapping game for a time. It is so necessary to get the greatest results from trapping that all useless theories should be eliminated. This will prevent the novice being handicapped in making his sets. What the trapper does require is practical knowledge of the tracks and signs of fur-bearers; their habits, foods and general peculiarities. When he has obtained knowledge along this line and applies it correctly he will from that time on see an increase in his catch.

PREPARING THE TRAPPING GROUND

The most successful trapper is the one who studies the animals' habits and signs, both on the trap line and

from reading other people's experiences. Before the season opens the trapper should spend as much time as possible strolling over the trapping ground and preparing it in a general way for the time when he is to set his traps. This is the time to make artificial dens along the streams for mink; to put up sliding wires or sliding poles; to cut notches in logs to have the notches old-looking by the time the season opens; and in general to have any places fixed so that by the time the season arrives the animals will have become used to the changes in the locality and will not be suspicious as they would if all these changes were made at the time the traps were set. A careful survey of the ground will enable the trapper to get an idea of the number of animals of each kind to be found there. Skunk dens should be located and examined by looking for black and white hairs inside the den, whether it is inhabited or not; the same of muskrat dens and houses; the muddy banks of streams examined for mink tracks; while the roads in the woods and pastures used by the cattle will show you tracks of fox if there are any around.

SYSTEM IN TRAPPING

The trapper who during the winter months makes a business of trapping will find it to his advantage to make a map of the territory he intends to cover and mark on this the most favorable places he has found for sets in his travels over the grounds. For instance, he will find skunk dens on hill-sides, in hollows, on rocky bluffs, etc.; and after making sure these places are occupied by skunks they should be marked on his map; and the dens he finds of the other animals and most favorable signs should be marked in a like manner. It pays to be systematic in any line of work.

THE OUTFIT

The amateur's outfit need not be elaborate nor expensive, and exactly what that outfit will be will depend on the amount of trapping that is to be done. Outside of the traps, he can utilize many things found around home, as, for instance, a hatchet, ordinary pocket knife, etc. The trapper on a larger scale than the novice will, of course, find it to his advantage to have a special outfit to use for trapping purposes, and have each one of these articles the best that can be secured.

TRAPS

The day of low, thin-jawed traps for the smaller animals is passing. The reason is simple: animals such as the muskrat have very tender leg bones. When one of these thin-jawed traps become shut on the leg it breaks the bone, and there is nothing but the tender skin and flesh of the animal holding it. All that is required is a few jerks, and it is free. Skunk and muskrat will frequently amputate their legs when every other means of securing freedom fails. For these animals especially, the high-grip variety of traps should be used. The Victor trap has for years held the lead in being the most popular trap among trappers who want a reliable trap at a moderate price. Most trappers, having once used the Victor, would not care to change to some other brand without good reasons. However, it is not necessary to change brands, for the best, all-round trap can now be secured in the Victor make. It is the No. 1 Giant, and by all means use them. For the first time they eliminate several different sizes in traps, and the one size can be used for anything up to fox. The Giant being perfectly constructed, is after the high-gripping pattern, and with the wide, spreading jaws it reduces to a minimum the escape of animals from gnawing or pulling out.

GUNS

To the small trapper who catches only the smaller fur-bearers a gun is handy; it is not a necessity. The trapper whose catch is large really needs a gun; not all the time, perhaps, but quite often. To fill the nest of a trap line gun he requires something light and easily carried, and that he can use not only to kill bait for his trap and game in his traps, but one that will stop a bear or drop a flying partridge. The best gun for this purpose is a two-barrelled gun. The upper barrel 22

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calibre rifled, and the lower one 44 smooth bore, shooting either the ball or shot. The barrels are in three lengths: 12, 15 and 18 inches; the stock is skeleton and folds when carried in the special holster. In all, the gun weighs about three pounds, and is the ideal one for the person who makes a business of trapping on a good-sized scale. For the boy trappers and others who catch only the smaller animals any of the standard 22 calibre rifles are good.

KNIVES AND HATCHETS

If there is one thing more than another the trapper needs it is a good knife. He need not have an elaborate affair, but what he wants is a knife that will take a keen edge and keep it for some time. It will pay the trapper who does a good deal of skinning to have a special skinning knife; the small trapper can use a good jack-knife. After an animal has been caught, that is only half the important part; the next step is to skin the animal without making any cuts in the skin or destroying the ears, eyes or nose. A good knife puts you a long way over the road to safety.

TRAPPING METHODS

In trapping, as in business, you have to understand the basic principles entering into it before you can succeed. A man could not expect to succeed in starting a store if he didn't know what to buy, what his customers wanted, and various other details; so more can a person expect to succeed in trapping if he does not try to learn all he can about the animal he is going to take: its habits, foods, traps to use, etc. If you understand the animal's habits, you can successfully take animals anywhere, using both old tried methods and originating new sets.

"NEST" SET

This is the set commonly used with slight variations for all animals taken on the land. Make an excavation the size and shape of your trap, and if there is any danger of the trap freezing to the ground, line the bottom of the excavation with dry leaves or grass. Set your trap on this, having the spring to one side. Cover the trap carefully first with grass or leaves, then with dirt or material of a fine nature, natural to the surroundings. In case the place in which you are setting the trap is sandy, put a piece of cotton batting under the pan of trap to prevent dirt getting under pan and preventing its working. When covered over, have the trap level with surface of the ground so that it cannot be noticed.

For setting in snow this set would be a little different. Under the trap should be grass or a piece of paper; battens put loosely under the pan and around the jaw posts to prevent wet or snow preventing its action here. The whole set is then covered with dry leaves, or grass or a piece of waterproof hutter paper with an X-shaped slit in it, the slit coming directly over the pan. With a stick or a brushy hush, brush a thin layer of snow over the set. Never use your hands in placing the snow; the warmth of your hands will cause the snow to harden, forming a crust which will prevent the trap springing when the pan is stepped on by a small animal.

WATER SET

In water sets so much care as must be taken in making sets on land is unnecessary for the reason that the water not only washes any traces of the set away but it often hides the set. In setting for mink and such animals in this way, still water especially, it is best to place over the trap an old water-soaked leaf. For muskrat this is unnecessary. Muskrat travel chiefly at night; seldom caught at any other time. Mink are often taken in the daylight, and if the trap is at all prominent they are apt to see and avoid it. In water trapping, if your traps fail to catch anything and remain un sprung, test them frequently. Sometimes dirt gets under the pan, or around the jaws, the spring breaks, or the trap becomes set and will not spring. Testing them frequently is the only way you will know whether or not they are working properly. These two kinds of sets will answer all purposes, and while they may require slight variations for individual needs the trapper himself can see to that.

SKINNING THE CATCH

The novice should equip himself with a sharp knife and should tackle the skinning of his first few animals with much patience. Nothing is gained by rushing it through; you have got to take time or you will spoil the pelt. Then after you have had experience it will come easier, and you will be able to skin much faster. There are two methods of skinning: open and eased. Beaver, bear and coon are skinned open (ripped down the belly), while the rest of the animals are eased.

THE OPEN METHOD

This method is the easier of the two, and the operation performed exactly the same way as you would skin a cow. Rip the animal from the chin down the belly in a straight line to the vent. The skin is then taken off carefully by pulling up on the edges and making short cuts in the tissue that holds the hide to the flesh. Care must be taken around the eyes, nose and ears or you may knock off much of the value of the hide.

THE EASED METHOD

Begin by making a slit down one hind leg on a line with the vent, over to the vent, and from there to the other hind leg—on the belly side of the animal. Now skin back to the tail and remove the tail bone by skinning up on it as far as possible and pulling. This done, skin the hide free around the hips and on down the body to the front legs. Grab the upper joint bone and, turning the leg inside out, pull it away from the hide. The next operations are the ears. Care must be used to cut far enough back to reach the base of the ears; otherwise you will make a big slit. The same is true in skinning around the eyes. When the skin is off the animal it will be "eased"; that is in the form of a bag. In skinning muskrat the tail is left on the carcass, of course; the same is true of beaver. The tails of these animals have no value, being covered with scales and hair—not fur.

FLESHING

After the skins have been taken off the animal they are gone over to remove superfluous flesh and fat, and this treatment is known as "fleshing." On the skunk and such animals that hibernate to a more or less extent in the winter, when taken in the fall the fat on them is considerable and to increase the appearance of the pelt as well as to prevent the fur becoming "burnt" and falling out this fat must be removed. The simplest way is to pull the hide loosely on a stretching board, and then with a dull knife scrape off all the fat. Scrape forwards, not backwards, on the roots of the fur, and be careful not to scrape too deep. Judgment must be used to determine how much to scrape.

STRETCHERS

Having the hide ready for stretching, we shall now consider the stretchers. For skunk and muskrat the trapper is advised to use the Newhouse wire stretcher which are easily obtainable at hardware stores. These stretchers are cheaper than home-made shingle stretchers in the long run; firms will pay as high as ten per cent more for skins stretched on them; the furs dry quicker and never give any difficulty in removing; besides all this, they are the correct shape—the most important consideration. It is difficult for the novice to make wooden or shape the shingle stretcher into the correct shape. The best way for the novice is to borrow some boards off an old trapper and from these he can get the patterns and sizes for mink, etc.

STRETCHING

Simple as it may sound, there is quite a knack in stretching a hide correctly; it must neither be over-stretched nor under-stretched; but must be stretched right to command the highest prices. In the first place, never stretch a skin any tighter than it can be conveniently done with the hands. Use plenty of tacks at the nose tip, and especially at the base. The tail can have a wire run into it to keep it open and also to keep it from shrinking.

After the skins have been stretched hang them in a cool, airy place, free from dust, the sun, or artificial

beat. Be careful the skins are not hung so they can touch while drying; if they do, they are sure to mildew. This makes them almost worthless to a fur buyer.

TO TAN SKINS FOR MATS

The following is a simple way to cure sheepskins and other skins with the wool and fur on them for use in making foot-mats or rugs: Take off any pieces of fat and meat left on the skin. Take one pound of alum, one pound of common salt, dissolve them in one gallon of water, and into this put the sheepskin as soon as possible after it has come from the sheep. Let it stand and soak during twenty-four hours. Then take it out of that solution and nail it to some outside. Stretch the skin as it is nailed, and turn the flesh side of the skin out to the sun. Let it get dry. You cannot tan a skin in cold weather by this method; dry inside if cold. Line the skin with a piece of Ingrain carpet or anything desired.

TO TAN HIDES WITH THE HAIR ON

Here is the way to cure hides with the hair on them. Small as well as large hides and rattlesnake skins with the scales adhering are tanned in this way: Turn the hair or scales down, and stretch the skin tightly and smoothly on a board or door, then tack it in place using as many tacks as are required to make it lay smooth. With a blunt knife take off any pieces of flesh or fat that cling to the skin, now rub prepared chalk into the skin, rubbing it hard and thoroughly; when the chalk will not adhere any longer and remains dry when applied, remove the skin from the board and rub powdered alum into it; let the alum lay thick on the skin. Fold the skin through the middle, laying the two raw surfaces together, then roll it up tightly and put it away where it will keep dry. Let it stand one week. That treatment will make it pliable and also retain the hair or scales on the skin. It may be used as desired.

TO TAN WITH THE WOOL ON

Should the skin be old and dry, soak it in water until soft and easy to handle, then take a case-knife, and remove particles of flesh from the skin. On all the hides that way, such as deer, sheep, calf, and fur skins. With the sheepskin make this difference: trim off the round edges. Take one pound of pulverized alum, one-half pound of salt, one pint of wheat bran, mix them together, and add enough water to make them into a thick paste. Spread this evenly over the raw sides of the hide. Now fold the skin in the middle, bringing the flesh sides together. Then roll up tightly. Lay it away for one week, where it will not get wet, rat-eaten or frozen. At the end of that time unroll it, brush away the mixture, and rub the skin between the hands until it is pliable. The skin may be lined should it be used as a robe.

TANNING COW HIDES

The following directions are for tanning such skins as cow, calf, deer, coyote, dog, and similar furs with the hair left on: Soak the skin soft, then with a dull knife or half round file scrape off the flesh and fat, after which soak in warm water for an hour. Now take for each skin, borax, saltpetre and gaulther salts, of each half ounce, and dissolve or wet with soft water sufficient to make a paste which can be spread on the flesh side of the skin with a paint brush, thickest in the center or thickest portion of the skin, then double it together, flesh side in, and keep in a cool place twenty-four hours, not allowing it to freeze, of course. Wash the skin clean, then take sal soda, one ounce, borax half ounce, refined white soap (Ivory will do), two ounces. Melt these together slowly, not allowing them to boil. Apply this mixture to the flesh side as before, roll the skin up again and keep in a warm place twenty-four hours. Now wash the skin clean and have saleratus, two ounces, dissolved in hot rain water sufficient to saturate the skin. Now take alum four ounces, salt eight ounces and dissolve in hot rain water, and when cool enough to bear the hand in (as before) put the skin in for twelve hours, then wring out the water and hang up for twelve hours more to dry. Repeat this last soaking and drying from two to four times, according

to the desired softness of the skin when finished. Finish by pulling, rubbing, working and finally by rubbing with pumice stones and fine sandpaper.

To tan the same skins with the hair off proceed as follows:

Put into a bucket of soft water one quart of lime, let the skin lie in it three or four days, then wash skin, removing the hair and flesh. Into three quarts of warm milk pour, slowly and carefully, one ounce of sulphuric acid, add one pint of salt and stir all together. Dip the skin in warm rain water having sufficient saleratus in it to make it rather strong, working and squeezing it well for a few minutes, then wring dry as possible and put into the acid mixture for fifty minutes, stirring all the time. Now wring out, soak a while in water, finally drying and working until soft.

TANNING COYOTE SKIN

If the skin is not fresh, soak it thoroughly in soft water (never use hard water in tanning). Then place the hide over a smooth beam or a round metal tube, or even a smooth pail, using the side, of course, not the end, and scrape off with a dull knife all fat and superfluous flesh. An old dull drawing knife is good for this purpose; the hide should always be scraped with the grain of the hair, that is, from the nose down. Next put the skin in a lukewarm bath made of soft water with enough oil of vitriol to make it as sharp as vinegar. (The amount of vitriol to be used can be determined by adding a little gradually and tasting the liquor after stirring it thoroughly), and add a handful of salt. Leave the skin in this bath 24 hours, when the native grease should be removed by which time the glue in the skin loosened from the fibre, so as to give the tanning materials an opportunity to take effect.

Next wash the skin (fur or wool) in strong soap suds, removing all dirt or grease from wool or fur, then rinse in clean water. Now dissolve in hot water, 2 ounces of alum, 1 ounce of Glauber salt, 1 ounce of borax, 1 piece of saltpetre the size of the end joint of your thumb, and add a little salt. Add this mixture to sufficient water to cover the skin, the water being a little below blood heat. Leave the skin in this 24 hours stirring at frequent intervals to allow the solution to reach all parts of the skin. When the skin is taken from this tanning liquor, wring out with your hands, all the water possible and hang up in the shade to dry. Never hang it in the sun; the sun will make it hard.

When bone dry, sprinkle the flesh side with water, fold up until the leather is evenly damp (not wet), then, with the hands stretch lengthways and crossways. Repeat this pulling and stretching process until the skin is dry, when it may be finished off with sand paper. If the hide is handled as directed it will be as soft and pliable as velvet.

Success in working leather depends more on the manner of handling than on the materials used. To tan a skin without first removing all grease and oil means that the leather would soon become rotten.

CLEANING FURS

Dark furs may be cleaned with bran or with cedar, mahogany or other hard wood sawdust, which has been heated in an oven. Beat the fur gently with a switch until free from dust, then lay on a table with the fur side up, and rub the hot sawdust or bran through the fur. Use plenty of sawdust and rub vigorously. After this, place the garment upon one or two feather pillows or cushions, with the fur side down, and beat well until all the sawdust or bran is out of the fur. Then hang the garment where the air can blow through it.

If a fur collar is greasy at the back of the neck, rub it with a bit of cotton batting wet with gasoline.

White furs are cleaned in the same manner as dark except that white corn-meal is used instead of sawdust. The corn-meal should be heated. Soiled pieces may be cleaned by being rubbed with cube magnesia. Allow the powder from the magnesite to remain in the fur for a day, then brush the fur and shake the garment thoroughly.

It rarely pays to attempt to tan furs at home. Successful tanning calls for experience and a knowledge of what one is trying to do. Send furs and pelts to an expert tanner if you want a good job of tanning.

Handling Hides on the Farm

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Remove the hide carefully, cutting it as little as you can and taking with it as little flesh as possible. When the hide is off spread it out flat in a clean place, fold and roll up. If the hide is to be salted do not salt until the animal heat has escaped. Use clean coarse salt liberally. It will not hurt to use salt equal to the weight of the hide. The hide floor should have drainage so that the excess of brine can run off. Never stack hides in a pit, as the lower hides will become brine soaked and the quality greatly injured. Sprinkle a thin layer of salt on the floor. Spread out the hide smooth on this surface, hair side down. Sprinkle salt evenly over the skin surface. Be sure every portion of the surface is salted. If cleanliness is observed the excess salt can be used again.

If hutchering frequently the hides can be stacked, hair side down. In stacking the hides do not drag the top hide to displace the salt on the lower one. Hides should stay in the salt at least a week before being shipped.

Preparation for Shipment

Shake off the excess salt. Each hide should be folded and tied separately. Spread the hide out smooth, hair side down and proceed as follows:

1. Fold the front end, making the fold at the front point of the legs.
2. Fold in the tail.
3. Fold in each side so the legs will be all folded in and a smooth edge obtained. This will fold the hind edge in about one-sixth.
4. Fold the legs so they will lie lengthwise upon the side fold.
5. Fold over each side fold so the inner folds will tuck about 2 inches of meeting at the center.
6. Turn the two long folds together, making a single long fold.
7. Fold from the butt end, making the fold about two-fifths from the butt.
8. Fold the forward one-fifth toward the rear.
9. Fold the remaining two-fifths together and tie the square of hide into a tight bundle, using 6 or 7 feet of stout twine. Tie the square of hide both ways, and tie in a shipping tag to each hide.

Shipping

Farmers or groups of farmers or local hutchers should arrange to ship hides direct to reliable hide brokers, who handle in sufficient quantities so they can sort and grade direct into car lot shipments for the tanneries. The packers are able to ship the car lots of the graded hides direct to the tanneries.

Following the present custom, the green hide without salting is sold by the farmer to the local junk dealer. He salts the hide and sells to a travelling buyer, who in turn sells to the larger hide dealer who assembles car shipments for the tanners or for export.

There are upwards of 30 to 40 classes and grades of beef hides. The manner of the take-off, which the farmer can control, governs whether the particular hide grades No. 1, No. 2, of glue stock.

The following points the farmer can control, and the ultimate results will be a better quality and a corresponding better price for country hides:

1. Hides clean from manure and mud.
2. Freedom from blood stains.
3. Good standard pattern or shape.
4. Dew claws off. No jagged edges.
5. Freedom from cuts and scores.
6. Freedom from bruises and dragged spots.
7. Broad as little as absolutely necessary. Place brands on neck or cheek, where hide is least valuable.
8. Salt hides as soon as they are cool.
9. Keep hides from freezing.
10. Co-operative shipments direct to big dealers for final grading.

Calf Skins

The take-off and care of calf skins is practically the same as for beef hides. Use the knife as little as possible. After skinning out the head and feet, most of the work can be done by flaying and beating with the knife handle.

When veal is to be shipped or kept some time, it is customary not to remove the hide until the meat is wanted, as it keeps the carcass moist. In this case greater care must be exercised to avoid cutting the skin. For shipment, fold the calf skins similar to the beef

hides, but several skins may be tied into a single bundle for shipment.

Sheep Pelts

Sheep pelts must be kept as free as possible from blood stains. Lay the sheep on a bench and stick through the neck just behind the angle of the jaw. Let the edge of the knife be toward the neck. The point of the knife should stick through the lower side of the neck. Let the blood run off the point of the knife. Do not leave the toes on the pelt. Split down each foreleg to meet just in front of the brisket. Open from the basket to point of lower jaw. Skin out the cheeks and start the skinning down each side of the neck. Open on the right side of the brisket and gradually carry the opening up to the middle of the body and continue the opening to the hump. The pelt sticks very tight over the brisket, and careful knife work is necessary in order to leave a smooth crease and not cut the pelt. Open down the hind legs to the hump. In skinning out the legs, do not let the knife work. Most of the pelt can be pulled loose. Tie the hind feet together and suspend the crease. Loosen the pelt along the belly and starting at the middle of the belly let the pelt loose along the sides. Use the half clenched hand and work in and down over the shoulder and back and up over the hind leg. A little knife work will be necessary over the rump and around the tail stub. With a saw-saw pulling motion the pelts can be pulled from the back with almost no knife work. Use the knife to skin over the skull and face.

Lay the pelts out singly, wool side down, on a clean floor until they are cool. Salt on the skin side with clean, fairly fine salt. Sheep pelts hunt more easily than beef hides. Do not pile more than 10 or 12 in a pile. They may be shipped after they have been salted about a week. Fold each pelt the length of the back, the wool out. Stack five or six pelts in a pile and tie well with two pieces of heavy twine. Make one tie just back of the front legs and the other tie just in front of the hind legs.

Dead animals should be skinned as soon as possible after they are found. Prompt action in most cases will give a hide of value equal to that from the slaughtered animal. Do not drag the carcass around before skinning. Dragging spoils the grain of the leather.

Horse Hides

The handling of horse hides is essential, the same as beef hides. Skin out the feet and head. Attach a chain around the neck and fasten to a post. Wrap a chain or rope around the hide just back of the ears and with a horse or block and tackle pull off the hide. The tail and mane should be removed and sold separately. Where a number of horse hides can be assembled co-operative shipments will usually bring much better returns. Many local junk dealers appear to want to absorb all the possible profits.

If the farmer wishes to dispose of the hides green—that is, without salting—they should be taken to the buyer within 24 hours, so they can be salted before any spoilage occurs.

WASHING BIRDS FOR SHOW

Dark or parti-colored birds need not be washed for a show. You can give them clean, nice straw a few days before sending them to a show, and they will get into very good condition, but a white fowl must necessarily be washed carefully, and very carefully handled after washing. A room that can be warded up, where the birds are dried off and groomed, then after they are dry make the change to cooler quarters gradually, or rather, cool the room with care to avoid a draft.

A tub of real warm water is needed. First put the bird in and wet the feathers well, then lather all over using white soap, working out all the dirt and discoloration. Work out all the water you can, then put bird in a tub of water slightly warm and rinse out the soapy water. Then put your exhibition specimen in a tub of cool water just long enough to rinse the bird well. In this last water drop in a little bluing so it will become tinted. Too much bluing will ruin the fowl. Then take the bird to a drying room and dry it out with towels, gradually fluffing up the feathers as they dry out. Afterwards keep bird in a clean coop with dry straw. Pay particular attention to the comb, wattles and lobes. See that the coop at the exhibition is clean and if not wash it out.

HELPFUL HOUSEHOLD HINTS

CLEANING THE CLOCK

If one is troubled with the clock not keeping correct time, or if it has a habit of stopping mysteriously, just remove the works and immerse them in coal oil, allowing to remain over night. When removed, wipe dry with a soft cloth as much of the works as can be reached. The dose is generally effective. A small alarm clock does not need taking apart. Of course, this method is intended for clocks that have dust in the works, as often from this cause small parts refuse to move and stick so that other parts cannot run properly.

BLACKING A STOVE

In blacking a stove there are various simple additions which improve the result.

1. Use turpentine, and a little sugar, to mix ordinary blacking. It prevents rust and makes the polish more durable and glossy.
2. Mix the polish with soapuds; or shave good hard soap into the polish and boil them together.
3. Mix the polish with vinegar and just a little sugar.
4. Mix the blacking with cold coffee instead of water.

TO TEST OVEN

It is not everyone who can gauge the degree of an oven's heat at any moment with even approximate accuracy. A useful and simple test is to try the oven every five minutes with a piece of white paper. If too hot the paper will blase up or blacken. When the paper becomes dark brown—that is, rather darker than ordinary meat-pie crust—the oven is fit for small pastry. When light brown—for example, the color of real nice pastry—the oven is ready for pies, etc. When the paper turns dark yellow you bake bread, large meat pies or large pound cakes; while if the paper is just tinged the oven is right for sponge cakes and meringues. The temperature of an oven may be reduced, while cooking, by placing a bowl of water in it.

PICKLING TRIPE

Tripe is made from the walls of the first and second stomachs. The contents are removed, and the stomach thoroughly washed, after which it is scalded in water at a temperature of 140 deg. to 160 deg. Fahr. The lining loosens within a few minutes, and may be easily skinned off. This is better than to allow the stomach to lie for 24 hours or to use lime, as is the practice of some housewives. After scraping and cleaning, the tripe is ready, or pickling in full strength vinegar. Tripe may be bleached to whiteness by boiling a few minutes in five gallons of water to which two ounces of alum has been added. It may be rubbed with salt to preserve it. Tripe is a nutritious product, and is well worth saving whenever a beef animal is slaughtered on the farm.

CURE FOR INGROWN TOE NAILS

Take the sharp blade of an old razor or penknife, and gently scrape the centre of the toe nail. Do not cut it; but continue to scrape until considerable of the nail has been removed. Then leave it.

HOME-MADE HARD SOAP

Put in a large iron or copper kettle, 6 quarts of soft water, 1 tin concentrated lye, 2 tablespoons borax, 1 tablespoon ammonia powder. Melt 5 lbs. of clean tallow, or any grease, pour into the liquid, set on back of range and bring to boiling point very slowly; nothing is gained by hurrying. Stir occasionally with a wooden stick. Boil till the soap drops from the stick in strings. Then pour into moulds. Set in a cool place, but not cold enough to freeze. When cold, turn out and out into size required. This makes 16 lbs. of soap.

HOW TO OAN FISH

Remove the head and tail, skin the fish and remove the back bone. Cut the fish into such pieces as will fit into a jar. Pack the fish neatly in the jar, allow $\frac{1}{2}$ teaspoonful salt to each pint jar. Put on a new rubber, place the cover in position (if a screw cover screw tight, then turn back $\frac{1}{4}$ of a turn), place the jar in the boiler on a false bottom made of alea, and pour in water until it rises one inch above the tops of the jars. Cook for three hours, counting from the time the water begins

to boil. Remove from the water, fasten the cover tightly, cool and store. Some people prefer to soak the fish several hours in a strong brine before cutting and placing in the jar.

In that case no salt will be needed in the jar.

Another way known as the American style is as follows: If the fish are large cut into slices. Clean, and sprinkle with salt. Let them stand this way for three hours. For each pint jar of fish, use $\frac{1}{2}$ teaspoonful salt, $\frac{1}{4}$ teaspoonful of pepper, and $\frac{1}{2}$ teaspoonful of cinnamon, allspice and cloves, mixed. Place in jar, one layer of fish, then sprinkle on some of the above spices, then another layer of fish and so on. Add $\frac{1}{2}$ teaspoonful of flour to each pint jar, and pour equal parts of cider vinegar and water into the jar to fill it, adding 1 teaspoonful of olive oil to each jar. Cover and proceed as above. In canning, all jars should be sterilised before the food is put into them. All jars must be absolutely air tight, and new rubbers must be used each time.

LIMESTONE IN ALUMINUM KETTLE

The ordinary mineral acids, muriatic, sulphuric and nitric have very little action on aluminum, consequently a tea kettle coated with limestone may be cleaned by a cold dilute solution of any one of these three acids. Vinegar will also remove the limestone, and it may be used hot.

TO REMOVE DANDRUFF

Put one tablespoonful flour of sulphur in a quart of rain water, and use once a day, after shaking well, as a wash to the scalp. Do not wet the hair with anything else. This treatment is claimed to be very effective.

Washing the scalp in salt water is also beneficial in the removal of dandruff. Use the hair brush, but avoid the use of fine combs as they only irritate the scalp. Apply vaseline twice a week rubbed well into the scalp.

Those who object to vaseline by reason of its being too greasy, may find a valuable substitute in glycerine and rose water. The advantage of glycerine lies in its easy removal. It readily unites with water, therefore may easily be washed off.

RESILVERING A MIRROR

Remove the paint on the back of mirror to be resilvered by means of a strong caustic solution.

The glass should then be treated with strong nitric acid, which will dissolve off the silver. The glass should be made chemically clean with the soda and nitric acid, and then rinsed several times with distilled water and laid on its edge. It must on no account be handled on the face or dried, as the least particle of dust or grease will entirely spoil the deposit of silver. For silversing the mirror, prepare the following solutions (1) 90 gr. of nitrate of silver, 4 os. of distilled water; (2) 1 os. of pure caustic potash, 25 os. of distilled water. Take 2 os. of solution (1), add ammonia drop by drop until the precipitate first formed is just dissolved, add 4 os. of solution (2), and then ammonia again until the solution just becomes clear; make up to 15 os. with distilled water, then add solution (1) drop by drop until a light grey precipitate appears, which does not re-dissolve, allow to settle, add 2 os. of solution (3), and stir well. The glass plate should now be carefully levelled until it is exactly horizontal, and the solution prepared as above should be poured gently on the glass, so that the whole of it is covered and none of the solution is lost. Allow to stand several hours in a warm room free from dust. At the end of that time pour off the liquid, replace the plate, and pour on it a good second lot of the liquid. When the silver has deposited from this, rinse the plate in distilled water, allow to dry spontaneously, and then give a coat of good paint to form a protection.

HOW TO TAKE THE CRIMP OUT OF OLD YARN

There are times when one wishes to ravel some knitted garment and use the yarn again. The crimp formed by knitting keeps the second garment from appearing smooth and evenly knitted. If the yarn is dipped for a minute into boiling hot water and placed on a cloth or hung up to dry, all the stubborn crimps will disappear and it will be as fresh and fluffy as new.

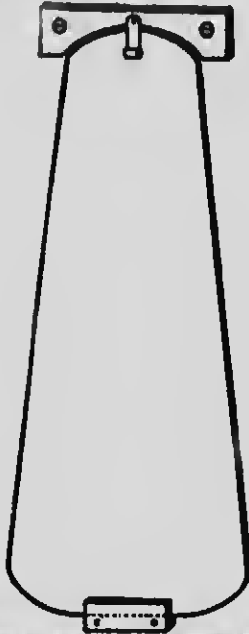
HOMEMADE SALVE FOR FELON

Camphorated oil, or a salve made from stick camphor and fresh lard, will draw out the most obstinate suppurations or a felon. Take a piece of camphor the size of the first joint of one's thumb, add two tablespoonfuls of fresh lard—not salt, and boil together until well mixed or melted. When cool store in a close-covered box or tin for future use.

HOME-MADE IRONING BOARD

The ironing board shown herewith can be fastened up against the wall and is out of the way when not in use. It should be made of well-seasoned 1 or 1½-inch material. A board of convenient size can be made by the following dimensions: 4 ft. 8 in. long, 15 inches wide at the attached end, and 8 inches at the free end. About two feet from the attached end the board begins to taper gradually. The free end is rounded.

A strip 1½ by 4 by 15 inches is securely fastened by screws to the wall at a convenient height. The height at which the board is placed varies with the height of



Board Folded Against the Wall

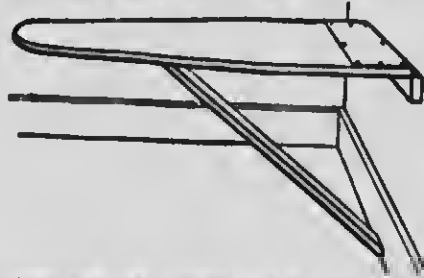
the user. For a woman of average height it should be 31 or 32 inches. The board is hinged to the wall strip with two No. 3 butt hinges.

The leg or brace, made of material 1 inch thick and 4 inches wide, is fastened with a No. 3 butt hinge to a board strip 1 by 4 by 8 inches. The board strip is screwed to the underside of the board 11 inches from the free end. The length of the brace depends upon the height of the board, and when the board is in position the brace rests against the baseboard of the wall. Skirts may be easily ironed without changing the position of the brace. A piece of galvanized iron may be tacked to the board, on which the hot iron may rest when not being used. The board is folded up against the wall and may be held in place by using the upper part of the rack for holding the portable ironing board.

The ironing-board rack or holder may be attached to the wall or to the inside of a closet door to hold a portable ironing board when not in use. The upper part of the holder is made of 2½-inch material and is 5 inches in depth. It is 12 inches across the top and is shaped to fit the contour of the smaller end of the ironing board. In the center is a button which holds the top

of the board in place. The button is made of metal and so shaped as to give it a spring and to provide a finger hold for easy movement. The upper part of the rack or holder is screwed to the wall or door.

The bottom or lower part of the rack is 5 inches wide and 3 inches in depth, and is made of 2½-inch material.



Illustrating the Folding Ironing Board in Use

It is rabbeted on the side next to the wall. An inch rabbet is cut in to form a rest for the ironing board. This part of the rack is fastened with two screws to the wall or door.

SAVING THE BEST SEEDS

Many people never think of trying to save flower seeds, and, only a few, vegetable seeds. This is not difficult to do. The main thing is to save seeds from only the best and strongest plants. Look over the flowers and select several perfect blooms. Mark these by tying a string loosely about the stem so that the flowers will not be plucked. When the flowers are withered and the seeds ready to fall or drop out, break off the flower heads or pods and drop into labeled paper bags. If the flower is of the type which scatters or loses its seeds rapidly, it should be watched carefully and when it is about ready to shed the seeds, tie a small paper bag over each blossom, they will then drop into the bag, instead of on the ground or carried away by the wind.

After the flower heads and seed pods have been gathered, they can be placed away in paper bags until one can find the time to separate the seed from the chaff. Pull the flower heads to pieces, rub the seed pods between the fingers and then remove the chaff. Care must be used to see that the seeds are perfectly dry before storing away.

If the seeds are to be separated from the chaff as soon as gathered, spread the flower heads and pods out in the attic to dry, then remove the seeds and spread these out to dry. Small, wide mouthed bottles are ideal for storing the seeds in or one can use paper bags. Tin cans with a tight fitting cover are also good.

THE SAVING OF VEGETABLE SEEDS

The value of good seed cannot be over-estimated and it is always advisable to save as much as possible, from certain vegetables. It is not possible to save seeds from all vegetables that we grow in our garden, but many can be saved. It is never much trouble to save vegetable seeds as they are coarser than flower seeds and they do not blow away as readily as flower seed. In deciding upon which plant to save from, select the sturdy plant, that is well developed, free from disease, etc. Mark each well developed vegetable with a string and then let it get full matured before removing the seeds.

The best and most practical vegetables to save seeds from are: peas, beans, sweet corn, melon, squash, pumpkin, cucumber and tomato. It does not pay to save from any of the others such as carrots, parsnips, etc., as one does not always get the best results. The roots of these vegetables must be planted in order to get seed from them.

Melon, squash, pumpkin, cucumber and tomato seeds can be easily saved. Simply remove the seeds and wash through several waters and spread out to dry. The seeds from sweet corn is also easily saved. I always like to go over the patch and mark the best looking ones with a string. This I leave until they are

fully matured and well hardened up. I then gather them in leaving a few husks on each ear and tie or braid six ears to a bunch. These I hang from the ceiling in the attic, near the chimney. Sometimes I put them in the basement. When I had neither basement or attic, I hung them in the kitchen until thoroughly dried and then stored them away until spring.

STORING VEGETABLE SEEDS

Small sacks are ideal for storing vegetable seeds— if one has very many seeds. One can easily write on the outside of the sack with a lead pencil the name of the seed, where and when grown, if it is good, or just fair, etc. I use suit sacks as well as those that cereals and sugar come in. After the seeds are well dried, they can be stored in a tight lard can with a tight fitting cover to keep the mice away or the sacks can be hung from the beams in the attic or store room.

Very often I have saved more vegetable seeds than we could use and sold some of them and still had some to give to a few friends. It is rather nice to be able to exchange things with one another and one can do so if they save a few flower and vegetable seeds each year.

REMOVING WALLPAPER

Coat it two or three times with water applied with a clean washing-off brush, and then scrape off with a flat-bladed knife or other suitable tool. For varnish paper the shove does not answer, and it will be necessary to score the paper all over with an off chisel so as to remove part of the paper bodily in strips, then to apply plenty of hot-boiling, if possible—water, which will find its way beneath the varnished portion of the paper left on the wall, and ultimately soften it sufficiently to permit of its being scraped off. This method takes a good deal of time. The next way is to remove the varnish by using a paint remover which can be purchased ready made. A mixture of soda, soft soap, and slaked lime answers the purpose, but this is rather a dirty job. After the varnish is removed the paper can be soaked in hot water and scraped off in the usual manner. Perhaps the best plan is to use steel wire brushes to remove the varnish, and if these are rubbed briskly over the surface the result will soon be achieved; but there is this objection to the method that the varnish powder, if inhaled, is likely to be injurious. It is necessary, therefore, in doing the work to tie a handkerchief over the mouth and nose.

WATERPROOFING CELLARS

With careful workmanship a new cellar can be constructed which will be waterproof. A satisfactory mixture is one part cement to two parts sand to four parts coarse gravel or crushed stone. The concrete for walls and floors should be mixed to a jelly-like consistency and should be well tramped or spaded into the form. As an aid in causing the concrete to flow into place readily hydrated lime can be added in the proportions of eight pounds of hydrated lime to each bag of cement, the lime and cement being thoroughly mixed before the other materials are added.

To secure satisfactory results in a cellar already constructed is sometimes a rather difficult matter. If the trouble is not severe a surface treatment with water-glass may be satisfactory. The surface of the concrete should be first thoroughly dried and cleared of all loose concrete, dirt and other substances. If the surface has been washed it should be thoroughly dried. The wall should then be painted with a solution of one part water-glass to five parts water, the solution being applied over the entire surface with a brush. After four hours and within twenty-four hours the surface should be washed with water and then allowed to dry, after which another coating of the water-glass solution should be applied. Repeat this operation three or four times. If the trouble is severe it may be necessary to dig down on the outside of the wall, and after this is clean and dry apply a treatment of hot tar or pitch; at least three coats should be applied.

On the floor a good cement mixture as outlined for new cellars is usually sufficient or if cement is already in and it leaks, then a good thick coating of one part cement to one and one-half parts of clean sand will be helpful.

An American system that is claimed to be satisfactory in waterproofing old cellars is here given.

Wait till the cellar is dry and then go over the floor with a chisel or pick and roughen up the surface slightly, and also the walls if they are at all smooth. Go over all the surfaces with a stiff brush and water, partly to brush off any loose material and partly to see that the surfaces are thoroughly wet. Now wipe up all loose material and you are ready for the cement work.

This consists of first going over the wet surface with a cream-like grouting of cement and water, followed within a few minutes with a three-quarter inch coating of cement plaster, mixed in the proportion of one part of cement to one and a half parts clean sand, to which may be added a small part of patent waterproofing compound if desired. Apply the plaster about 3/4 inch on the walls and 1 1/2 to 2 inches thick on the floor taking care that a good joint is made between floor and wall coats.

No more mortar should be mixed than can be used in 30 minutes. It can be applied with an ordinary trowel, and should be worked down with a wood float at once to make the concrete as dense as possible. The final finishing may be done with a steel trowel, traveling for not more than a minute, as a little too much troweling will result in checking. The finished coat should be sprinkled occasionally for at least a week to prevent drying too rapidly and producing haircracks.

TO TAN SKINS FOR MATS

The following is a simple way to cure sheep skins and other skins with the wool and fur on them for use in making foot mats or rugs: Take off any piece of fat and meat left on the skin. Take one pound of alum, one pound of common salt, dissolve them in one gallon of water, and into this put the sheepskin as soon as possible after it has come from the sheep, let it stand and soak during twenty-four hours. Then take it out of that solution and nail it to some outhouse. Stretch the skin as it is nailed, and turn the flesh side of the skin out to the sun. Let it get dry. You cannot tan a skin in cold weather by this method; dry inside if cold. Liae the skin with a piece of ingrain carpet or anything desired.

WHAT TO DO IN CASE OF ACCIDENTS

To consider the cause, nature, effect, and treatment of the multiplicity of injuries due to accidents is impossible, except in a treatise devoted to the subject. The object here is to instruct the layman to use his reason and good sense to aid the afflicted till skilled help arrives. It is especially important that he refrains from doing a lot of foolish things, and does not give or apply remedies about which he knows nothing, the effects of which are often more dangerous to the patient than the injury itself.

The symptoms demanding urgent attention after an injury are usually shock, pain, bleeding, support, and adjustment of mangled or broken limbs, protection to open wounds, burned surfaces, bruises, etc.

Wounds—The all-important item in the treatment of wounds or cuts is absolute cleanliness or asepsis. Asepsis can be secured by having everything that is to be used for the wound boiled just before applying it.

Before dressing a wound:—

1st.—Wash your hands, scrub and clean finger nails thoroughly with soap and hot boiled water.

2nd. Wash the limb or parts around cut or wound with boiled water and soap, being careful not to wash dirt from around the sore into it.

3rd. Wash out the wound with hot boiled water. If there is still oozing from the cut surfaces press clean cloths wrung out of boiled water as hot as hands can bear against the bleeding surfaces till it stops.

4th. Draw the edges of the wound together with strips of court-plaster.

5th. Lay over the wound so as to cover it well ten or twelve thicknesses of clean boiled and baked dry cheesecloth, sheeting, or linen, and fasten on with a bandage.

6th. Let the injured parts be at rest. If you have secured asepsis and gotten the edges of the wound together closely, keep the wounded parts at rest for from three to six days; the wound will then heal without

Helpful Household Hints

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pain or pus, and without swelling, inflammation, or fever. Don't hinder the healing of a wound by putting pitch, tobacco juice, "healing ointments," liniments, or other filth into it.

Broken or mangled limbs should be supported by temporary splints, made from boards, pasteboard shingles, etc. Put one on each side of the limb and till up with handkerchief or bandages. The splints should be long enough to support entire limb.

Burns and Scalds—If the burn is extensive, place the person in a bath of lukewarm water, keep the body immersed up to the chin, see that the water is kept warm; patient may be left in bath indefinitely. If the burn is not large, but painful, cover the burned surface with a thick layer of flour, powdered starch, zinc ointment, or cotton batting. Equal parts of lime-water and linseed oil may be applied, and the burn covered with cotton. It is important in burns to apply a dressing that will exclude the air. In large burns there is always severe shock; treat this as directed below.

Shock.—When a person has been severely injured or badly frightened, there follows a condition of the nervous system which is known as shock. A person suffering from shock generally becomes pale, cold, faint, and trembling, with a small weak pulse. The mind is dull and the person looks anxious and distressed. Sometimes the person is excited and restless.

Treatment.—Let the person rest in a quiet cheerful place. If he is little injured tell him so calmly. If the injury is severe, and there is pain, broken bones, bleeding, etc., you must still be calm, cheerful, and helpful. Give a tablespoonful (2 or 3, if a drinker) of whiskey in water every quarter or half-hour. Wrap him in warm blankets and lay hot water bottles around him. If there is much pain, give 10 drops of laudanum in case of bleeding, open wounds, or broken bones, treat them as directed. A flushed face and fever show that the patient is reviving and does not need hot water bottles or whiskey. Never let an injured person be surrounded by a crowd of people.

Pain is frequently relieved by the adjustment and support of mangled limbs, by protecting exposed open wounds, burns, bruises, etc., with clean gauze dressings. Morphine $\frac{1}{4}$ grain, or 20 drops of laudanum, or 1 grain of opium can be given if pain is unbearable. Unless absolutely necessary this treatment should be left to the physician.

Hæmorrhage or bleeding always occurs after an injury. It is the result of the tearing or cutting off of the blood vessels. A person suffering from hæmorrhage, either internal or external, is pale, faint, with feeble pulse.

Treatment.—Keep the person quiet. If the bleeding comes from a wound in the upper or lower limbs, it will stop by raising the limb up above the rest of the body. Tie clean cloths slightly over the sore. If the blood comes in spurts tie a rope or handkerchief tightly around limb above cut nearest to body. If bleeding is slight, it will stop by tying clean cloths tightly over the cut. Ice may be applied over the bleeding vessels. Clean cloths wrung out of water as hot as hands can bear is often effective.

Never use sawdust, tobacco juice, or other filthy things to stop bleeding. If a person spits or coughs up red frothy blood, he is probably bleeding from the lungs. Let him lie down, and if it continues to come up apply ice to chest and give a teaspoonful of extract of ergot.

Sunstroke and Heat Exhaustion.—In sunstroke the person has a red face; skin is hot and dry; there is high fever; breathing and pulse are very rapid; there is often delirium and convulsions. Put the patient in a cold bath; apply ice to the head and rub the skin with pieces of ice. If he cannot be put into a bath, put him in the shade and pour cold water over him, or wrap him in cold wet blankets. In heat exhaustion the patient is pale and the skin cool. There is no fever. Let the person rest in the shade. Give stimulants, as hot coffee and whiskey.

THE HOME MEDICINE CHEST

The family medicine chest means, as its name signifies, that it is for the use of the entire family. This being the case, every adult member should not only know each article, but also its use. Children

should be inspired with that wholesome fear which impels them to leave it severely alone.

Materials and Appliances Needed

Just what should be the equipment of the home medicine cabinet? First, let us take the materials and appliances. They are: Absorbent cotton; sterile gauze; oiled silk; hot-ster bag; ice bag; medicine dropper; medicine glass; graduate measuring glass (for solutions); soft-rubber ear syringe; fountain syringe; small basin (kidney shape); clinical thermometer; package of wooden tongue depressors; package of wooden applicators; small dressing forceps; bandages—two-inch and four-inch; adhesive plaster; cork-screw; nail-brush; safety pins. I include in this list the medicine glass, because spoons are inaccurate measures for medicines. The oiled silk is very necessary when applying hot compresses. It not only helps to retain the heat, but prevents the water from leaking through.

Wooden tongue depressors are useful in many ways. They are primarily intended for examining throats—that is, for holding the tongue down while looking at the throat. After using one of these it should be broken in half and burned. Most households use a teaspoon for this purpose. This is, however, very unsanitary since, unless care is exercised and the spoon boiled the sore throat or bad cold may pass to other of the family. A wooden tongue depressor may also be used as a spatula in applying salve.

The wooden applicators are little, round wooden sticks, rather long. When a little absorbent cotton is wrapped around one end, the applicator may be used as a brush in applying iodine to a wound or for such other purposes as may arise.

As to salves and ointments there should be: Zinc oxide; Ichthyl (20%); lanolin; petrolatum; cold cream. Zinc oxide is valuable for healing abrasions and cold sores. Ichthyl ointment is used for reducing inflammation. Ointments should be kept either in small round jars or in tubes.

The necessary crystals and powders are: Talcum powder; bicarbonate of soda; boracic acid; Epsom salts. With the exception of the talcum powder these are best kept in wide-mouth bottles with glass stoppers. The time-honored flaxseed and powdered mustard, used for poultices, should also have a place among these.

MEDICINES TO USE INTERNALLY

The worth-while internal medicines consist of: Castor oil; cascara sagrada; petrolatum; milk of magnesia; olive oil; cal-nel; Scidlitz powder; aromatic spirits of ammonia; sirup of Ipecac; sweet spirits of niter; peppermint water; quinine pills (if living in malarial section); brandy; whisky; soda-mint tablets; limewater.

The first five remedies are used for the home treatment of constipation or as a laxative. Milk of magnesia is best for infants, and castor oil for children from three to ten years. If constipation persists, lose no time in calling in a physician. Everyone knows the use of calomel and the Scidlitz powder. They should not be taken promiscuously.

Aromatic spirits of ammonia is used for fainting, nausea or nervousness. Sirup of Ipecac is useful in producing free vomiting in children with croup, when there is spasmodic closure of the glottis. Sweet spirits of niter is sometime given to children to break up fever or cold. Peppermint water is used for colic in infants. Quinine is the specific remedy to use against malarial infection. Brandy is a stimulant. Soda-mint tablets are for indigestion.

Limewater is a gastric sedative. It is often added to milk and, by preventing curdling in large lumps, aids in its digestion. When combined with olive oil in equal parts, caron oil is formed, which is an excellent dressing for burns.

Too much emphasis cannot be placed on the statement that the family medicine chest should not contain "headache remedies." Most headache remedies are heart depressants; they generally contain caffeine, phenacetin or acetanilid. All these drugs are powerful and dangerous. Headache is by no means an ordinary ailment. It should not be treated by headache medicines secured at random or by home remedies. Recurring headaches always demand the advice of a physician.

MEDICINES FOR EXTERNAL USE

For external use the cabinet should contain: Alcohol; witch hazel; spirits of camphor; hydrogen dioxide; turpentine; tincture of iodine; antiseptic mouth wash; Dobell's solution; collodion. The uses of the first five are well known.

Tincture of iodine is used externally as a counter-irritant and also as a disinfectant to wounds. It should be applied with a cotton swab or a camel's-hair brush. When extreme burning follows, the application should be washed off with alcohol. Dobell's solution is an efficient gargle for mild sore throat. Collodion is used for painting over small cuts or sores. It makes an excellent covering while healing is taking place.

Carbolic acid, king of the known chemical disinfectants, is in a class all by itself. It has many uses in the household, not the least of which is cleaning the mouthpiece of the telephone with a 1-40 solution, thereby avoiding many a trying cold. As carbolic is such a deadly poison, it should be made into a solution of 1-20 (1 part carbolic to 19 parts water), which would be approximately 12½ drams of carbolic to one quart of water. From this as a stock weaker solutions can be made.

Carbolic should always be mixed with very hot water, otherwise globules of the acid may remain undissolved and any one of these will burn living tissue.

All bottles containing poisons such as iodine or carbolic should be very small dark bottles with glass stoppers. Each should bear a red label marked "Poison," and they should be kept on the top shelf.

HOW TO CHART POISONS AND ANTIDOTES

As dangerous and poisonous drugs often find their way into the family medicine chest, there should be pasted on the inside of its door a chart with a list of the common poisons and their antidotes. The poisons commonly taken in mistake and the most accessible antidotes are:

Opium: Often taken in the form of paregoric or laudanum; antidote, black coffee.

Ammonia: Dilute acids such as vinegar or lemon juice; also milk or oils.

Iodine: Starch or flour mixed with water.

Sugar of Lead: Lemon juice or white of an egg.

Strychnine: Strong tea.

Arsenic: Often mistakenly taken in form of Fowler's solution; antidote, demulcent drinks—oils.

Alcohol: Produce vomiting if possible; coffee, inhalation of ammonia, cold to head, heat to extremities.

Oxalic Acid: Frequently mistaken for Epsom salts; limewater or milk.

Carbolic Acid: Alcohol.

A safe rule to follow in taking medicines, and one which will never fail, is to read the label on a bottle three times before taking the medicine: First, in selecting the bottle with the eye; second, after taking the bottle in the hand; third, after pouring out the medicine to be taken.

In pouring medicine, hold the bottle in the right hand and pour from the side away from the label. If the cork is removed by grasping it in the bend of the little finger of the left hand—where it can be held while pouring out the medicine—it will neither be lost nor will it gather dust.

CONSTRUCTING A CHIMNEY

A chimney should extend straight up from the basement to a point at least two feet above the roof. It should not be less than eight inches square inside for an average house, larger than this would be better. It should be smooth inside and the joints between the bricks sealed up tight with mortar. A brick chimney should never be built on a bracket or shelf or in any other way than straight up from the basement.

If the chimney top is two feet higher than the highest point of the house and the chimney diameter is clean and sufficiently large, the chimney will not smoke or fail to give a draft that will assure a good fire at all times. That may be asserted with scarcely an exception in the case of country homes where there are no high buildings nearby to overtop the house and chimney and cause contrary air currents.

A great mass of high trees towering above and near a farm house may cause air currents that will make the chimney smoke when the wind is in certain directions.

A house tucked under a hill may also have smoking flues at times for the same reason. These obstructions catch and hold the air and cause it to back down the chimney just as water may back up a drainpipe. In such instances there is nothing to do, except to remove the trees or the hill or else endure red rimmed eyes and hope for the wind to change. But generally speaking the chimney two feet higher than the roof ridge will prevent back drafts.

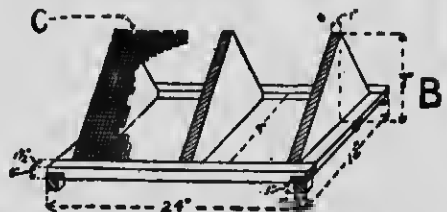
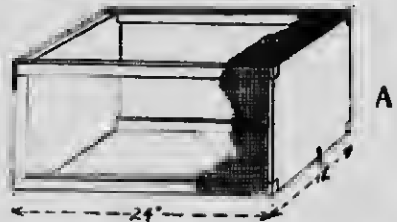
The chimney may meet all requirements as to height and still be an inveterate smoker because it is too small in diameter. Kitchen flues very often have an inside diameter the dimensions of an ordinary brick laid flat—four by eight inches—which grows smaller as the chimney collects soot. A flue for a wood or coal burning heater should never be that small.

The minimum inside diameter of a chimney for a cook-stove or a heating stove should be eight and a half by eight and a half inches. This is called a six brick flue. For a large stove a seven brick flue is preferable. It has an inside diameter of eight and a half by thirteen inches. For a furnace, or where more than one stove taps the flue, the chimney should have a smoke channel of at least thirteen by thirteen inches.

To be safe, a chimney that is only one brick thick should always be lined with tile flue lining. If the flue lining is omitted the chimney should be two bricks thick. Either construction is safe. The chimney should rest on the foundation of the building or a foundation of its own. Wood should never touch a chimney at any part of the building's construction. Floor beams should not be allowed to project into the chimney. Frequently the floor joists have to be cut to let the chimney up through; the end of the joist is imbedded in the chimney to give it bearing. This should not be done. The joist cut off should be supported otherwise.

TRAPPING THE HOUSE FLY

The fly is an inhabitant of filth and dirt, so let us look to his breeding places first. He is particularly fond of decayed fruit, vegetable refuse, etc., so we must be careful to place every thing of this kind in a receptacle with a tight cover. The slop pail and manure heap are the places he calls home, so we must keep the slop pail clean and tightly covered, and sprinkle the manure heap with a fly destroying solution.



Showing a tent-type Fly Trap intended for use anywhere flies congregate. When the trap is set up the screen box A fits on the base B, and two pans of bait are placed beneath the tent. C shows a row of holes at the apex of the tent to let the flies pass into the trap.

Flies breed by the millions in a manure heap, and by the time they are a few hours old they will have found their way to the kitchen door and be waiting for a chance to slip in unnoticed. When he has gained admittance to this part of the house it is only a matter

of minutes until he finds his way into the other rooms, and our peace is destroyed unless we can convince him that his room is better than his company.

It is not very pleasant to think that the harmless looking little fly that is crawling over the sleeping infant, or making a tour of investigation around our dinner table was the inhabitant of slop pail, hog yard or manure heap a few short hours ago, is it? Well such was the case for Mr. Fly thoroughly detects cleanliness and when he leaves his filthy surroundings it is because some thing has attracted him. It may be the odor of something cooking on the kitchen range, it may be the waves of heat coming from the open door; whatever it is that calls him he is sure to be a pest and nuisance just as soon as he enters the house.

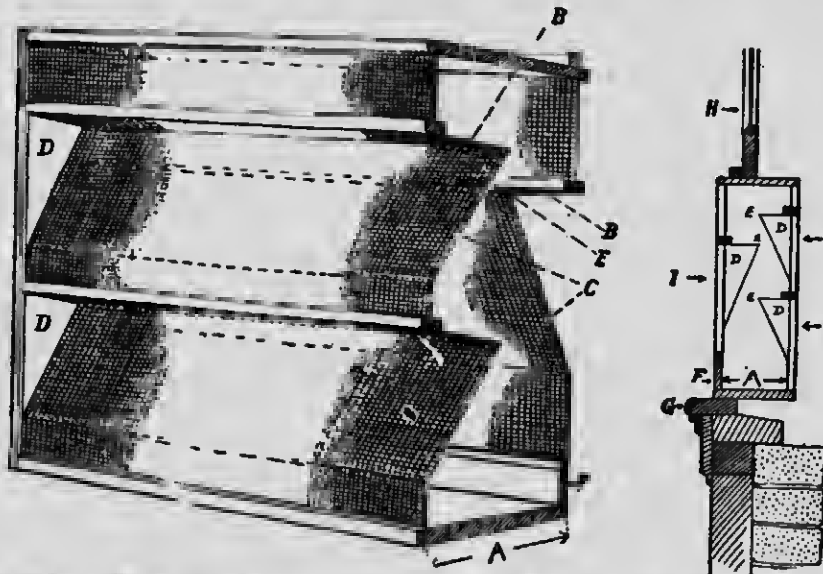
First, let us begin with the manure heap the "necessary evil" about the barn. The manure should not be allowed to accumulate, but should be disposed of regularly. Many flies and a great many unhatched eggs may be destroyed by sprinkling the manure heap

good insect powder. When you are ready to prepare the evening meal gather up papers, flies, etc., and burn.

For the other rooms, immerse a small sponge in boiling water and place it upon a dish, pour a few drops of oil of lavender upon the sponge. Flies do not like oil of lavender and will generally seek other quarters. This should be repeated two or three times a week.

SIGNS OF WEATHER CHANGES

How many of these old sayings about the weather have you heard and how many of them have you observed to have some significance in foretelling weather conditions: "A dry moon lies on its back." "The first three days of December show what the winter will be like." "It will rain for forty days straight if it rains on St. Swithon's Day" (July 15). "Long and loud singing of robins denotes rain." "If March comes in like a lion it will go out like a lamb." "When squirrels are scarce in autumn the winter will



Detail drawing of a Window Trap that is widely used to catch flies in houses and stables. The large sketch on the left shows the trap with the end removed to show construction; at the right, cross section of trap placed in a window. A, end of trap. B, upper sides of folds in screen. C, lower side of folds in screen. D, portion of end of trap sawed out and returned after attaching screen. E, holes along apex of folds. F, door for removing dead flies. G, window sill. H, upper sash. I, inside entrance for flies. O, outside entrances.

and all likely breeding places with a 40 per cent formalin mixture. Formalin is particularly good as it kills the fly and disinfects the corpse at the same time. If the formalin is not at hand use a strong mixture of lye and hot water, this is more effective if a cupful of coal oil be added to each pailful of the mixture. Sprinkle generously, better too much than too little.

If the slop pail is frequently scalded with boiling water to which a small quantity of sal-soda or lye has been added it will not prove so attractive to Mr. Fly.

Meet him at the kitchen door by having a few dishes of formalin awaiting him. Take a cupful of warm water and milk, equal parts, to this add one tablespoonful of the 40 per cent formalin, place a piece of toasted bread in each dish and pour the mixture upon it, set in any convenient place where the fly will surely find it. Be sure to place poisonous substances where the children cannot possibly get at them.

If he finds his way into the kitchen we can "get" him by closing the room for a few hours. Draw down the blinds on all windows leaving one (where the bright sunlight shines in) raised about two inches, place a table before this window, put old newspapers upon the table and sprinkle them generously with a

be severe." "Enough blue sky to make a Dutchman's breeches indicate clearing." "A late spring never deceives." "A cloudy February 2nd means an early spring," and a host of others.

Now some of these sayings may have a basis in truth, but most of them have not. For instance there is the one about what will happen if the second of February being cloudy—"the day the bear comes out to see his shadow." If he sees his shadow he is supposed to conclude that it will be six weeks before spring comes; but if the day is cloudy and he cannot see his shadow winter is practically at an end. How many times have you known this to be true? So also with the saying that the first, second and third days of December are an indication of the nature of the coming winter. According to this axiom if the first is fair so will December be; if it is cold on the second so will January be; and if it snows on the third so will it snow in February. If all three should be fair a remarkable winter would follow.

The loud and long singing of robins is not an indication of anything meteorologically. If the singing denotes anything at all it denotes merely that the robins are in a happy mood, filled with food and at

peace with the world in general. If you want to find out what advance information rohins have of the weather and what they do just before a storm, watch and listen to them before, during and after a storm.

March coming in like a lion and going out like a lamb may be tested by anyone over ten years of age. As a rule it is impossible on the 30th day of March to foretell whether the month will go out like a lamb, a lion or a load of hay.

You often hear people speak of a "dry moon." A dry moon lies on its back, in which position it is supposed to hold the water. When on edge the water falls out and a wet month is the result. Now the moon, according to meteorological science has nothing to do with the weather. The moon causes the tides on the ocean and to an infinitesimal degree may cause weather changes, but we would have just as much and just as variable weather if there was no moon at all. Neither is there much ground for presuming that the "changes" of the moon cause weather changes. Possibly of all the sayings about the weather those referring to the influence of the moon are the most widely believed. But the moon, unfortunately, has nothing to do with it; at least most meteorologists say it has not.

There are a lot of proverbs also about the breast bone of the goose, the milt of the pig, the quantity of hickory nuts the squirrels store for winter and the way wild birds desert themselves in spring or fall. As a matter of fact if birds had all the weather sense they are credited with by some persons, there would be no need for all the expensive service maintained by the Federal government for foretelling what the weather is going to do next. But unfortunately birds are not absolutely reliable. Last spring, for instance, a lot of birds were away off in their estimate of the spring, that is if they had any ideas at all on the subject, which is doubtful. Thousands of them died in the snow storm the first week in May. Had they known as they should have, that the storm was coming every bird could have gotten far enough south to be outside the storm area. However they simply stuck around and died. Birds and other animals have a greater sensitiveness than man in sensing the coming of a catastrophe like a violent earthquake or a tornado, but they have very little seasonal wisdom and are not reliable weather prophets.

The man who desires weather wisdom should seek it with his own eyes. If he does that he will soon have some weather changes and add something to the sum total of the knowledge that is possessed of one of the most interesting studies in the world.

SIGNS OF FAIR WEATHER

Here are some of the signs that indicate continued fair weather:

A gentle wind from the west, northwest or a little south of west.

Sunset in a cloudless sky.

A sunset composed of light tints inclined to red or yellow.

A sunset followed by a glowing and slowly fading western sky.

A sunset that resembles a ball of fire (warmer).

The sun rising out of a gray sky.

The clouds noticeably high for the season.

Clouds have frequent breaks showing clear sky between.

The sun breaks through a departing thunder-storm and makes a rainbow.

The spiders spin webs on the grass.

The sky is bright with stars.

The moon rises clear.

The wind blows down mountain ravines after nightfall.

Salt is dry, smoke ascends, birds fly high and animals act normally.

SIGNS OF A CHANGE TOWARDS STORMS

Look for a change towards storms when:

The west wind drops suddenly.

Small whirlwinds are seen.

The clouds look like fish scales, the so-called mackerel sky.

Light scud drifts across the sky from east to west.

Walls grow damp, the water pitcher "sweats;" flies are more of a nuisance and swallows fly low.

Smoke falls to the ground.

A circle appears around the sun or moon. Sun-dogs appear about the sun, denoting ice-particles in the upper air.

The summer morning is sultry and the winds variable.

The temperature is above normal.

Few stars are visible and those are indistinct.

The clouds drop down the mountain sides.

The wind continues to blow up the mountain ravines after nightfall.

The sunset is a dull gray or the sun sets in a livid cloudbank.

The sunrise is a fiery red and the dawn is high.

CLEARING AFTER THE STORM

Look for a change to fair weather when:

The wind shifts back into the west.

The temperature falls rapidly.

Patches of blue sky appear through the rifts in the clouds, wind north.

Thunder and lightning appear only in the eastern quarter.

SIGNS OF WARMER WEATHER

The temperature will rise when:

A thunderstorm is brewing, or in winter a day or two in advance of a storm.

After a thunderstorm if another is to follow.

The sun sets as a ball of fire, at which one can easily look.

SIGNS OF COOLER WEATHER

The temperature will fall when:

A thunderstorm breaks, temperature continuing low if the wind blows from the west after clearing.

Nightfall approaches and the air is free from clouds.

The wind swings west of south in a storm—the fall will be sudden.

A cloudy day clears at sunset.

The sky shows green and the clouds look hard.

These are some of the signs that foretell changes in the pressure or temperature of the air and are certain indications of weather changes. Naturally a person who has never been much of an observer of weather signs might not be a very accurate forecaster at the start for the reason that many of the signs referred to are not as clearly defined in the sky as one might expect, and because one has to become familiar, through experience in observing these phenomena before he can judge correctly what they portend. But with a little practice one can attain a measure of proficiency and as experience widens will come to have more confidence in the conclusions reached. Also he will form some axioms of his own.

MUSHROOM GROWING

The usual time to start a mushroom bed is the fall. A bed prepared and planted in the fall should be producing mushrooms in from seven to eight weeks and the bed should continue bearing for from two to three months. But results with mushrooms are very uncertain and it is hard to say in advance just what will happen. Sometimes a beginner will get a good crop and other times a bed prepared, planted and cared for in the same way will produce nothing. A good deal seems to depend on luck in mushroom growing. You may or may not be able to grow them successfully. The only way to find out is to try. Mushrooms may be grown in Manitoba, in cellars or like places only. They cannot be grown outside. Spawn may be obtained from any seed firm handling garden seeds. You can secure a circular on mushroom culture from the Central Experimental Farm, Ottawa. Ask for pamphlet No. 22, entitled "Mushroom Culture." This pamphlet gives instructions for making beds, planting and caring for mushrooms and other information necessary for the successful growing of them.

Mushrooms are grown in beds of rotted horse manure. The manure is piled and forked over during a period of about 3 weeks prior to making the bed. When the manure is put into the bed it is tamped down solidly, in layers of 3 inches or so at a time until a depth of about 15 inches is secured. Soon after being put into the bed the manure will heat a second time, the temperature rising possibly to 100 degrees Fahrenheit. When the temperature falls to between 60 or 70 degrees the bed is ready for spawning. The

spawn comes in bricks, is broken into pieces the size of a small egg, and the pieces inserted every 8 or 10 inches and about 2 inches deep in the manure. The bed must be kept from drying unduly and the temperature should be between 60 and 70 degrees. Watering the bed is not considered good practice but some hay or straw may be scattered over it to prevent drying, and the walls and floor of the cellar kept damp. Mushrooms do best in a moist, warm place, rather dark.

As to the area of bed necessary to grow 10 pounds of mushrooms per day no very definite information can be given. A lot depends on "luck." As noted above a bed will continue bearing for from two to three months. Some growers consider half a pound per square foot a fair yield but this is rather low. From one to two pounds of mushrooms per square foot of bed is considered a fair average return.

MAKING SUGAR BEET SYRUP

The first step in making beet syrup consists in topping and cleaning the roots. The crowns should be cut off at the point of the lowest leaf scar. The reason for this is that the crown or upper part of the beet contains a large part of the salts taken from the soil in the process of growth. It is desirable to have the syrup as free as possible from these mineral salts which, if present in too large quantities, would render this syrup unpalatable.

In cleaning the roots, they may be placed in a tub or other suitable receptacle and covered with cool water, to loosen the dirt and to make the roots more crisp. After soaking for a few minutes until the dirt is loosened, they should be thoroughly scrubbed. A coarse brush with stiff bristles or wire is useful in this work. After the roots are thoroughly washed they should be cut into thin slices. A three-bladed kraut cutter securely fastened on the top of a barrel has been found very satisfactory. The upper head of the barrel should be removed so that the beet slices will fall directly into the barrel. If a kraut cutter is not at hand, any slicing device, the simplest of which is a butcher knife, will be satisfactory. The slices should be very thin. The thinner the slices the more rapidly the sugar is extracted. In field experiments slices only one-sixteenth of an inch in thickness were obtained. The slicing box of the slicer was not used, the beet root being held in the hand and pressed against the blades of the slicer.

A bushel of beets will make, approximately two bushels of slices, which should be placed in a barrel and covered at once with hot water. About 10 gallons of water will be required to cover them. An excess of water should be avoided, since it would increase the amount of evaporation required to reduce the solution to the desired consistency. If boiling water is used, the temperature of the slices will reduce the temperature of the water to about the proper degree, from 70 degrees to 80 degrees C. (158 degrees to 176 degrees F.), for the extraction of the sugar. The barrel should be covered with several thicknesses of canvas to hold the heat. The sliced beets should be permitted to soak for about 60 minutes, and the barrel should be agitated from time to time without uncovering it.

The water should then be drawn off and strained through several thicknesses of cheesecloth. No pressing is required to remove the juice from the beet. If the barrel is provided with a faucet near the bottom for the purpose of drawing off the liquid, it will be found convenient. The soaking does not remove all the sugar from the beet slices, but by far the larger part of it is extracted if the slices are sufficiently thin and the water is of the proper temperature. The resulting liquid is of a light brown color with a sweetish bitter taste. The refuse beet slices are a valuable feed for chickens, pigs, and other live stock.

The juice may be placed in a kettle or other convenient receptacle for boiling, where it should be heated slowly until it has evaporated to the proper consistency. It should be noted that evaporation depends upon the temperature, the surface of the liquid exposed, and the condition of the air above the liquid. Slow boiling is important in making beet syrup, and several hours will be required to complete the evaporating process. This may be done on the kitchen stove, or a kettle may be suspended in the open, and fire should be maintained sufficiently hot to keep the liquid boiling

until the proper amount of evaporation has taken place to produce the desired consistency of syrup. Some people like a thin syrup, while others prefer a thick product. In boiling the juice, care should be taken to avoid burning. A little experience will enable one to accomplish this boiling without scorching the syrup.

While this boiling is progressing, a scum will rise on the surface of the liquid; this should be removed carefully, by means of a skimmer. An old-fashioned milk skimmer, or a basin with or without small holes in the bottom will accomplish the desired result. The skimmer should, for convenience, be provided with a suitable handle. A small straight or curved stick of proper length, split at one end and slipped over the edge of the skimmer, will serve the purpose. The object in skimming is to remove the scum as completely as possible without wasting any of the liquid. This operation removes the strong beetlike flavor and leaves a wholesome and palatable product. The removal of the scum tends also to keep the liquid from boiling over. As soon as the syrup has reached the desired consistency and has been skimmed carefully, it may be placed in cans or bottles for future use. It should be canned or bottled while hot and tightly sealed or corked to prevent moldering.

The syrup produced from beets is dark in color. This would be objectionable if the product were placed on the market, but for home use it probably would not be regarded as serious, in view of the quality of the product and the simplicity of the process. Any method of bleaching or otherwise removing the dark color would require considerable skill and some outlay of money. The flavor of the syrup is pleasant. It contains the pure juice of the beet root and is a wholesome and nutritious food.

Beet syrup may be used for all purposes for which other syrups or molasses would be employed, especially for table use; for example, on hickwheat cakes, in making dark-colored cakes, or in preparing certain kinds of home made candy. If the evaporation is carried far enough and the syrup is allowed to stand, a dark sugar will settle out. This sugar will be found very satisfactory for home use in cases where refined sugar is not necessary, such as in making pies or dark-colored cake.

BED BUGS

Where bugs are in the joints of the bed only use kerosene or gasoline liberally in the joints, crevices and wherever there is the least opening. Renew the application in one week.

Badly infested buildings and rooms should be subjected to fumigation, either with sulphur or with hydrocyanic acid gas.

It must be remembered at the outset that hydrocyanic acid gas, which is formed by dissolving potassium cyanide in sulphuric acid is one of the most deadly of poisons either when taken internally in its crystalline state or when inhaled in its gaseous condition, consequently one should use extreme care in the handling of this substance. Never inhale the gas, nor for some hours after airing enter the room that has been fumigated. Remember it is one of the deadliest poisons known.

First, find the number of cubic feet in the room or house to be fumigated.

Second, make the room as tight as possible by stopping up all cracks and crevices.

Third, moisture takes up a small amount of acid and as a consequence one should remove all meats, butter and similar articles of food. On the other hand dry food products are not affected by this gas.

Fourth, weigh out in separate receptacles the desired amount of potassium cyanide (98 per cent pure) and of commercial sulphuric acid, which usually runs about 85 per cent pure, and of water, using these ingredients in the following proportions: one ounce of potassium cyanide, two fluid ounces of sulphuric acid and four fluid ounces of water to each one hundred cubic feet of space.

Fifth, use an earthenware dish or jar to generate the gas, preferably one deep enough to prevent the bubbling liquid from spattering over the edges. If a half-pound of cyanide is used for each charge, the jar should not hold less than two gallons. For perfect safety, to prevent injury to floors, carpets, etc., it is best to set the generator in a second dish. It is not best, under

ordinary circumstances, to use over one pound of cyanide to a generator.

Sixth, pour the required amount of water into the generator, then slowly add the acid. Be sure to pour the acid into the water and not the water into the acid. Now you are ready to add the cyanide, which previously should have been broken into small lumps and placed in thin paper bags. The reason for placing it in the bags is to slightly delay the action of the acid, thus giving the operator more time to leave the room before the fumes are given off. Leave the room immediately after dropping the bag containing the cyanide into the generator and close the door securely. The room should be fumigated for at least an hour or so, preferably for several hours, and at the end of that time it may be opened up from the outside only. Under no circumstances should a person enter the room before one-half hour after opening. If several jars are required in fumigating a large room, the operator should commence dropping the cyanide in from the far end of the room and work towards the exit. Likewise, in fumigating an entire house, always begin operations in the upper rooms and work towards the first floor.

Seventh, the jars should be taken out, after thoroughly airing the room, and the contents buried in the ground where the refuse can do no damage.

Sulphur fumes differ from hydrocyanic acid gas in that they tarnish metals and bleach certain colors of fabrics and wall paper. This gas can be used to best advantage in houses which do not have such furnishings. For satisfactory results make the room as tight as possible by stopping up all openings, and use at the rate of one quarter of a pound to each one hundred cubic feet of space. Sulphur candles, which can be bought in various sizes, furnish a convenient means of fumigation. When all things in the room, such as drawers, closets, etc., have been opened so that the fumes can penetrate readily to all corners, place the candles on some stationary object in a basin or tub of water. The operator should leave the room immediately after lighting the candles. Keep the room closed for four or five hours. This treatment for bedbugs has been one of the most successful used.

POTATO BUGS

The standard formula for mixing poison solution for killing potato bugs is:

Paris green	8 ounces
Unslaked lime	4 ounces
Water	40 gallons

Make a paste of the paris green before mixing it in the water. The lime prevents burning of the leaves by the paris green.

CUTWORMS

The following measures are recommended for the control and prevention of cutworms:

1. Avoid having weedy summerfalls. Certain cutworm moths undoubtedly lay their eggs on weeds, while others do so among them.

2. Keep the land as smooth as possible in order to eliminate the hiding places of the moths, for reason given above.

Control measures for cutworms are as follows:—

1. Watch the knolls about the first week in June and examine the ridges or small elevations of land. If there are cutworms anywhere on the field they should be found in greatest numbers in such places.

2. As soon as cutworms are located in destructive numbers, apply the following poisoned bait: Shorts or bran, 50 pounds; paris green, 1 pound; molasses, 1 gallon; water, 1½ gallons.

White arsenic, which is cheaper than paris green, may be substituted for it. It is, however, not so rapid in its killing power.

In preparing the bait, mix the poison with the shorts or bran while dry, add molasses to the water, and thoroughly mix all together so that the mash becomes crumbly and will not stick together in lumps. This should be applied as late as possible in the evening, preferably after sunset, so that it will still be moist when the cutworms come out to feed. It should be scattered wherever the grubs are numerous, using the above amount for not less than an acre of land. If applied in time, before the cutworms crawl from their

breeding places, 50 pounds of shorts may be sufficient to control the infection over many acres of crop.

3. The method of protecting individual plants by means of collars is valuable in gardens. This consists in using a piece of tin or wire screening cut in lengths of about 5 inches by 3 inches wide. This is twisted around the young plants to be protected so that the ends meet and the base of the collar is about an inch below the surface of the soil.

COCKROACHS

Dust into the crevices where the insects hide a mixture of equal parts of finely powdered chocolate and borax. The mixture should be very intimate and is best made in a mortar, so that with each particle of the chocolate, of which the roaches are very fond, they will get also a particle of borax, which is poisonous to them.

CANNING, PICKLING AND PRESERVING

By Margaret Palmer

Any one can successfully can by the cold pack method. It means to simply scald or blanch and cold dip all vegetables, pack them into jars uncooked and cook in the closed jar in a canner. Very few fruits need scalding or blanching or cold dip, except the hard fruits, such as apples, pears, citrus fruits, pineapples, apricots, quince, peaches and rhubarb. When the fruit does not need to be blanched it is made clean and packed in the jars, hot syrup poured over, rubber and cap adjusted, and then sterilized in the given time. Baked beans, soup, etc., do not need scalding, but are put into jars after they are ready and sterilized.

In preparing for blanching, after the product has been made thoroughly clean, pack into cheesecloth, have a kettle of boiling water ready, and plunge the bag into it, cover, and let remain in the water from one to fifteen minutes, depending on the product.

In the case of greens, they are placed in a steamer over live steam. As soon as the product is removed from the boiling water or steam, dip into cold, clean water immediately, remove, drain for a minute and then begin to pack into hot jars. In case of vegetables hot water and a teaspoon of salt is added to the jars after they are filled, adjust rubber and caps and sterilize the given time.

Some Suggestions

Amateur canners should send to their agricultural colleges and ask for canning bulletins and other literature, and then follow directions. In these bulletins one will find many valuable suggestions and illustrations. They show the home-made canner, the blanching, cold dipping, etc. Time tables are given, too. We can also learn much from each other, by reading, by attending lectures and demonstrations. After one has learned to can one kind of foodstuff successfully, the rest is easy.

In using the hot water bath for canning, I let the water come well above the cans, from four to six inches. I have the water boiling before I put the cans in it, and have previously rolled the cans in hot water. Keep the water boiling until time to remove the cans. It is not necessary to keep the water boiling so hard that it will jiggle the jars against each other, which is often the cause of jars breaking. I keep just little racing hubbles running over the surface of the water and I have never had a jar spoil yet.

Use rubbers that will stand long hours of hard boiling. If during the boiling process, a rubber hulges out from under the cover, simply push it back into place before sealing the jar. It is also important to see that all clamps on the jars are tight. Remove the clamp, bend it slightly in the middle by pressing down with both thumbs. Squeeze the ends together and put back on jar. One of the clamps can be used for lifting jars in and out of the hot water. Straighten one out and use it for a hook.

Sometimes trouble is experienced with Mason jar tops coming off while boiling or when lifting them in and out of the boiler. This can be avoided if one will screw the tops on tight as for the final sealing, and then slip the cover back a quarter of an inch.

I raise my own vegetables as far as possible, and in this way we do not feel the cost of buying them. I aim to keep my jars filled the year round with one thing or another, and am always on the alert for new

Helpful Household Hints

ideas and suggestions, for I know it means good, wholesome food and it is much cheaper than buying.

We pickle almost everything, and consequently this is something we never have to buy. We raise most of the things we pickle, with the exception of peaches and pears. In the spring we begin by canning horse radish. We are particularly fond of the pickles preserved in brine and soaked out and pickled as we need them.

In years when the wild fruits and home-grown fruits are plentiful, we make use of them for pickling as well as canning. Last year the wild fruit was to be had in great abundance. Our jellies, sauce, jams and preserves and fruit juices for use in making fruit drinks, were all made from the wild fruits. We did not even pass by the ripe gooseberries with prickly stickers. These were gathered, looked over and washed through several waters and put on to cook with barely enough water to cover them, cooked until soft and faded looking, then run through a fruit press or a fine colander, one cup sugar to two of pulp was added and the whole cooked for fifteen minutes, and sealed in hot jars. This is delicious with hot biscuits, bread and butter, toast or on pan cakes or waffles. The smooth ripe gooseberries were made into preserves. I used one cup of sugar to two of the berries, and cooked them down over a gentle fire for about twenty minutes.

Then, in the midst of all this wonderful canning, along came the sugar shortage! But I did not let this stop the canning. I went right on just the same, leaving out the sugar. I prepared the pulp for jams and preserves, the juice for jelly, material for sauce and pies, and simply canned it up. The sugar can be added any time and the jelly jams and preserves seemed all the fresher for being made up as we wanted them.

From wild and home grown fruits we had plenty of materials for pies, sauce, preserves, pickles, etc. For years I have not bought a single can of vegetables,

fruit or a glass of jelly or jam or preserves. In fact the only thing that I do buy in cans is a little fish, olives and peanut butter once in a while.

This year sugar is high, but I shall not let it prevent my canning. I shall go right on, and add sugar later on as we use the things, and perhaps by the time winter is here sugar will be cheaper.

Let me say to those who do not plan to can on account of sugar shortage, you are making a mistake. Go ahead and do your canning just the same, without the sugar.

When fall comes, look over your fruit closet and see the goodly supply of things you have. It will more than repay you for the work involved. Make a study of canning and let nothing go to waste. For instance, suppose you have a lot of summer cabbage and a rain comes along and the cabbage starts to crack and burst open. Instead of allowing it to go to waste, make kraut of it. After the kraut is cured, blanch it in boiling water from six to fifteen minutes, cold dip, pack at once into hot jars, fill up the jars with boiling water, adjust rubber caps and sterilize one hour and a half. Bacon or sausage may be added, but in that case sterilize for three hours.

Each year I experiment with different things so as to get new ideas and a bigger variety. If I am in doubt as to time, I sterilize three hours and am reasonably sure that the product will keep. I label a great many cans as to time of blanching, sterilizing, etc. This gives me something to go by the following year and shows me how I can improve that particular product. In this way I cut down the time of canning peas from three to two hours, and asparagus from two hours to ninety minutes.

Along about Thanksgiving one has a lot of empties on hand, and possibly a goodly number of pumpkins. Then the time is opportune for canning the pumpkins for future pies. I did this last year for the first time and found it a most convenient thing to have on hand.

TIMETABLE FOR COLD PACK CANNING

Fruits

Products	Syrups	Scald or Blanch	Hot water bath outfits
Apricots	1 S: 1 W	1 to 2 min.	16 min.
Blackberries	1 S: 1 W	No.	16 min.
Blueberries	1 S: 2 W	No.	16 min.
Cherries	1 S: 2 W	No.	16 min.
Cranberries	1 S: 1 W	No.	16 min.
Currants	3 S: 2 W	No.	16 min.
Dewberries	1 S: 1 W	No.	16 min.
Gooseberries	1 S: 1 W	No.	16 min.
Grapes	3 S: 2 W	No.	16 min.
Peaches	1 S: 2 W	No.	16 min.
Pineapples	1 S: 2 W	1 to 2 min.	16 min.
Plums	1 S: 1 W	No.	16 min.
Wild Plums	1½ S: 1 W	3 to 5 min. in soda water, teaspoon soda to each kettle plums.	16 min.
Raspberries	1 S: 1 W	No.	16 min.
Rhubarb	1 S: 1 W	1 to 2 min.	16 min.
Strawberries	2 S: 1 W	No.	16 min.
Citrus fruits	1 S: 1 W	1½ min.	16 min.
Apples	1 S: 2 W	1½ min.	12 min.
Pears	1 S: 2 W	1½ min.	20 min.

"S" indicates 1 part sugar

"W" indicates 1 part water

Vegetables

Products	Scald or blanch	Hot water bath outfits
Tomatoes	1 to 3 min.	18 min.
Pumpkin or squash	5 min.	1½ hrs.
Corn	5 to 8 min.	3 hrs.
Hominy	5 min.	2 hrs.
Asparagus	2 min.	1½ hrs.
Beans	5 min.	2 hrs.
Sauerkraut	6 to 15 min.	1½ hrs.
Beets	6 min.	1½ hrs.
Carrots	6 min.	1½ hrs.
Sweet potatoes	6 min.	1½ hrs.
Greens—all kinds	10 to 15 min. in steamer over boiling water	1½ hrs.
Peas	5 min.	2 hrs.
Corn and beans for succotash	5 min.	3 hrs.

Meats and Soups

Beef and pork	3 to 4 hrs.
Poultry	3 to 4 hrs.
Soup mixtures	1½ hrs.

Note—Cooked meats as pot roasts, baked roasts, stewed meats, etc., 1½ hours. Thus one can easily can up left-over meats to prevent their spoiling.

TO CLEAN A CARPET

Have the carpet thoroughly beaten and shaken, then re-lay. Should there be any spots of grease, these should be taken out first by placing a piece of thick brown paper over the spots, and pressing with a hot iron. Put a tablespoonful of soft soap into a pail of warm water, and in another hucket of clean cold water, put half a cupful of liquid ammonia. Be sure to use cotton clothes, and go over the carpet first with the cloth wrung out in the soapy water, then with one wrung out in the clean ammonia water. The cloths must not be too wet, and the rubbing must be well done. All the dirt comes off with the first cloth, and the second brings up the colors like new.

TO CLEAN A SEWING MACHINE

Take out the screw that holds the footplate, remove it, and clean out the fluff accumulated there. Clean the little grooves and under the whole of the plate with a penknife (the needle must be taken out before the work is begun). Very often this is the only cause of the machine running hard and not carrying the work.

FURRED KETTLES

When kettles become furred—that is, coated over on the inside with a hard deposit from the mineral and other substances in solution in water which are set free in boiling—they can be cleansed by boiling whiting in them for one or two hours. This, however, can be prevented to a great extent if a small marble be kept in the kettle.

WASHING DISHES

The best way to wash dishes is as follows: Have ready a pan of hot suds and a pan of clear hot water. Wash the dishes in the hot suds, rinse them in the hot water, drain them on a wooden rack or in a wire basket, and wipe them perfectly dry with clean towels. The glass should be washed and wiped first; next the silver; then the china, and so on to the tin and iron vessels. As soon as the water becomes soiled or cold it should be thrown away, and the pans be filled with clean hot water. Linen towels are best for the glass, silver and china; coarser cloths will do for the kitchen dishes; but they should be clean and dry.

CLEANING LAMP BURNERS

To clean lamp burners, boil in a strong solution of borax, renewing the solution if burners are very dirty.

Another way is to dissolve an ounce and a half of sal soda in a quart of water; put into this the burner, set it on the stove and let it boil for ten minutes, then rinse and dry the burner. This should be done every two weeks. Wood ashes also are good. Lamp burners may also be cleaned in the following manner: Save all your onion peelings and when the burners get dark or begin to look old wrap each burner with the onion peelings, putting on several thicknesses, tie firmly with string, put in a dish, cover with warm water, add a tablespoonful of kerosene, and then boil for an hour or two; finally wipe the burner dry, and it will look like new.

LIME WATER

Lime water is made as follows: Take a small lump of lime weighing about half an ounce, and pour on it six tablespoonfuls of cold water; when the fizzing has subsided add one pint of water; and let it stand half an hour, stirring occasionally. Allow the lime to settle to the bottom, pour off the liquid and throw it away, add four quarts of water to the lime, shake well and keep in a tightly corked jug or bottle. This is the formula used by druggists.

MUSTARD PLASTER

A mustard plaster made according to the following directions will not blister the most sensitive skin: Two teaspoonfuls mustard, two teaspoonfuls flour two teaspoonfuls ground ginger. Do not mix too dry. Place between two pieces of old muslin and apply. If it burns too much at first lay an extra piece of muslin between it and the skin; as the skin becomes accustomed to the heat take the extra piece of muslin away.

RE-FINISHING STUCCO

Before proceeding to re-finish exterior stucco work the surface should be washed down with a plentiful

supply of water. If a hosepipe is not available for this part of the work you can work from a gail, using a kalsomine brush with which to apply the water freely. If there are any cracks showing in the stucco these should be repaired with plaster of paris mixed to a putty with water—mixing only a small quantity at a time as this material rapidly sets in a hard lump.

The next procedure will depend on what treatment the work originally received. If the surface has already been well saturated with paint and there is little or no suction on the surface (you can tell this by watching whether the water sinks in rapidly, or not) then proceed as follows. Select a well known and reliable brand of ready mixed house paint, stir contents well and take out a small quantity and reduce with turpentine. With this, touch up all cracks or broken pieces you may have repaired, allow two or three days for perfect drying, then paint the entire surface.

If, however, the stucco work has not been properly prepared, and manifests a great deal of suction, apply two coats of the paint—thinning the first coat with raw linseed oil and applying freely so as to satisfy the spongy nature of the surface. If there is a great deal of suction make the first coat very thin so that it will sink well into the surface. In selecting color for this work it would be well to confine the choice to light greys, light stone color, or a nice shade of ivory drab.

VARNISHING MAPLE FLOORS

Be sure that the floors are perfectly free from moisture before proceeding with the work. Carefully remove all dust and grit with a painter's duster, or clean soft broom or counter duster. Select a well known and reliable brand of floor finish and apply the first coat reduced with turpentine in proportions of one part turpentine to five parts varnish. Apply a fairly liberal coat and brush well into the surface, avoiding "flooding" the surface. When this coat has dried hard, follow with two coats of the varnish, straight from the can without reduction, brushing out well, and evenly. Allow plenty of time between second and third coats for perfect hardening and remember that three such coats, well brushed out, will give much better and more lasting results than two heavy coats. When applying the varnish take only a few boards at a time and finish the entire length of the room before starting another stretch.

COAL OIL STOVES

Coal oil stoves have been on the market for years, but it is only in the last very few years that they have been brought to their present state of perfection. As the demand increased the manufacturer naturally turned to the higher development of the coal oil stove, and having concentrated his efforts on the one line he has evolved an oil cooking stove that will perform the work of any kitchen range. These stoves are made in sizes with two burners, three burners, four burners or batteries of 12 and 18 burners. These latter are used mostly in domestic science kitchens in connection with technical schools. For several years nothing but the 2 burner stoves were sold, then the 3 burner, and recently, as the public realizes more and more the value of the article, the demand has been almost entirely for the 4 burner size. The consumption of oil is small, the control of the flame perfect, and there is not the slightest danger in operating.

Ovens are made for these stoves—the most popular covers 2 burners of the stove and is fitted with a glass front drop door. These ovens are all asbestos-lined and have removable tin linings and are very easily kept clean.

In one of the most advanced types of coal oil cooking stoves the flame is controlled by a lever handle and is placed very close to the cooking utensils, similar to a gas range. The oil is fed by the gravity principle and can be cut off several minutes before the cooking is completed and the gas vapors in the combustion chamber will finish the cooking. This type of stove though very powerful, is under perfect control at all times and is extremely economical to operate, only costing about two cents per burner per hour. Five gallons of coal oil will last the average householder one month. It is absolutely odorless—no gas fumes escaping into the kitchen. It is safe, no danger of explosion, no vent pipe or other equipment is necessary to set it up, it is complete in itself.

Curing Meats on the Farm

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Meat must be properly and thoroughly cooled to insure good keeping qualities when cured. If salted before the animal heat is out, the shrinkage of the muscles causes the retention of injurious gases, giving an offensive odor to the meat. Neither should meat be frozen when salted, as the action of the frost will prevent the proper penetration of the salt and uneven curing will result. It is important, also, that curing should begin as soon as the meat is cooled and while it is still fresh. Tainted meat may be cured so that it will keep, but nothing in the line of preservatives can bring back the natural flavor when it is once lost. The safest rule to follow is to salt meat as soon as the animal heat is out, and before it freezes or starts to decay. Ordinarily twenty-four to thirty-six hours after slaughtering will allow sufficient time for cooling.

A cypress hard-wood barrel is a suitable vessel in which to cure meat. A barrel made for the purpose is best, but where it can not be had a melon or syrup barrel will answer.

CURING IN BRINE AND DRY CURING COMPARED

Brine-cured meats are best for farm use, for the reason that a suitable place for dry curing is not usually obtainable. It is also less trouble to pack the meat in a barrel and pour on a brine than to go over it three or four times to rub in the salt. The brining method also gives better protection from insects and vermin. Trouble is sometimes experienced in keeping brine, but if pure water is used and directions followed in making the brine there should be no difficulty in keeping it for a reasonable length of time. During warm weather brine should be closely watched. If it becomes "ropy," like sirup, it should be boiled or new brine made. A cool, moist cellar is the best place for brine curing. Dry curing may be done successfully in a cellar also, though even more moisture is needed to effect a thorough cure. The cellar should be dark and tight enough to prevent flies and vermin from damaging the meat.

CURING CORNED BEEF

The pieces commonly used for corning are the plate rump, cross ribs, and brisket, or in other words the cheaper cuts of meat. The loin, ribs, and other fancy cuts are more often used fresh, and since there is more or less waste of nutrients in corning, this is well. The pieces for corning should be cut into convenient sized joints, say, 5 or 6 inches square. It should be the aim to cut them all about the same thickness so that they will make an even layer in the barrel.

Meat from fat animals makes choicer corned beef than that from poor animals. When the meat is thoroughly cooled it should be corned as soon as possible, as any decay in the meat is likely to spoil the brine during the corning process. Under no circumstances should the meat be brined while it is frozen. Weigh out the meat and allow 8 pounds of salt to each 100 pounds; sprinkle a layer of salt one-quarter of an inch in depth over the bottom of the barrel; pack in as closely as possible the cuts of meat, making a layer 5 or 6 inches in thickness; then put on a layer of salt, following that with another layer of meat; repeat until the meat and salt have all been packed in the barrel, care being used to reserve salt enough for a good layer over the top. After the package has stood over night add for every 100 pounds of meat, 4 pounds of sugar, 2 ounces of baking soda, and 4 ounces of saltpeter dissolved in a gallon of tepid water. Three gallons more of water should be sufficient to cover this quantity. In case more or less than 100 pounds of meat is to be corned, make the brine in the proportion given. A loose board cover, weighed down with a heavy stone or piece of iron, should be put on the meat to keep all of it under the brine. In case any should project, rust would start and the brine would spoil in a short time.

It is not necessary to boil the brine except in warm weather. If the meat has been corned during the winter and must be kept into the summer season, it would be well to watch the brine closely during the spring, as it is more likely to spoil at that time than at any other season. If the brine appears to be ropy or does not drip freely from the finger when immersed and lifted, it should be turned off and new brine added

after carefully washing the meat. The sugar or molasses in the brine has a tendency to ferment, and, unless the brine is kept in a cool place, there is sometimes trouble from this source. The meat should be kept in the brine twenty-eight to forty days to secure thorough curing.

DRIED BEEF

The round is commonly used for dried beef, the inside of the thigh being considered the choicest piece, as it is slightly more tender than the outside of the round. The round should be cut lengthwise of the grain of the meat in preparing for dried beef, so that the muscle fibers may be cut cross-wise when the dried beef is sliced for table use. A tight jar or cask is necessary for curing. The process is as follows: To each 100 pounds of meat weigh out 5 pounds of salt, 3 pounds of granulated sugar, and 2 ounces of saltpeter; mix thoroughly together. Rub the meat on all surfaces with a third of the mixture and pack it in the jar as tightly as possible. Allow it to remain three days when it should be removed and rubbed again with another third of the mixture. In repacking put at the bottom the pieces that were at the top the first time. Let stand for three days, when they should be removed and rubbed with the remaining third of the mixture and allowed to stand for three days more. The meat is then ready to be removed from the pickle. The liquid forming in the jars should not be removed, but the meat should be repacked in the liquid each time. After being removed from the pickle the meat should be smoked and hung in a dry attic or near the kitchen fire where the water will evaporate from it. It may be used at any time after smoking, although the longer it hangs in the dry atmosphere the drier it will get. The drier the climate, in general, the more easily meats can be dried. In arid regions good dried meat can be made by exposing it fresh to the air, with protection from flies.

PLAIN SALT PORK

Rub each piece of meat with fine common salt and pack closely in a barrel. Let stand over night. The next day weigh out 10 pounds of salt and 2 ounces of saltpeter to each 100 pounds of meat and dissolve in 4 gallons of boiling water. Pour this brine over the meat when cold, cover and weight down to keep it under the brine. Meat will pack best if cut into pieces about 6 inches square. The pork should be kept in the brine till used.

SUGAR-CURED HAMS AND BACONS

When the meat is cooled, rub each piece with salt and allow it to drain overnight. Then pack it in a barrel with the hams and shoulders in the bottom, using the stripe of bacon to fill in between or to put on top. Weigh out for each 100 pounds of meat 8 pounds of salt, 2 pounds of brown sugar, and 2 ounces of saltpeter. Dissolve all in 4 gallons of water, and cover the meat with the brine. For summer use it will be safest to boil the brine before using. In that case it should be thoroughly cooled before it is used. For winter curing it is not necessary to boil the brine. Bacon stripe should remain in this brine four to six weeks; hams six to eight weeks. This is a standard recipe and has given the best of satisfaction. Hams and bacon cured in the spring will keep right through the summer after they are smoked. The meat will be sweet and palatable if it is properly smoked, and the flavor will be good.

DRY-CURED PORK

For each 100 pounds of meat weigh out 5 pounds of salt, 2 pounds of granulated sugar, and 2 ounces of saltpeter, and mix them thoroughly. Rub the meat once every three days with a third of the mixture. While the meat is curing it is best to have it packed in a barrel or tight box. For the sake of convenience it is advisable to have two barrels, and to transfer the meat from one to the other each time it is rubbed. After the last rubbing the meat should be in the barrel for a week or ten days, when it will be cured and ready to smoke. To cure nicely it is desirable to have a cool and rather moist place in which to keep it.

This recipe should not be used where the meat must be kept in a warm and dry place, as the preservatives will not penetrate easily and uniformly.

VETERINARY

DIAGNOSING THE DISEASE

The important thing about treating a disease is to recognize what the disease is. A close examination should be made of the sick animal, its behavior, appearance and surroundings noted and finally the general or local symptoms. The pulse should be taken, respirations, temperature and the condition of skin, hair and mucous membranes noted. Local symptoms are usually pain, swelling, tenderness, and loss of function in the part affected.

It is not possible for the layman to attain very high efficiency in diagnosing since his opportunities to observe cases are limited. He can, however, by observing, come to know the appearance of animals in health and learn to detect the more common ailments. The common ailments are discussed in the following pages. Obscure diseases should be dealt with only by the trained veterinarian.

TEMPERATURE OF FARM ANIMALS

The normal temperature of different farm animals is as follows: horse, 100 to 101 degrees Fsh.; cow, 101 to 102 degrees; sheep, 103 to 104 degrees; pig, 102 to 103 degrees; dog, 101 to 102 degrees; poultry, 105 to 108 degrees. Temperature is taken by inserting the thermometer in the rectum.



Point at Which the Pulse is Taken in the Horse

PULSE

The normal pulse or heart beat per minute in adult animals is as follows: horse, 36 to 40; cow, 45 to 50; mule and ass, 46 to 50; pig, sheep and goat, 70 to 80; dog, 90 to 100; cat and hare, 120 to 150; chickens, 140; geese, 110. In the new-born colt the pulse rate is 100 to 120, at two weeks 80 to 90, at three months, 68 to 70, at six months 64 to 72, at one year 48 to 56, at two years, 40 to 48, at four years, 38 to 50, in old age 32 to 40.

The horse's pulse is taken at a point just forward of the angle of the jawbone on the inside border. The pulse in cattle is taken at the same point. The sheep's pulse is taken from the femoral artery by placing the fingers over the inner region of the thigh. The hog's pulse is taken from the femoral artery on the internal region of the thigh. The dog's pulse is taken by resting the fingers over the inner region of the arm just below the elbow.

RATE OF RESPIRATION

Exercise greatly increases the rate of respiration. In horses at rest it is about 10 per minute but may increase to 50 or more in active motion. Cows run from 24 to 36, bulls and steers about 20, sheep, at rest 15, cat, 24, dog 15 to 18. Young animals breathe faster than adults.

DRENCHING A HORSE

In giving a drench to a horse it is most convenient to use a long-necked, heavy glass bottle. Ordinary long-necked quart whiskey bottles are a good kind to use. The horse should be backed into a narrow stall and the head elevated by placing a loop in the end of a small

rope over the upper jaw, passing the rope back of the nose piece in the halter and throwing it over a beam and raising the head until the mouth is slightly higher than the throat. If the horse refuses to swallow a teaspoonful of clean water may be dropped in the nostril. This forces it to swallow. A drench should never be given through the nose as it may pass into the air passages causing a fatal inflammation of the lungs.

DOSES

In figuring the size of dose required for horses of different ages where the dose given under the treatment of the disease is for a full grown horse, the following rules may be followed: The dose for a colt one year of age is about one-third the quantity given the adult, two years of age one-half and three years of age two-thirds. In cattle the doses recommended are about in the same proportion.

DRENCHING A COW

Use a long-necked bottle. If the cow is in a stall where there is room the easiest way is to catch her in the nose with the left hand and raise up her head. Insert the bottle in the right hand. Slip the cork into the side of her mouth and pour the contents slowly down her throat. Give the drench slowly, a little at a time, holding up the head all the time with the left hand. Do not force her to take the medicine rapidly. If you do some of it is almost sure to pass into the windpipe and may get into the lungs and set up irritation and inflammation there.

DRENCHING A HOG

A small metal dose syringe is best for giving medicine to hogs, the hog's head being held up by means of a small rope placed around the snout and well back towards the corners of the mouth. If the drench is bulky and the hog hard to hold it may be necessary to elevate the head and raise the fore feet off the ground. The drench should not be given until the hog is under control as a struggling hog is likely to get some of the medicine into the air passages and cause trouble. Where a large number of hogs in the same pen are being treated at one time it is well to mark each one as it is given the medicine. A daub of paint on the back will serve to mark them.

DRENCHING A SHEEP

Drenches must be given with considerable care to sheep. You should straddle her or back her into a corner and stand on the right side. Place the left hand on the jaw with your thumb in her mouth and on the tongue between front and back teeth. Do not hold the head too high as is quite customary. Even a human being can't swallow very well with the head stretched back. Pour the contents of the bottle slowly and a little at a time. In brief, give the animal every opportunity to swallow as naturally as possible and little difficulty should occur.

VETERINARY INSTRUMENTS FOR FARM

The veterinary equipment for the farm may vary from a jack knife to a full set of instruments and an assorted lot of drugs. Its completeness will vary with the ability of the man to diagnose disorders and prescribe treatment. One should have a good work or two on the diseases of farm stock and the treatment of the same. Craig's "Diseases of Farm Animals" is a good book, or there are scores of others. The simplest assortment of medicines that could be advised would include Epsom salts, raw linseed oil, sulphur, bicarbonate of soda, aloes, carbolic acid, creolin, oil of tar, liniments, blisters and remedies for specific diseases such as colic or influenza. This list may be increased to any extent desired, the controlling factor being one's own ability to make a proper use of the medicines. Instruments on hand should be a clinical thermometer, a trocar and canula, a good knife, bandages and dressing, ropes for throwing and restraining. We publish here a list of veterinary instruments in common use among farmers: Blackleg vaccine outfit; milk fever outfit; hull nose punch and rings; thermometer; castrating knife; cattle trocars; claw clippers; dehorning instruments; dental set; eye droppers; emasculator; fring iron; assortment of forceps; eyerings; mouth gag; garget outfit; milk tubes; drenching horn; hypodermic

needles; injection pump; rasp, hoof clippers; hoof knife; measuring glass; molar cutters; assorted needles; prescription scales; prohang.

PRESCRIPTIONS

The following are some useful prescriptions for the treatment of various ailments in live stock.

WHITE LINIMENT

Turpentine.....2 ounces
Aqua Ammonia.....2 ounces
Olive or Raw Linseed Oil.....3 ounces

This is a very useful liniment for both the horse and stable, but if a milder effect is desired add more oil. It should be applied once or twice daily.

HOOF OINTMENT

Crude Petroleum..... $\frac{1}{2}$ pint
Neat's-foot Oil.....1 pint
Its w Linseed Oil.....1 pint
Oil of Tar..... $\frac{1}{2}$ pint

Apply to hoofs once a day when needed.

HEALING LOTION

Sugar of Lead..... $\frac{1}{4}$ pound
Sulphate Zinc.....3 ounces
Carbolic Acid.....3 ounces
Water.....1 gallon

This makes an excellent healing lotion and is not very expensive. It should be applied two or three times a day.

PURGATIVE FOR CATTLE

Epsom Salts.....1 to 2 pounds
Ginger (Tincture).....1 $\frac{1}{2}$ ounce
Salt..... $\frac{1}{2}$ pound
Water.....3 pints

For a brisk effect add forty drops Croton Oil.

HEALING SALVE

Carbolic Acid.....1 part
Vaseline.....8 parts

This makes a nice salve for healing dry surface sores and it should be applied twice a day.

COLIC MIXTURE

Aromatic Spirits of Ammonia..... $\frac{1}{2}$ ounce
Fluid Extract Belladonna.....1 dram
Sulphuric Ether..... $\frac{1}{2}$ ounce
Fluid Extract Ginger.....2 drams
Hypo-sulphite of Soda.....1 ounce
Water.....1 pint

This is a good colic remedy and should be given at one dose and repeated in forty or fifty minutes if a recovery has not taken place.

BLISTER

Biniodide Mercury.....1 dram
Lard.....1 ounce

SOOTHING LOTION

Fluid Extract of Witch-hazel.....8 parts
Fluid Extract Opium.....1 part
Tincture Arnica.....2 parts
Tincture Aconite.....1 part

Remedy for sprains and bruises.

DRYING POWDER

Alum (Dried).....1 ounce
Pulverized Sulphate Copper.....1 ounce
Powdered Sulphate Iron.....1 ounce
Calomel.....1 ounce
Wood Charcoal.....3 ounces

Apply to raw unhealthy sores once or twice a day.

DRYING HEALING POWDER

Oxide Zinc.....2 ounces
Powdered Alum.....2 ounces
Boric Acid.....4 ounces

This makes a nice dressing for open sores and should be applied twice a day.

COLIC CURE

The following should be kept mixed and ready to give. Have it put up by the druggist: 1 $\frac{1}{2}$ fluid ounces each of laudanum, tincture of belladonna and sweet spirits of nitre in a pint of cold water. This is a dose for an ordinary horse. Repeat if relief is not apparent within an hour. After the acute symptoms pass, give a purgative of from 1 to 1 $\frac{1}{2}$ pints of raw linseed oil.

CURE FOR MANGE

Where cattle are affected with any disease of the skin, especially as the hair falls out and small sores appear on the skin, it is advisable to treat at once as follows:

Sulphur.....2 pounds
Oil of Tar.....8 lbs.
Raw Linseed Oil.....1 gallon

Heat these ingredients gradually together, but do not allow to boil. Apply thoroughly to the affected parts with a brush. This is good for any skin disorder or scurvy condition of the skin in cattle.

CONDITION POWDER FOR HORSES

When horses are out of condition and in need of a tonic the following is recommended: Give each animal four tablespoonfuls of the following mixture twice daily: Sulphate of quinine 4 drams, tincture of iron 3 ounces, whiskey to make 20 ounces. Shake well and inject back in the mouth with a small syringe. Following this medicine, give a tablespoonful twice daily of a powder consisting of Glauber's salt 4 ounces, saltpetre 4 ounces, powdered sulphate of iron 3 ounces, ground gentian root 3 ounces, powdered nux vomica 2 ounces. Mix the powder in scalded bran and oats. Feed liberally and be sure the water supply is clean and pure.

COMMON DRUGS, USES AND DOSES

Aloes—A purgative for the horse, dose 4 to 6 drams.
Arca nut—A vermifuge for horses; dose $\frac{1}{2}$ to 1 dram.

Calomel—A vigorous cathartic; horses, 15 to 60 grains; sheep, 8 grains, dogs, 1 grain.

Cantharides—A blister and stimulant, not used internally.

Carbolic acid—Antiseptic and disinfectant, used in water at the rate of 1 part to 100 parts.

Caster oil—Purgative; horses, 1 pint; cattle, 1 $\frac{1}{2}$ pints; sheep, $\frac{1}{2}$ of an ounce; dogs, $\frac{1}{4}$ an ounce.

Charcoal—Is useful in checking digestive disturbances. It may be given in as large doses as will be taken.

Epsom salts—Purgative; horses, 1 lb.; cattle, 1 to 2 lbs.; sheep 1 to 4 os.; dogs, 1 to 4 drams.

Formalin—Used in the treatment of wounds and as a disinfectant in a 2 to 4 per cent solution in water.

Gentian—Tonic; horses, 4 to 8 drams; sheep, 1 to 2 drams; pigs, 50 grains.

Ginger—Stomachic; horses, 1 os.

Glauber's salts—Purgative; horses, 1 lb.; cattle 1 $\frac{1}{2}$ lbs.

Linseed oil—Purgative; horses, $\frac{1}{2}$ to 1 $\frac{1}{2}$ pints; cattle, 1 to 1 $\frac{1}{2}$ pints; sheep, 6 ounces.

Nux vomica—Tonic; horses, 20 to 60 grains; cattle, same; sheep, 10 grains; pigs, 8 grains; dogs, 2 grains.

Sulphur—Alterative; horses, 1 ounce; sheep, 1 to 2 drams.

Sweet spirits of nitre—Stimulant, causes sweating; horses, 1 to 3 ounces; cattle, 3 to 4 ounces; sheep, 3 to 6 drams; pigs, 2 drams.

POPULAR ERRORS IN REGARD TO DISEASE

Lampas, seen in young horses is a simple congestion of the hard palate behind the upper front teeth, and is associated with the eruption of the permanent teeth. Many owners seem to think the condition is one that requires some treatment, but as a matter of fact no interference is required.

Hollow Horn, popular fallacy that remains from eiden days, and treated by boring a hole in the cows' horn and then pouring in turpentine, which is supposed to solidify the horn. As a matter of fact the horn is hollow and any treatment of that nature is inhuman.

Wet Tail—Tail ill, in which the animal is supposed to have a worm in the end of the tail. The ignorant quack proceeds to split the end of the tail and fill the wound with a mixture of pepper and salt.

Black Tooth in Pigs. This condition is another myth, which still exists in the minds of the ignorant, and is supposed to cause the death of young pigs.

The above delusions are mentioned so that owners may not lose time in treating imaginary disease, when the real trouble should be looked for elsewhere.

DISEASES OF HORSES

AZOTURIA

Most common cause is a rich diet during periods of idleness. Generally occurs among working horses left idle for a few days with no reduction in feed. On this account this has been called "Monday morning disease."

Symptoms: Loss of control of hind legs. Horse goes down after working a short time. Excretion of dark-colored,ropy urine of brown or reddish color.

Treatment: Inveatloo is best. Reduce the grain when horses stand idle after a very work and heavy feeding. Give idle horses exercise. Turn them to pasture if possible.

Blanket an affected horse. Give sles 3 drams, podophylla $\frac{1}{2}$ dram, and ginger 2 drams in a drench in one dose, or 1 quart of raw linseed oil. Keep from going down. If he goes down keep him from lying flat; rub the legs and ears, keep warm, rub the back with mustard. Give plenty of water, not too cold. Keep him quiet and comfortable. Secure the services of a veterinary surgeon if possible. Good nursing more than medicine is required in treating azoturia.

BOTS

It is doubtful if bots, unless present in large numbers, do any serious harm. In some cases they may be responsible for indigestion and general unthriftiness, and in rare instances may produce conditions resulting in death, but it is probable their injurious effects are more or less overrated, as in all countries where gadflies (the fly that produces the bot) are numerous, most horses are affected to a greater or lesser degree. The gadfly deposits its eggs on the limbs of horses and when the animal licks the spot the larvae are conveyed to the mouth. Passing down the gullet they fasten themselves in the stomach walls by means of a little hook on each side of the mouth. So closely do they adhere that efforts to dislodge them may tear the grubs in pieces before they release their hold. When spring comes the grub lets go its hold on the stomach wall, and passes away with the excreta. After remaining in the ground for six or seven weeks it emerges from the pupal envelope as a mature gadfly. At this season of the year their removal from the digestive tract may be hastened by the administration of a laxative such as 1 $\frac{1}{2}$ pints of raw linseed oil, containing two ounces of oil of turpentine. The oil should be given in the morning after the horse has fasted overnight. It is difficult to remove bots from the stomach during the winter months without giving medicine that may prove injurious to the horse, unless carefully and properly administered. Such treatment therefore should not be attempted by anyone but a qualified veterinarian.

CHOKING

When a horse chokes give some softening material at once, such as linseed oil or plenty of water. If this does not remove the obstruction use a probang. If a probang is not at hand a perfectly smooth oiled, stick or buggy whip may be used to push the obstruction down the gullet. Care must be exercised in using a whip or stick so as not to injure the throat or rupture the gullet. If a veterinary surgeon is within reach better call him.

COLDS

In case of a simple cold rest the horse in a well-ventilated stable and give warm food and water. Good results are usually obtained from bran mash or linseed gruel, particularly if the animal is constipated. Letting the horse inhale steam for 15 or 20 minutes four or five times a day will help to loosen the cold and clear out the nasal chambers. The use of a little eucodin in the water is helpful.

CONSTIPATION IN FOALS

When the foal is affected with this condition, it will be noticed that a day or two after its birth, it appears to be very dumpish and listless and to keep elevating the tail and straining to defecate without passing anything. It also shows considerable uneasiness, and signs of colic becoming manifest, while the belly may become distended or bloated. If not relieved, the condition becomes more pronounced, the pulse and breathing become quickened and the colt may begin

to sweat and keep grinding the teeth through pain. To avert and overcome this condition when present, the hardened material, or retained fecal matter, if within reach, should be removed from the rectum with the fingers, or by means of a piece of smooth wire bent double to form a loop. This should be followed by injections into the rectum of a little raw linseed oil, or some warm, soapy water, which can be given by means of a hard rubber syringe. If care is exercised in giving the injections, they may be repeated every hour or two, and have a very beneficial effect in lubricating the passage, and thus enable the foal more easily to pass the fecal matter. Further to hasten the action of the bowels, a dose consisting of two or three ounces of castor oil should be given as a drench, poured carefully and slowly into the mouth.

As a preventive the diet of the mare during pregnancy should be of a laxative nature, or such as would not tend to induce constipation. In the case of mares which have gone much over time and have been losing milk, the foal, during the first few days after birth, should be carefully watched, and if the bowels are not moving regularly, a small dose of castor oil should be given, together with an injection of several ounces of warm, soapy water which, in most cases will have the desired effect.

Attention should also, in all cases, be given to the diet which the mother is receiving, as it has a modifying influence on her milk which, in turn, has effects, beneficial or otherwise, to the foal. In the event, therefore, of the dam being fed largely on dry feed, a change should be made to a more laxative diet, and bran mashes should be given, or, if the season of the year is suitable, and pasture available, the green grass will usually be found a good corrective.

CORNS

These usually result from injuries to the horn of the foot involving the soft tissues beneath. Removing the shoes and turning the animal to pasture sometimes effects a cure. If pus forms it is necessary to open the cavity and cleanse the affected parts. In very serious cases it is advisable to have a veterinary surgeon treat the foot. Severe cutting of the foot is not advisable. Rest in pasture is the best treatment.

CRACKS AND FISSURES

The treatment for cracks and fissures in the region of the toe and quarter is as follows: The walls should be cut away along the margin of the crack until it is quite thin. Extracts should be made in the shoes and a nail driven into the bearing margin of the foot wall a little to each side of the fissure. The wall at the toe should be shortened and the toe of the shoe rolled if the animal's work permits the use of this kind of shoe. Provide necessary moisture by means of foot baths, wet clay and poultices. Treatment consists in preventing motion on the margins of the cracks and fissures as far as possible.

CURB

This is a swelling of the posterior border of the hock just below the point of the hock. The most common cause is faulty conformation of the hock. The immediate cause is usually strain from slipping or heavy pulling. Curb is more common in young horses than in mature animals. Treatment consists in reducing the inflammation by applying cold water and rubbing by hand. After inflammation subsides tincture of iodine may be applied or the part blistered. (See Blisters). Rest is a very necessary part of the treatment.

DETECTING BLINDNESS IN HORSES

In a dark place the pupils of sound eyes dilate, so lead the horse into the light and notice if contraction of the pupils occurs. If it does not, the eyes are unsound. In blindness from paralysis of the retina and optic nerves (amaurosis, or "glass eye") the pupils are permanently dilated and the eyes consequently appear unusually bright and prominent, although the horse is "stone blind." Such a horse can look squarely at the sun without blinking.

Books and articles on the examination of horses for soundness advise that the soundness of the eye should be tested by a threatened blow of the hand. If the

horse can see, he flinches on noticing the approach of the hand, otherwise there is no winking of the eyelids. This test is useless, if not very gently done. A blind horse will wink, if he feels a column of cold air strike the eye, or if the fingers touch one of the long hairs projecting from the skin under the eye. Look for these long hairs. They are called "tentacles," have special nerve endings, so are sensitive and when touched communicate the message of impending danger to the brain, and the eyelids instantly close. They serve the same purpose as the long hairs or "feelers" projecting from each side of the mussel of the cat, and in the horse also are found in that region.

DISTEMPER

This is an acute infectious disease characterized by a feverish condition and partial loss of appetite. Glands in the region of the jaw become hot, swollen and painful, and the animal may be unable to eat. Secretions accumulate in the nasal cavities and break after a few days. Abscesses may form also in the throat and break, increasing the nasal discharge. Affected animals should be comfortably housed in clean, well-ventilated stables and protected from drafts. Blankets should be employed, if necessary. The feed should be laxative and nourishing. Soaked bran and oats, good clean hay and, if possible, a few roots. If the appetite is poor, food should not be allowed to remain before the animal after he has stopped eating, but should be immediately removed and the manger cleaned out thoroughly. Drinking water should be cold and offered at short intervals. Hand-rubbing and bandaging of the legs, removing the bandages every twelve hours, will help to make the patient comfortable. If there is any soreness of the throat or discharge from the nose, steaming the head will give some relief. Pour boiling water on a win of clean hay and hold the bucket under the patient's nose, stirring the hay occasionally. The application of mustard will hasten maturity of abscesses that may appear in the throat region. A tablespoonful of saltpetre, given twice daily in drinking water, will keep the kidneys active. If appetite is poor it may be encouraged by two-ounce doses of whiskey or liquor acetate of ammonia, given two or three times daily in drinking water. Affected animals should be kept separate from healthy ones.

DIARRHOEA

The treatment of diarrhoea depends entirely upon the cause in each individual case. If due to the presence of an irritant in the digestive system, the first step in the treatment is to endeavor to remove the irritant by administering a mild laxative such as castor oil. A good astringent remedy in horses is: Ground ginger, powdered catechu and prepared chalk of each half an ounce; powdered opium one dram administered in flour gruel. Repeat every four hours until purging ceases. Drinking water should be restricted in quantity and have the chill taken off. In persistent cases a little flour may be added. Unskilled persons should be very careful in attempting to check diarrhoea in animals as the administration of astringents may do more harm than good.

FISTULA OF WITHERS

Fistula of the withers sometimes follows bruises, abscesses or wounds of that region. The pus burrows and finds lodgement deep down between the mus les and escapes only when the sinews are full or when, during motion of the parts, the matter is forced to the surface. The treatment of such a condition is purely surgical and usually requires all the skill of the trained and experienced veterinarian. Consult a qualified veterinarian as it would be impossible to recommend a treatment which could be successfully carried out.

GLANDERS

In ordinary cases there is a dry persistent cough, especially after exercise. The glands on the inside of the jaw bone are swollen and sensitive. There is usually a discharge from the nose of a dirty white color. The discharge is sticky and adheres to the hair and skin. The animal usually loses flesh quite rapidly. Treatment is not recommended. Cases of glanders or suspected glanders should be immediately reported to the Health of Animals Board, Winnipeg, Regina, or Calgary. Glanders is infectious and is transmissible to man. Suspected animals should be isolated.

HEAVES

This disease is easily recognised from the peculiar irregular movements of the flanks and abdomen in affected horses. Heaves is a respiratory disease, caused by feeding dusty, smutty or moldy feed. There is no permanent cure. The best treatment is to feed clean hay and oats, sprinkling the hay with water so that the dust, if any, will not affect the horse. The symptoms may be greatly relieved by careful attention to the diet, watering frequently not letting the animal drink all it wants until work is over for the day. A small handful of flaxseed given with the feed helps to keep down constipation. Fowler's solution of arsenic may be given twice daily in the feed, in half-ounce doses for a period of ten days or two weeks.

HEMORRHAGIC SEPTICÆMIA

This disease presents itself in one or more of four forms: (1) Animals lose control of their locomotory apparatus and stagger or stumble, running into fences and buildings as though blind. (2) The ordinary symptoms of pneumonia—difficult breathing, discharge from the nostrils, which may be streaked with blood; eyelids swollen and sticky from a discharge. (3) Bowel discharge is bloody, and tarry in color; animal gets thin very rapidly, runs about excitedly and lying down, manifests severe, spasmodic pains. Swellings may appear on the legs. (4) There is more or less swelling in the region of the throat, dewlap and fore-quarters. Animals swallow with difficulty; milk secretion in cows stops, and the indigestion is general. The second and third forms are very fatal. When present, death occurs in from 12 to 48 hours. The first and fourth forms alone are not so serious, but animals affected are liable to become worse and develop into a more acute condition.

The disease is fatal when left uncontrolled. The first thing to do is to separate the affected from the healthy animals and disinfect the buildings or places where affected animals have been kept with a solution of 4 per cent creolin, sheep dip or carbolic acid. Treatment is preventive. It consists in the immediate use of bacterins injected into the other animals in the herd, as in blackleg. Many of the sick animals may be saved by the same treatment. Special bacterins (vaccine) are prepared for the different species of animals—horses, cattle, sheep, swine. It may be procured from dealers in veterinary remedies and supplies and the animals vaccinated as in blackleg or the veterinary surgeon, if one is within reach, can inoculate the stock. Carefully clean out all sheds and stalls where diseased animals have been kept; burn all straw and litter used about them and burn the carcass. The disease is infectious and every care should be taken to prevent its spread in the herd.

JOINT ILL IN FOALS

In view of the fact that joint ill is a veritable scourge causing a very high death rate among foals, every effort should be made to protect the foal from becoming infected. This is difficult to accomplish if infection of the system occurs in the womb of the mother before birth, or after birth from the milk of the mother. The most hopeful course would be the treatment of the foal at birth with a suitable vaccine. Realising that the disease is often due to the entrance of germs into the system soon after birth, by the navel, preventive measures should be employed to protect the foal from thus becoming infected. Towards the end, the mare at foaling time, if the season of the year is suitable, may be turned into a clean, dry pasture field. If kept in the stable to foal, the stall she occupies should be kept scrupulously clean and well bedded. Immediately before and after foaling, the mare's hind parts and bag should be washed clean. As soon as the foal is born, the navel cord should receive attention and be protected against possible sources of infection. The foal must therefore, be kept in a clean place and away from any accumulated filth or manure heaps, or other likely sources of contamination. The navel should be dressed daily, until healed, by means of an antiseptic solution. For this purpose tincture of iodine is one of the best applications. Immediately after birth the navel and the skin around it should be painted over with iodine at least. If nothing else is available, the navel can be smeared with oil of tar, or it may be treated with a

three per cent solution of creolin or carbolic acid. In treating the navel, one must avoid touching it with the hands unless they are perfectly clean. A very good way is to place the antiseptic solution in a risan cup, and, with the foal standing, hold the cup up against the belly and allow the end of the navel to remain immersed in the solution for a few minutes each time. Additional protection may be afforded valuable foals by applying a wide, clean bandage so as to cover the region of the navel, and kept in place by being fastened front and behind and tied up over the back. The foregoing precautions in regard to the mare and foal are essential to ensure a reasonable degree of safety for the foal, and, if consistently adhered to, at and following the time of birth, will undoubtedly greatly lessen the occurrence of the disease from post-natal infection, and lessen the mortality.

The treatment of foal actually affected with joint ill has not been as successful as might be desired. During recent years, what is known as the serum and vaccine treatment has been giving better results. This treatment consists in injecting under the skin, with a hypodermic syringe, suitable doses of anti-streptococcus serum or joint ill polyvalent bacterine. These preparations should be obtained from reputable veterinary surgeons and used under their directions as a preventive and curative treatment.

The sores on the limbs should also be kept clean and syringed out daily with a solution of equal parts of clean water and tincture of iodine. In addition, from ten to thirty drops of the tincture of iodine, diluted in a few ounces of water, can be given morning and evening as a drench by the mouth. The sick foal should be kept comfortable, and receive the best of care, attention, and nourishment, and its strength should be maintained by feeding milk and eggs.

KNUCKLING OVER IN COLTS

Certain defects of conformation such as short pasterns predispose to the condition known as knuckling, in which the pasterns assume a more vertical position than they normally do, thus throwing the fetlock joint forward. Unless due to faulty conformation, knuckling is the result of injury to the foot or disease of the tendons and ligaments, resulting in contraction. Foals sometimes knuckle slightly in early life owing to the legs remaining in a flexed position before birth, but unless accompanied by faulty conformation the condition is soon outgrown. If the foot is sound, we would recommend shortening the toe as much as possible and applying a smooth shoe sufficiently thickened in the heel to raise the heel about half an inch. To the tendons and back part of the fetlock, apply a fly blister—pulverized cantharides, 2 drams; vasoline, 1 ounce. It will be necessary to tie the colt's head up short for forty-eight hours at the end of which time the blistered surface should be washed with water and soap, and a little fresh lard applied. Repeat the larding every second day until the hair comes again. After blistering, the colt should be turned out, as the natural exercise of running about will aid in restoring the parts.

LANCING SHOULDER ABSCESS

In lancing an abscess on the shoulder care should be exercised to open the cavity at the lowest or most dependent point in order that it may drain thoroughly. The opening should be large enough to admit the finger so that all shreds of injured tissue may be removed. After cleaning the neck out the only treatment necessary is syringing carefully twice daily with some mild antiseptic such as a 3 per cent carbolic acid or creolin solution and keeping the wound open, until all discharge ceases. The horses should not be returned to work until healing is complete and all evidences of tenderness has disappeared.

LICE ON HORSES

There are several solutions which may be used to kill lice on horses such as a five per cent solution of creolin or kresol, or ksal, or any similar coal tar preparation. The ordinary dips may be used with good results in many cases. They are used generally in the same strength about from three to five per cent solutions. The method of using these preparations are much the same. The affected parts are washed thoroughly with the solution, and the treatment repeated once a week as may be required.

It is sometimes quite difficult to entirely rid horses of lice during the winter while kept in cold stables, preventing their bodies from being washed. They, however, can be benefited by the use of insect dusting powders, a very good one being equal parts of dry cement and powdered kerosene. This powder should be thoroughly rubbed into the hair over the surface of the body once a week. As soon as spring comes have your horses clipped and burn the clippings. Then remove all of the bedding and burn it, and whitewash the stalls. This should effectively get rid of the lice from both the horses and the stable. It would also be advisable to take precautions against permitting poultry roosting or nesting in the stable, as they are often a cause.

NAVICULAR DISEASE

This is a disease which affects the front feet and is commonly known as "coffin joint lameness." It consists of an inflammation affecting the structure connected with the coffin joint of the foot. There seems to be a hereditary predisposition to this trouble in certain individual animals of the lighter breeds. The hereditary tendency probably depends largely on peculiarities of conformation such as narrow, contracted, weak heels or extremely high heels, long toes and poor pasterns.

It causes a very serious lameness which persists and is difficult to overcome. To detect this disease requires careful examination of the feet and close watch as to the position in which the feet are kept when standing. When standing, the lame foot is usually kept slightly in front of the other, which is referred to as "pointing." The affected foot also appears smaller being contracted at the heels and the frog appears shrunken. On walking the step is short and stubby and at the trot the legs go stiffly and "digs his toes" to keep pressure off the heels causing him to stumble sometimes. Navicular disease is a disqualifying unsoundness.

NAVEL RUPTURE IN FOALS

As a rule, rupture at the navel in a foal is not a serious condition, except when of large size. Those of small size tend to disappear in a large number of cases with growth and development of the animal. Recovery can be assisted by means of a truss or supporting bandage. The foal should first be placed on its back, and the lump or tumor manipulated with the hand to return the protruding bowel into the abdomen. To prevent the bowel from again escaping a pad or small cushion is placed over the navel opening and retained in position by a truss or supporting bandage, such as a leather band or canvas girth encircling the body, fastened up over the back, and prevented from slipping forward or backward by means of a breast band and breech band. The only objection to the use of a truss or bandage is, that it may chafe the skin if not properly applied. In the case of ruptures, a good blister applied to the skin around the navel has a good effect. (See Blisters.)

If the foal reaches the age of four or five months without showing any improvement, and the rupture tends to enlarge instead of decrease, it may require an operation to overcome it. The most common method of operation are by means of wooden clamps, skewers and ligatures. In applying these, the foal must be placed on its back, and care taken to have the bowel contents of the rupture returned to the abdomen. The skio forming the pouch or sac should then be grasped by the hand and drawn out as far as possible from the body, and the clamps or ligature fixed tightly and securely over the skin, close up against the oval ring or opening. The clamps or ligatures are then allowed to remain in position until they slough and fall off together with the imprisoned skio and tissues.

OVERHEATING HORSES

Where horses become overheated at work and show signs of suffering put them in the shade of a building or bluff in preference to the stable. Remove the harness and sponge the head and body with cold water. Give cold water to drink. If the horse will not drink wash the inside of the mouth with it and if a syringe is available inject cold water into the rectum. Prevention is very much better than curing the trouble after it occurs. Horses just like men, require plenty of water in hot weather. The hotter the day the more water the horse requires. The teamster probably

demands a drink every hour or so but does not seem to realize that a horse working much harder and in the burning heat craves the same thing. His stomach is small, which is not capable of holding any large volume. He perspires freely and the water consumed in the morning or at noon is not sufficient. You will find that if your horse is watered at night, whether it be from a barrel drawn to the field and placed in the shade or a bluff, if there is one, or by other means, he will be less liable to the effects of the heat.

PNEUMONIA

Symptoms: High temperature, chills, loss of appetite, dilated nostrils, quickened respirations, hot breath, accelerated pulse, cough, rusty discharge from nostrils.

Treatment should be given as follows: Place the patient in a clean and comfortable box stall. Although the animal will not lie down for any length of time, the stall should be well bedded with clean straw. A strong mustard plaster should be applied to the sides, and the body covered with warm blankets. The legs should be well hand-rubbed and bandaged; bandages to be removed and hand-rubbing repeated twice a day. Good light and plenty of fresh air should be admitted, although care must be taken not to expose the animal to a draft. Medicine should be given in drinking water or soft food, or injected into the mouth with a syringe, but in no case should forcible administration be attempted. A tablespoonful of salt-peter may be given two or three times a day in the drinking water, together with two or three ounces of whisky or liquor acetate of ammonia. This food should be a little scalded bran and oats and fresh, clean hay or green feed. Only a little food should be given at a time, and if refused by the patient, immediately removed. Soft food allowed to remain in the feed box until it becomes sour will do much to destroy the patient's appetite. Cold water is very gratifying to the patient and should be offered at short intervals. Good nursing is very important in such cases.

PIN WORMS

To get rid of pin worms in a horse give from one to two ounces of turpentine in a pint of raw linseed oil, as a drench, repeated once a week as may be required, to expel all of the worms. In addition, injections into the rectum should be given each morning, consisting of warm salt water containing about four tablespoonfuls of salt to each quart of water. Bran mash should also be fed regularly and a little salt added to the mash. For a tonic, mix together one ounce of powdered nux vomica, four ounces each of powdered gentian and bicarbonate of soda, and give a tablespoonful at the feed night and morning.

POWDER FOR WORMS

Where horses are troubled with ordinary white worms and as a result are dull, sleepy and shaggy in the coat give a powder consisting of powdered sulphate of iron 2 ounces, powdered sulphate of copper 2 ounces, ground gentian root 4 ounces, powdered nux vomica 2 ounces, in doses of one tablespoonful each morning and evening in soft food. After giving the last powder, leave the horse without hay over night and administer raw linseed oil 1½ pints, turpentine 2 ounces, as a drench the next morning. Do not boil grain, but give the powder in oats and bran which has been scalded with boiling water and allowed to steam until cool enough to feed.

REMEDIES FOR SORE SHOULDERS

Certain remedies should be kept in the stable for use in case sores start on the necks, shoulders or backs of the horses. The first of these remedies should be common salt. One teaspoonful to a pint of cold water should be used on shoulders or necks threatened with inflammation or abrasion. If sores start, or the skin is seen to be inflamed and irritable, use a lotion composed of half a ounce of tannic acid to the half gallon of water, or of alum, one ounce, sugar of lead, one ounce, soft water, two quarts. In extra bad cases may be combined sugar of lead one ounce, sulphate of zinc six drams, carbolic acid one dram, and soft water one pint to make what is known as "white lotion." This is fine for shallow sores and wounds of all sorts. Label the bottle "poison" and shake the mixture well before use. Keep it out of the way of children, and

that is a safe rule as regards all medicines. For swellings, use a mixture of two parts of tincture of Iodine and six parts of extract of witch hazel, painted on twice daily.

In taking care of the shoulders there is nothing better than removing the harness and collar and sponging the shoulders with the salt and water. Use it three times a day, especially in the spring, and on colts new to work. It helps to harden up the shoulders and checks blistering or scalding. After using salt water and having the collar clean and dry, dust its bearing surfaces well with talcum powder or fine slack lime.

On sores that have become too severe to soothe or heal by simple means, it is necessary to use a "gall ointment." A home-made ointment may be mixed as follows: One dram each of iodolorm, tannic acid and boric acid rubbed up in an ounce of lanolin. That is better than lard or vasoline for ointment making. It is the fat of sheep's wool and is readily absorbed. The saliva also will be found suitable and effective for sores that form under the saddle or breeching strap. The sores that form on the backbone of a very thin horse cannot be cured by use of medicine alone. The horse should be worked less hard, generously fed and the haive pads so adjusted to the harness that it cannot rub upon the galled places.

There are several different sorts of sores of the shoulder and all of them due to one form or another of bruising or rubbing by the collar. The ones mentioned have been simple abrasions of the skin. Next comes that form of sore in which there is a hairy lump with a red sore in its centre. This has become invaded by a fungus known as the botryomycosis and the best treatment is to cut it out and treat it as a common wound.

That brings us to the third condition due to bruise. A large, hot, hard, very sensitive lump forms under the collar and the owner seeks to remove it by all sorts of treatment, often including blistering. Pus is present deep down in the tissues, under the elevator humeri muscle, and should be located and liberated. Treatment then consists in injecting a little tincture of iodine and then packing the cavity full of oakum saturated with equal parts of turpentine and raw linseed oil and leaving a tag of the oakum hanging out of the wound to serve as a drain. The dressing has to be renewed once daily until it is found no longer possible to work pecking into the cavity. A similar enlargement sometimes results from bruising, but is found to be merely skin deep, a collection of serum having formed. This is a serious sac, cyst or abscess, and is not hard or sore. It should not be opened, common erroneous treatment to the contrary. Nature may re-absorb the fluid if the horse is retired from work and the blubbing treatment given: Three or four times a day bathe the part with a lotion composed of one pint each of vinegar and water and one ounce of sulphate of zinc.

RINGBONES

These are bony enlargements around the coronet (the part of the hoof where the horn joins the skin). The disease is partly hereditary or at least the tendency is inherited. It may be prevented by the use of well balanced rations and care in trimming the hoofs of young colts so that the foot is always balanced. Proper shoeing may also help. It may be relieved by the use of blisters (See Blisters). If none of these remedies bring relief a veterinary surgeon may be employed to sever the nerve. This will remedy the lameness but will not cure ringbone.

ROARS

Roaring in the horse is caused by paralysis of the muscles of the larynx or throat. When roared becomes confirmed, medical treatment is entirely useless. At the outset of the trouble benefit might possibly be derived from blistering the throat and administering powdered nux vomica in teaspoonful doses twice daily in soft food. A cure may sometimes be effected by an operation, but the operation is a delicate one, requiring the skill of a qualified veterinarian.

SIDEBONES

This disease results from the lateral cartilage of the foot ossifying (turning hard and bony). It is common

in the heavier classes of horses. Treatment is largely preventive. Horses with sidebones should not be bred. There is no remedy that will cure the disease.

SORE NECK IN HORSES

The most usual cause of sores forming on the back of the neck is an ill-fitting collar. A collar either too small or too large will irritate the neck and cause soreness. Use a zinc pad in the top of the collar. These may be procured from any harness dealer or hardware merchant. Apply the following lotion twice a day: Sugar of lead, 1 ounce; sulphate of zinc, 6 drams; carbolic acid, 4 drams; water, 1 quart. Shake well before using.

SPASMODIC COLIC

This disease is usually due to excessive drinking water or eating indigestible food.

Symptoms: Begins suddenly. Horse stops, stamps, looks at his side, paws lies down, gets up. Follows a period of ease then another attack.

Treatment: Drench composed of 1 ounce of sulphuric ether, 1 ounce of tincture of opium (laudanum) $\frac{1}{2}$ ounce tincture of ginger and 1 dram tincture capsicum in 2 pints of water. Repeat this dose in one hour. Give afterwards 1 quart raw linseed oil and reduce the food supply for the next 24 hours.

FLATULENT COLIC

Sudden changes of food, too long fasting or the eating of excessive quantities of food after exhaustion are the common causes.

Symptoms: Horse is dull, paws a little, pain appears continuous. Abdomen swells (bloats). Characteristic symptom is the accumulation of gas in intestines. Symptoms develop less rapidly than in spasmodic colic treatment: Chloral hydrate as a drench, 1 ounce doses in a pint of water every 2 or 3 hours. Home remedies: 1 quart strong red pepper tea warm, followed in an hour by a pint of raw linseed oil. A teaspoonful of haking soda in a pint of whiskey, repeated in an hour if necessary. An ounce of charcoal every hour until relieved.

SPAVINS

Spavins usually are due to strains or bruises. A bone spavin greatly interferes with the usefulness of a horse and is a serious unsoundness. Blistering, the use of liniments or firing are the usual remedies. Bone spavin may be detected by the characteristic lameness. The foot is picked up and held with the hock flexed for a few minutes. The foot is then dropped and the animal moved off at a brisk trot. If the lameness is marked the presence of a bone spavin is indicated. Bog spavin is a soft swelling on the front and inside of the hock. The use of blisters and strong liniments is recommended (see Blisters and Liniments). Give the horse rest in pasture. Spavin cannot be permanently cured but the lameness may be remedied.

SPLINTS

If the splints are not situated too close to the knee they can be cured, unless they are of the type known as pegged splint, which affects both sides of the same limb and may interfere with the free play of the tendons. Curing of the splint, however, does not necessarily entail the complete removal of the enlargement, which is bony, and may remain after the inflammatory action has subsided and lameness has disappeared. The enlargement sometimes becomes absorbed in later life. If the mare is not lame we would not recommend interference of any kind, but if lame, she should be left at rest and the enlargement blistered with biniodide of mercury, 2 drams; vaseline 1 ounce. Tie the bead to prevent her hitting the part and wash the blister off after 48 hours, when the head may be let down. Apply fresh lard every second day until healed.

STERILITY IN STALLIONS

The most common causes of partial or complete sterility in stallions are excessive service, lack of exercise, improper feeding, masturbation, fevers (as influenza), etc. It is possible that a stallion may have been so abused in early life that his sexual powers cannot be restored. In proper care and management from now on lies the only hope of improvement in such cases. Constant idleness cannot be too strongly

condemned. He should have regular work in harness—not abuse—but daily working exercise between breeding seasons, and even during the season unless travelling a regular route. The diet should be nourishing, clean, sound oats and bran or crushed oats and bran. Oats is preferable to any other grain feed. Bran should be fed at all times, but more liberally during the winter months. Hay should be of good quality and free from dust or mold. Good prairie hay is preferable to timothy, and alfalfa or clover would be better than either. Do not feed straw. Give free access to salt at all times, and in the breeding season add a teaspoonful to each night feed. Give an occasional scalded feed of bran and oats to which a little boiled flaxseed may be added. When the breeding season starts in no case should he be permitted to serve more than two mares a day, and a larger percentage of foals may be expected if he is allowed to serve only one. In short, the important features of good stallion management are—regular working exercise, intelligent feeding, thorough grooming and moderate service.

STOCKED LEGS

Swelling or stocking of the legs is not unusual among horses of the heavier breeds. The condition is caused by lack of proper elimination of waste products through the ordinary channels, viz., bowels, kidneys and skin. The remedy lies in restoring the activity of these organs. To this end it may be advisable to clip the body, particularly if the coat is unusually heavy, to render proper grooming less difficult. A more laxative diet (giving an occasional feed of scalded bran and oats to which a little boiled flaxseed may be added) will aid in restoring the proper function of the bowels. Regular exercise is necessary to maintain the normal activity of the organs of elimination. Horses that have been clipped should be clothed to protect them from cold. The following alterative powder will be of benefit: Sulphate of soda, 8 ozs., saltpetre, 4 ozs., powdered sulphate of iron, 2 ozs., powdered nux vomica 2 ozs. Mix. Give one tablespoonful once or twice a day in soft food. The legs may be bandaged and bandaged after exercise.

STRINGHALT

Violent cases of stringhalt have sometimes been cured at the outset by the administration of a dram each of iodide of iron and powdered nux vomica given in soft feed once a day for two weeks. Nux vomica should not be given to a pregnant mare. Fowler's solution of arsenic has also been employed with benefit in dealing with this disease. Usually, however, the patient fails to improve despite all treatment, the symptoms generally increasing with age. As a rule, cold weather aggravates the trouble. The cause of this condition is not clearly understood, but if associated with disease of the hock joint the symptoms sometimes pass away after recovery of the hock affection. The operation of tenectomy has also given relief, but should not be attempted by anyone but a qualified surgeon. It is considered to be hereditary.

SUNSTROKE

In cases of this disease the animal suddenly stops, droops his head, staggers and falls to the ground unconscious. The breathing is noisy and the pulse slow and irregular. The temperature may rise to 107 or 109 degrees Fsb. Ice or cold water should be applied to the head and spinal cord and whiskey given in six ounce doses with half an ounce of carbonate of ammonia. Keep the animal in a cool place in the shade.

SWAMP FEVER

While considerable investigational work has been carried on in connection with this disease in recent years, comparatively little progress has been made in regard to preventive and curative measures. The cause is said to be an invisible filterable virus which circulates in the blood of affected horses. It has been definitely established that the blood from a diseased animal when injected into a healthy one will produce the disease. It is sometimes difficult to diagnose this condition at the outset, but repeated attacks of fever, accompanied by diminished vigor, together with a growing pallor or rustiness of the visible mucous membranes, leaves no doubt as to the true nature of the affection.

Many remedies have been employed in the treatment of this condition, but up to date the results have been most unsatisfactory. Some observers speak of the mortality as being 75 per cent, implying that recoveries may occur, but the writer has never known a typical case of pernicious anaemia to make a permanent recovery, and is of the opinion that reputed cures are in reality errors in diagnosis.

It is a remarkable fact, however, that the progress of the disease in some cases may be so slow that death does not take place until one and a half or two years after the first signs of trouble. In such cases each attack of fever leaves the animal slightly weaker and more anaemic. In the later stages dropsical swellings appear under the belly and in the head, and the gut becomes weak and staggering. While the appetite may be impaired when the fever is at its height the horse usually eats well until shortly before death.

On general principles, it is advisable to keep affected subjects separated from healthy horses, to disinfect the stables where affected animals have been housed and to burn all litter, as the causative agent may be present in the urine. The disease is supposed to be more prevalent in low-lying and swampy districts, hence the name swamp fever. Use nux vomica and iroa powder and also give Donovan's solution of arsenic in one ounce doses twice daily in drinking water.

SWEENEY

The condition known as sweeney is the result of atrophy (wasting) of certain muscles of the shoulder. The typical case of sweeney generally occurs in a young horse unaccustomed to working in harness. From pulling awkwardly or from ill-fitting harness. The draft is unequally applied, the muscles are strained, and wasting follows. There are cases, however, in which a certain amount of atrophy of the shoulder muscles is observed in connection with disease of the forefeet. Some horses are naturally flat and lean about the upper part of the shoulder. Typical cases of sweeney or shoulder slip may be treated by applying a blister composed of pulverized cantharides, 4 drams; vaseline, 2 ounces. The blister may be repeated every six weeks until the muscles are restored. In cases of slight wasting unaccompanied by lameness we would not recommend interference of any kind.

SWELLED ITCHING LEGS

Owing to their sluggish temperament, heavy horses are more liable to suffer from swelled legs than the lighter and more active breeds. Coarse-grained animals lacking in what is known as "quality," unless carefully fed and regularly exercised, are particularly inclined to stock in the legs, and after the condition has recurred two or three times the thickening becomes more or less permanent. The best means of combating this condition is to feed rather sparingly on wholesome and nutritious diet and to keep the bowels in good condition by an occasional soft feed. Table-spoonful doses of the following powder will increase the activity of the kidneys and also act as a general tonic: Glauber's salt, ½-lb.; saltpetre, powdered sulphate of iron and gentian, of each ½-lb. Regular exercise is important and hand-rubbing and bandaging of the legs will increase the activity of the absorbent system. Small doses of saltpetre or raw linseed oil will not injure a pregnant mare. Itching of the legs can be arrested by the application of a mixture consisting of sulphur, 1 ounce; oil of tar, 1 ounce; and raw linseed oil, 1 pint.

SWELLING UNDER THE BELLY

This condition in horses is due to a vitiated condition of the blood, although swelling of the sheath may also be the result of filth, in which case it should be thoroughly washed out with warm water and caustic soap. Feed on a laxative and nourishing diet, and give a table-spoonful of the following powder each morning and evening. In soft food: saltpetre 3 ozs., powdered sulphate of iron 3 ozs., ground gentian 3 ozs., powdered nux vomica 2 ozs. If horse appears to feel well, turn him out regularly during the day.

THRUSH

Thrush is a disease of the soft, fatty, frog; and is characterized by a foul smelling discharge from the cleft of the horny frog. Commence treatment by first

soaking the mare's feet for twelve hours in a soak tub containing a warm solution of bluestone, then with a paring hoof knife remove all filthy disease portions of the frog, and pick the clefts of the frogs with calomel. To keep the feet clean, apply a good wad of oakum to the sole of the foot and keep in place with a canvas bandage. Apply the calomel every other day, but first wash the parts with the bluestone solution. It takes from three weeks to a month to effect a cure.

WARTS ON HORSES' LIPS

Small warts on the lips of colts often disappear without treatment of any kind. They may be clipped off with sharp scissors or twisted off with forceps, and the spots touched once a day with bluestone or lunar caustic, until all unhealthy tissue is destroyed.

WIND PUFFS ON LEGS

For the satisfactory treatment of wind puffs, the horse should preferably be laid off work for a time. To reduce the puffy swelling about the best preparation is iodine liniment. This is rubbed well into the enlarged parts every day for a few weeks, or as long as may be required. Pressure bandages applied around the fetlocks are also beneficial. Sometimes several months' treatment is necessary before showing of improvement.

WORMS IN HORSES

Blood sucking worms known technically as sclerostomes are quite common in some sections of the west and cause a considerable mortality among horses. In fact, many cases reported as swamp fever are, in reality, caused by the destructive effects of these parasites. The best treatment so far tried is large repeated doses of turpentine and creolin. A table-spoonful of creolin should be given every evening as a drench in a pint of milk, and in the morning, before feeding, two or three spoonfuls of turpentine should be given in a pint of milk. This treatment is repeated morning and evening for a week, and a pint of raw linseed oil is then given to clean out the bowels. The treatment is then continued for another week, if necessary. The above dose of creolin and turpentine is that used for the average sized horse. Colts may receive a little less and large heavy horses a little more.

WOUNDS

Too little attention is given to the treatment of wounds in farm animals, particularly in horses. It should be remembered that various diseases, especially lockjaw, may be contracted through fresh wounds and there is always some danger of blood poisoning. Moreover, even shallow wounds may become exceedingly sore and cause a great amount of pain and worry to the horse. Where cut surfaces are kept perfectly clean, the wound heals without the formation of pus. Under ordinary circumstances, however, this is impossible with farm animals. Nevertheless, whenever an animal receives a wound, an effort should be made to treat it so as to at least prevent the development of dangerous bacteria. For this purpose corrosive sublimate may be used at the rate of one part in a thousand parts of water; or a 1 per cent. solution of carbolic acid, a 2 per cent. solution of lysol, formalin or creolin. If the wound is so situated that it cannot be conveniently bandaged, it may be well to keep the surface covered with iodoform or some other dry antiseptic. Attention should also be given to wounds to keep flies from depositing their eggs in such places.

The first step in treating a wound is to stop bleeding. Bathing with hot water (115 to 120 degrees) is a satisfactory method of controlling bleeding from small blood vessels. If large blood vessels are severed torsion or ligation should be practiced. Pressure over the surface of the wound is a convenient method of controlling bleeding in most cases.

The next step is the preparation of the wound for healing. Foreign bodies such as hair, dirt, slivers of wood and nails should be removed by washing. After treatment consists in keeping the animal quiet and preventing it from biting, licking or nibbling the injury. It is advisable to keep the animal in a clean stall until healing is well advanced. Wounds should be kept clean by washing twice daily with an antiseptic wash that is non-irritating. After the wound shows signs of healing longer intervals should elapse between treatments. Unhealthy granulations may be kept down by applying caustic occasionally.

DISEASES OF CATTLE

ABORTION IN COWS

When cows abort the womb should be flushed regularly with an antiseptic solution and the discharge should entirely cease before the cow is bred again. To prevent the possibility of infection being conveyed to healthy cows by the bull it would be necessary to thoroughly disinfect the genitals after service. First clip the tuft of long hair from the opening of the sheath then irrigate the sheath thoroughly with an antiseptic solution, such as 1 per cent carbolic acid or 1 part of permanganate of potash to 1000 parts of water. Use solutions warm. This can be easily accomplished with an ordinary fountain syringe or a rubber tube with a funnel attached to one end. The tube should be inserted into the sheath and the foreskin held with the fingers to prevent the immediate escape of the fluid. Pour in sufficient fluid to fill the preputial sac. In addition to this the skin of the belly and inside the thighs should be sponged with the antiseptic. This disinfection should precede the service of a healthy cow.

BLACKLEG

This is a highly infectious disease affecting cattle from 6 months to 2 years of age. Affected animals become dull and show a high fever. Lameness and stiffness of the legs takes place and death occurs within one and a half days after the appearance of the first symptoms. Blackleg may be readily distinguished by the presence of gas under the skin of the shoulder and the crackling sound heard when the shoulder is rubbed. There is no remedy. Affected animals never recover. The use of vaccine every six months is an effective means of preventing blackleg. It renders animals immune.

BLOAT

In mild cases place a large stick or rope through the mouth and tie back to the horns. Walk the animal about slowly. If carefully done, a piece of small hose may be passed down into the stomach permitting the gas to escape. If the case is a severe one, the best way is to puncture the animal and let the gas escape. This may be done with a trocar and canula, or with a knife. Often quick action is necessary and only a pocket knife is available, in which case it should be used without hesitation. The puncture should be made on the left side between the hip and the first rib. The wound made should be washed daily with a disinfectant and treated with vasoline. Bloating can usually be prevented by allowing the cattle to partly fill up on other grass or dry feed before turning them into alfalfa or good pastures, until they become accustomed to it. It is best to keep them on it only a short time for the first few days, and that after the dew is off. Though great care is taken, it is liable to occur at times.

BLOODY MILK

Bloody milk is generally a sequel of inflammatory trouble of the udder. Milk of this kind should not be used for food, nor should it be milked out on the stable floor, as it frequently contains the causative agent of mastitis and disease may be thus conveyed to healthy cows. Bloody milk is the result of disease of the udder. Extensively diseased udders are very difficult to treat successfully and the owner generally saves himself considerable annoyance, time and money, by fattening the animal for beef. While the case may appear to make a complete recovery, when the cow freshens again you are likely to have a return of the same condition, as animals suffering from serious udder troubles seldom again become satisfactory milk producers. Milk from diseased udders is unsafe for food, and as the disease is frequently contagious, there is always a danger of other cows becoming infected. In a bad case it is best to dry up and fatten for beef.

CAKED UDDER IN COWS

If the udder is inflamed after calving it should be bathed frequently with water as hot as the hand can bear. After drying thoroughly the application of camphorated oil will be of benefit. The udder should also be supported by a broad bandage (having holes for the teats) tied up over the back. As to medicinal treatment one ounce of Epsom salts combined with half an ounce of saltpetre may be given twice daily in bran mash. This later will clear her system out and give

nature a chance to rectify the condition of the udder. The most simple and perhaps the best treatment is to bathe the udder from fifteen to twenty minutes with hot water (as hot as can be endured by the hand) two or three times daily and wipe it thoroughly dry each time. A little acetate of lead may be added to the water. Dissolve 1 part gum camphor in 10 parts of lard and rub in well. Keep the udder well milked out and feed her a laxative ration. If the cow is on grass no special laxative feed would be needed.

CALVING A COW

A large box stall, well bedded, is the best place to calve a cow in cool weather and a small grass lot with shade is good in summer. After she is placed in the box stall, she should be seen at least three or four times each day, because of the assistance which may be needed. If the calf does not come properly and the cow is permitted to strain for many hours, she becomes weak, the parts become swollen and serious results may follow. A little assistance just at the right time may save both cow and calf. It is not possible to describe here all the difficulties which may arise. The front legs of the calf should appear first, followed by the nose lying on top of the legs. When in this position, there is usually no difficulty unless the calf is large. If the cow strains for one hour or more and nothing appears, or if only one foot appears, or if the head does not appear, examination should be made. If one leg or the head is turned back, the calf should be pushed back and the head or leg straightened. If this cannot be done, a veterinarian should be called at once. It is possible for the calf to start in almost any position and there is nearly always difficulty unless the natural position is taken. If there is still difficulty after the calf has started right, the cow may be assisted by pulling strongly but gently on the legs as the cow strains. Care must be taken to not tear the parts. After the calf is born, the cow should clean in a short time. If the afterbirth remains one day, it is apt to remain until removed. This should be done by the end of the second day. Some breeders recommend leaving the afterbirth until it is absorbed or comes away as a discharge. Disinfectants are injected daily in such cases. When the hand is inserted to remove the calf or afterbirth, great care must be taken not to injure the surrounding tissues. The extended part of the afterbirth may be twisted about a stick and pulled gently while the hand is inserted and worked about the remaining portion, carefully loosening it from the wall of the uterus. Before attempting any of these operations, it is necessary to disinfect the hand and arm. This is best done by washing thoroughly with soap in warm water; then washing in a disinfecting solution and oiling well with carbolized vasoline or linseed oil, which has been hoiled and kept in a closed vessel. Lard heated hot enough to kill all germs may be used. After the operation, the hands and arm should be thoroughly washed and disinfected again; since there is always some danger to the person of blood poisoning where the after-birth has remained for some time. If germs are carried into the cow on a dirty hand, they may cause her death. If there is a foul discharge from the cow after she has been fresh for several days, she should be washed out until the discharge disappears. Boiled water should be used in mixing the disinfectants for this purpose. It must not be forgotten that, in all of the above operations, the strictest cleanliness must be exercised. After the calf is born, look well to the feeding of the cow. Continue the laxative feeds and do not bring her up to heavy feeding before a week has elapsed. If at that time all is well, she may be given gradually a more abundant ration. Before the calf is born, the udder may be rubbed with vasoline or lard to keep it soft and, in rare cases, it may be necessary to milk out a portion of the milk. If milking is started, it must be kept up.

CASTRATING CALVES AND BULLS

The best instrument in use for castrating animals of all kinds is the emasculator which is so constructed that while severing the cord it crushes the end of the artery in a manner which favors the formation of a clot and thus prevents bleeding. Calves should be castrated under three weeks of age, at which time the operation is very simple and the risk of loss slight. Many people

make a practice in castrating young calves of pulling out the cord. In doing so it is well to scrape it a little just above the testicle and give it a couple of twists before pulling. The animal should always be carefully examined to see that no rupture or other abnormal condition exists. In castrating animals over four months of age the emasculator should be used, and in the case of old bulls be permitted to remain on the end of the cord for a full minute before opening the instrument. This will greatly lessen the danger of hemorrhage. To prevent possible infection after the operation the animal should be placed in a clean, well-bedded stall or in warm weather turned on the grass. Mature animals should be kept at rest for twelve hours to avoid the risk of secondary hemorrhage. There are other methods of operating, such as with ligature and with clamps, but these need not be mentioned here. Bulls affected with scrotal rupture require to be castrated by the covered operation which should not be undertaken by an inexperienced person.

The best time of year for castrating all animals is during the warm weather of early summer, say from May 20th to June 20. Calves, pigs and lambs, however, should be castrated at an early age (from two to four weeks old) regardless of the time of year. If weather is cold or raw they should be kept in clean, comfortable quarters until healed. It is conceded by authorities on the subject that the best age at which to castrate is one year. The most suitable instrument now used for such a purpose is the emasculator, which is so constructed that in removing the testicle the severed end of the cord is crushed in a manner which prevents bleeding. No animals should be operated upon while suffering from indisposition or sickness of any kind, particularly colds, strangles or influenza. To avoid the danger of infection stables should be as clean and sanitary as possible, and instruments should be thoroughly washed and immersed in a five per cent solution of carbolic acid each time before being used. When ready to operate take the animal out of the stable and examine him carefully for evidence of rupture or abnormality of any kind. Having satisfied yourself as to his condition cast and secure him and wash the scrotum with an antiseptic such as a three per cent solution of carbolic acid. Then grasping the testicle between the fingers and thumb of the left hand make an incision parallel to and about half an inch from the median line. Having cut through the skin make an incision in the covering of the testicle permitting it to pop out. When the animal has ceased struggling and the cord is relaxed apply the emasculator far enough up so that the end of the cord will not hang down between the lips of the wound when the animal gets up. Close the instrument gently and firmly and do not remove it too quickly. In the case of adult animals the instrument should not be opened for a full minute. Having finished the operation and permitted the animal to regain his feet he should be tied and left at rest for a few hours before being turned out. At nights or rainy days keep in a clean, well-bedded stall and turn out for exercise on fine days. No after-treatment is required. The older the animal, the greater the risk from this operation. The law governing the practice of veterinary medicine and surgery makes an exception for castration and any person may castrate animals and make a charge for same providing he does not represent himself to be a veterinarian. Where the services of a professional man are available, however, stock-owners would be well advised in employing a veterinarian to castrate colts as he will be equipped with the proper instruments.

COW POX

Cow pox is a contagious affection of the udder which may be conveyed from cow to cow by the hands of the milker. The teats should be handled as gently as possible in milking, and in persistent cases it may be necessary to make use of a milk tube. The duration of the disease is usually about three weeks. To check the propagation of the germ the teats should be washed frequently with a solution of hyposulphite of soda—an ounce to a pint of water. If this fails, try washing the sores twice daily with a 2½ per cent solution of zinc chloride. Internal remedies are seldom necessary.

COWS CHEWING STICKS AND BONES

When cows chew sticks and bones they suffer from a disease called pica. This condition is more prevalent

some years than others, and generally affects animals pastured on low swampy lands. It occasionally happens however that one animal in a herd is affected although all are fed alike. An effort should be made to supply the cow with sound, wholesome food, and a heaping tablespoonful of the following powder should be given three times a day: finely ground bone or bone flour 1 pound, carbonate of iron 4 ounces, common salt 8 ounces, powdered fenugreek 4 ounces, mix thoroughly. In addition to this mix three table spoonfuls of powdered charcoal with soft feed three times a day. A piece of rock salt should be placed in the manger where the animal can lick it at will.

COWS FAIL TO BREED

Sterility in cows may be the result of various causes the most common of which is contagious abortion, a disease frequently followed by changes in the ovaries which interfere with the natural liberation of ova. Very fat and highly fed cows sometimes escape conception. Excess of sexual desire is also a cause of barrenness. If the heat period recurs frequently or lasts unusually long, or if the sexual desire seems to be particularly intense, shut her up for a couple of days and then breed her just before the period passes off. If convenient try having her served two or three times in the same heat period. Feeding on smutty fodder or ergoted grasses is also a cause of sterility. If a cow does not conceive after giving her a fair trial then see her for beef because she is taking the place of a cow that would bring you a calf every year.

DEHORNING CALVES

The best method of preventing the growth of horns on young calves is by the application of caustic potash. The calf should be treated not later than one week after birth, preferably when it is from three to five days old. The hair should be clipped close over the horn core, covering a space the size of a ten-cent piece. Smear a little vaseline or lard around the edge of this spot to prevent the caustic from spreading. The caustic potash should be wrapped in paper, leaving one end exposed. Having moistened it with water, apply by pressing it firmly against the skin with a rotary motion for a few seconds. Apply to the opposite side, then repeat the process two or three times. Should any caustic accidentally get on the operator or in the calf's eyes it should be fully washed off at once.

DEHORNING MATURE CATTLE

The animal should be well secured in a dehorning shoot or otherwise. A dehorning chute should be built of plank with a strong frame well bolted together, with stanchion and nose block for confining the head. A meat saw or dehorning shears should be used to remove the horns. The horn should be cut off at a point from one-quarter to one-half inch below the hair line or skin. If this is not done an irregular horn growth or stub will develop. It is not customary to apply anything to the wound. If bleeding is severe a piece of absorbent cotton may be spread over the wound and pushed into the opening to keep it in place; pine tar being smeared over this dressing if at hand. Dehorning should not be practiced in warm weather. Spring or early fall are the best seasons.

DIRECTIONS FOR BRANDING

The branding of cattle is such a simple operation as to need very little elaboration in the way of explanation or instruction. The difficult part of the operation is usually to catch and hold the animal. Under the modern method of branding, the animal is held with a "mash" or chute with movable sides. This method is faster, and easier on the animals than the roping process. The essential point in regard to branding irons is that the design be simple and the iron large. Small complicated designs are easily hurried out, and even if they are put on correctly, long hair soon covers them over so they cannot be read. A good brand must, above all things, be legible. If the iron be large and simple and properly applied, the brand should be legible all the year round. The actual size will depend on various things, but in general each letter, if letters are used, should be four or five inches high. The stock of which the brand is made should be from one-quarter to three-eighths across the face. The depth of

the stock is not so important, but if it is an inch or more, the heat will be retained better. Copper is by far the best material for making irons, since it holds the heat much better than iron. It is expensive, however, and if the heating facilities are good and the branding not carried on with extreme rapidity, iron will answer as well, or for rapid work several iron brands may be used. For heating the iron, a large hand forge is the best, but they are not always readily available. Old stoves are sometimes used, and quite successfully. The common method, however, is the open bonfire, which does very well, but is troublesome and takes a lot of good, dry wood.

The temperature of the iron has much to do with making a permanent brand. Long-haired cattle require a much hotter iron than short-haired cattle. In all cases the iron must be hot enough to make a good blister everywhere it touches, which usually means a good red. There is very little danger of having the iron too hot, but much danger of not having it hot enough. The injury to the animal may be greater with the moderately hot iron, since it is often held to the skin for some time, and although the skin may not be much affected, the heat has time to penetrate to the tender tissue beneath and do more damage and cause the animal more suffering than if the skin were burned to a crisp by the almost instantaneous application of white-hot iron. This same principle is well illustrated in horse-shoeing. Veterinarians know that serious injury to a horse's foot seldom comes from the application of a red-hot shoe, for the scorching warns the shoer to take it away, but the serious injury comes when the shoe is not quite hot enough to scorch and is therefore left in contact with the foot long enough for the heat to penetrate into the tender tissues below, thus producing serious and lasting injury. With horses, the brand is applied almost instantly, but with cattle the iron must be held to the skin for a moment since it takes a little time for the hair to burn through. If the iron is very hot, however, the work is performed as soon as the iron strikes through the hair.

The common locations for the brand are the hips, thighs, sides and shoulders. Of these, the hips and side are by far the best. Between the two, the preference is for the hips. When animals are running out in the open, a brand on the side can be more easily seen; but when crowded together in a corral or cutting pen, the hip brand is more convenient. If the brand is placed on the side it must be well up toward the backbone, for otherwise it cannot be seen when the animals are crowded. A larger brand can be placed on the side than on the hip, although a brand larger than can be put on the hip is seldom necessary. The shoulder presents an excellent surface on which to put a brand, but the animal must stand broadside towards you and there must be no other animals in the way or the brand cannot be seen. The thigh brand also cannot be seen when the animal is in a hunch.

FOOT ROT

Soreness of the foot in cattle is caused by a crack coming between the toes. When the condition is first noticed the treatment is comparatively easy and consists in cleaning out the affected area and applying some antiseptic such as creolin or carbolic acid in weak solution (1 ounce to a pint of water). Some cases in the early stages will yield to the repeated applications of turpentine. Tincture of iodine is more effective, and in those cases which are somewhat difficult to heal, a mixture of powdered copper sulphate and pine tar can be smeared on a small piece of cloth and pressed into the diseased area and then held in place by a bandage passing between the toes and around the foot. Renew the treatment daily until cured.

GRUB IN CATTLE'S BACKS

Grubs in the backs of cattle, found in winter and spring are the larvae of the warble fly. The life history is as follows: During the summer months the fly deposits its eggs on the limbs or lower parts of the body, and the tiny grub, newly hatched from the egg, gains entrance to the body by penetrating directly through the skin. The larvae now wander extensively through the body tissues, being found towards fall in large numbers in the walls of the gullet. About the first of the year they arrive at their final location in the

body beneath the skin in the back, where they give rise to the well known swellings. During this later development of the grub it breathes through a small opening in the skin, through which it also finally makes its escape from the animal's body. By spring or early summer the grub forces its way through the opening and falls to the ground, into which it burrows and transforms into the pupal stage to emerge about a month later as a mature fly. During the latter winter months the backs of cattle should be examined carefully for the presence of warbles. The grubs can be forced out by pressing on either side of the lump. If any difficulty is encountered, the opening may be slightly enlarged with the point of a sharp knife. Care should be taken to crush all grubs removed in order to prevent their later development into flies. If this course could be followed in the case of all cattle, the fly would become extinct in one season, and warbles would be no more. This, of course, is not practicable.

HANDLING A BAD BULL

The best system of managing a vicious bull is to place him in a yard and handle him so that at no time is he given an opportunity to injure anyone. The yard fence should not be tight but should allow the bull to see what goes on about him. This tends to lessen the viciousness which seclusio frequently causes. The fence may be constructed of heavy lumber spaced apart so the bull can see out. Heavy woven wire nailed to strong posts set fairly close together, is most satisfactory. Either type of fence should be at least 6 feet high. It is possible to construct a breeding pen in connection with the bull lot that there is absolutely no danger in handling a bull, whether he is known to be vicious or not.

The following is a description of a yard used satisfactorily: A yard just large enough to back a cow into can be constructed in one corner of the bull's yard. This yard has two gates. The one behind the cow is hung from an overhead track similar to a sliding barn door. This gate is closed when the cow is backed in. The gate in front of her is closed and while one man holds the cow with a rope through the fence, the other opens the gate behind the cow so the bull can enter. After the service the bull can be whipped back out of the small yard so the gate can be closed, separating the cow from the bull, after which the cow is led out. The yard should be only slightly larger than the length of the cow, so when the bull backs off after the service, he will back out far enough so the gate can be closed between him and the cow.

INDIGESTION

The disease is indicated by lack of appetite, grunting, so cud and general unthriftiness. The cause is over-feeding, too much cold water, etc. Give an adult animal $1\frac{1}{2}$ pounds of Epsom salts, combined with $\frac{1}{2}$ -pound of common salt dissolved in two quarts of warm water. To this mixture add two or three tablespoonfuls of ginger. Shake well and administer as a drench. Keep the cow in the stable until the purgative has ceased to operate. Follow this treatment by tablespoonful doses of baking soda, given twice daily in bran mash.

LICE ON CATTLE

A good remedy to apply for lice is equal parts of kerosene and linseed oil, or kerosene and grease of any kind. These wet applications are not good in cold weather for cattle running outside, but are most effective in killing lice. Any of the coal tar dips for sale in the market—that is the dips ordinarily used for dipping sheep for ticks, may be used successfully against lice. The containers in which these dips come give directions for preparing the dip for lice. Another satisfactory treatment is kerosene emulsion. To make this dissolve one-half pound of hard soap in one gallon of boiling soft water. As soon as the soap is dissolved, add two gallons of kerosene. Stir briskly until a thick, creamy emulsion is formed from which the oil does not readily separate. Before using add the quantity thus prepared to 19 gallons of water. The emulsion may be applied with a spray pump or with a brush. The amount given above is about enough for 20 cows.

Diseases of Cattle

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LUMP JAW

For this disease give two teaspoonfuls of iodide of potassium dissolved in water twice daily as a drench. Continue the medicine for ten days or until the eyes commence to water. Repeat the treatment a month later if necessary.

RINGWORM IN CATTLE

Wash off the affected part with warm water and soap; then clip the hair around the edges of the diseased part. The affected part should then be painted daily with tincture of iodine. The iodine can be applied with a camel's hair brush or swabbed over the surface with a piece of absorbent cotton. The treatment should be continued until the part is completely healed. Another common remedy is sulphur ointment made by mixing one part of sulphur with eight parts of lard or vaseline.

ROPY MILK

Ropy milk is due to an organism which gains entrance to the milk from standing or stagnant water. Pastures having low places and stagnant pools in them are ideal for the multiplying and growth of the germs. These will adhere to the hair of the cow's legs and sides and fall off into the milk pail where they find conditions favorable for their further growth and dividing. Wherever possible it is advisable to fence off these low spots and keep the stock from them especially if any indications of the fermentation are present in the milk. If ropy milk germs once get started they are in some cases difficult to exterminate. It will be necessary to thoroughly scald and clean all utensils after each milking. It may be necessary to pasteurize the milk heating it to 145 degrees Fahrenheit, and maintaining that temperature for a half hour. Only a complete cleaning and whitewashing will eliminate the germs from the stable. Sunlight is the greatest germicide and its admission to every nook and corner of the stable and milk house, as well as its free play upon the milk utensils during the day, will do much to keep them clean and free from ropy milk germs.

SELF-SUCKING COWS

Self-sucking in cows and heifers is a hard habit to break. A remedy that we have seen used is to put a bull ring in the nose and baag a second ring from it. This is said to be effective. The second ring may be taken off after a time and the ring left in the nose. Ordinarily it is as well to dispose of a cow that develops this habit, but if you want to keep this one you might try the remedy suggested.

Other devices for stopping a cow from sucking herself are as follows: A piece of wood or iron is bent into the form of a horse collar, so shaped as to bring the ends nearly together. This is placed over the cow's neck just in front of the shoulders, with the open side down. Half way down on either side of this collar the end of a short rod is attached, the other end being securely fastened to rings in her halter. When she attempts to turn her head to such, these rods stop her.

Another plan is to put a head halter on the cow, also a surcingle just back of front legs, not very tight, in fact quite loose. Fasten an ordinary harness snap on one end of a stick about five feet long; a fork handle is about right size. When you turn the cow out, put stick between the front legs and through the surcingle snapping into the ring in the halter. She can eat, drink and do anything necessary except to lick or suck herself. When she lies down, the stick prevents her from sucking herself. Take it off when the cow is in the barn.

Putting a sack over the udder is also recommended. A surcingle is placed around the cow's body just back of her forelegs, a strap runs from this to and around the tail, the whole being similar to the usual back pad, back strap and crupper of a harness. Two half-inch straps are attached to the back strap just in front of the hips so as to cross diagonally, one end of each strap extending over the hip to the rear of the udder and the other straight down to the front quarter on the opposite side. A piece of canvas or grain sack is cut to proper size to cover the udder, each corner of which is attached to the ends of the half-inch straps by means of a ring and snap. The half-inch straps should have a buckle at the top, so they may be conveniently tightened up.

A bit in the mouth is said to be a sure cure for self-sucking. A straight bit in the cow's mouth, it is said, will not interfere with her eating but will prevent her from lapping the tongue around the teat. One who has tried this says: Fasten a common bit in the mouth by means of a halter headstall. Adjust it so it will not make the mouth sore and let her wear it continually. A right sized bit, properly adjusted, will not make the mouth sore and will break the cow of the sucking habit in from one to two months.

SORE EYES IN CATTLE

This is an infectious disease in which the eyes swell up and are sore and watery, the pupil turning white or yellowish. Some animals go blind from this disease. The disease is known as enzootic ophthalmia. It is a severe inflammation of the eyes, caused by some infectious principle, which has not been definitely ascertained as yet. Some claim that it is due to some fungus which develops under adverse conditions on some plants and during certain seasons. In any event, the disease only occurs during certain seasons in some districts and disappears as mysteriously as it came. Whenever its presence is noticed in a herd, the affected animals should be removed by themselves to prevent possible spread to the others. In treating the affected animals, they should be placed in a darkened shed or stable, as the light increases the irritation. The eyes should be bathed at least night and morning with a lotion of boracic acid, made by dissolving a spoonful of boracic acid in a pint of clean water. If the cattle require to be turned on pasture to feed, a piece of cheese cloth should be soaked in the boracic acid solution and fixed to the horns so as to hang down as a protective covering to shade the eyes. Where the eyes are treated as soon as they are first affected, the course of the disease is arrested, and the majority recover their sight. On the other hand, where treatment is neglected until the eyes become badly affected, a large percentage lose the sight of one or both eyes. The meat of the animal is not injurious, and they may be fattened for beef quite safely.

STERILITY IN COWS

Sterility in cows is generally the result of a cystic condition of the ovaries often found associated with the disease "contagious abortion." While it is possible such cases may recover spontaneously the only known treatment at this time is to break down the cysts by manipulation with the hand performed through the rectum. This operation requires considerable surgical skill and can only be performed by one thoroughly familiar with the anatomy of the parts. If you have reason to believe that any of your cows have ever been affected with contagious abortion or have come from herds so affected, it would be advisable to flush out the genital canal with a solution of potassium permanganate 1 to 1000 with lukewarm water, once a day for several days before breeding. Other causes of sterility are feeding on mouldy roughage or ergoted grasses. Very fat cows sometimes fail to conceive. You might try flushing the uterus out with a solution of bicarbonate of soda using one tablespoonful of the soda to a pail of luke-warm water. In doing this it is necessary to syphon the solution out of the womb by means of a catheter or tube.

TUBERCULOSIS

This is the most serious and widespread disease affecting cattle. The symptoms are difficult to recognize in the early stages, the first most noticeable symptom being a dry cough. The animal gradually loses flesh and various internal organs become affected. The only certain way to determine whether or not an animal is diseased is to apply the tuberculin test. This should be applied by a veterinary surgeon. There is no cure. The disease can be stamped out of a herd by testing with tuberculin and getting rid of the diseased animals. There is no medicinal treatment that is of any avail. Milk from diseased cows should not be used as it contains the germs of the disease and may set up infection in human beings. Diseased animals may be shipped to any government inspected abattoir where the carcass will be used if the meat is not affected or condemned if unfit for use. Cattle kept under sanitary conditions are less liable to become infected with tuberculosis than those which are main-

tained in filthy barns without proper light and ventilation. It is estimated that from 20 to 30 per cent of the cattle of this country are affected with tuberculosis. Wherever the disease is suspected to exist the tuberculin test should be applied and the diseased animals separated from the healthy.

WHITE SCOURS IN CALVES

White scours is a serious and highly fatal infectious disease of calves supposed to be due to a germ. The fact that its appearance is sometimes coincident with contagious abortion has convinced some observers that there exists a close relationship between the two diseases. This infection is so rapidly fatal that medicinal treatment offers little hope of success, and attention must be turned to preventive measures. If possible it is well to remove cows that are within two or three days of calving to a separate stable containing suitable stalls that have been most thoroughly disinfected with linn wash and creolin or carbolic acid in the proportion of one pound of disinfectant to three gallons of linn wash. The stalls should be well bedded with clean, fresh straw sprinkled with a 3 per cent solution of creolin or carbolic acid. As soon as calving sets in the tail and hindquarters of the cow should be thoroughly washed with a solution of carbolic acid, a tablespoonful to the quart. The foetal membranes and damp litter should be at once removed and burned and clean bedding supplied. The navel cord should be tied with a string that has been soaked in a carbolic solution and the stump of the cord saturated with tincture of iodine and dusted with boracic acid or slacked lime. Some smear the end of the cord with tar after treating with iodine. Calves seldom become affected after a week or two of age. The strictest of sanitary measures are necessary to prevent the disease in places never infected. Froth on separator skim milk may cause bloat or scours in calves. It is a good plan to carefully remove the froth to make sure that no harm will be done the calves.

YEAST CAKE TREATMENT FOR STERILITY

The use of a yeast cake has been recommended when cows cannot be got to calve. The treatment is as follows: Take an ordinary cake of yeast, and make it into a paste with a little warm water. Allow this to remain in a moderately warm place for twelve hours; then add one pint of lukewarm, freshly boiled water, mix and allow to stand for another twelve hours. Prepare this mixture twenty-four hours ahead of the time the cow is expected to come in heat, and inject it into her vagina the moment she is seen to be in heat. Breed her just when she is going out of heat. This treatment is not recognized by the veterinary profession.

TEAT TROUBLES IN COWS

Chapped teats are treated by washing the udder and teats in warm soft water to which a little disinfectant has been added and afterwards treating with a little vaseline or a salve made up from three parts of lard to one part of turpentine.

WIRE CUTS

Sore teats from hard wire cuts is another common ailment. Such a wound usually heals very slowly. This is due to the fact that every time the cow is milked, the wound is usually re-opened. The milker should make a special effort to allow the healing to continue. Mechanical milking is much easier on such a cow than is hand milking. When such a wound is cut, it should at once be thoroughly washed out with a disinfectant. Then apply a salve. One of the ordinary carbolic acid salves, vasoline and the turpentine salve, described above, are all suitable. Ordinary lubricating oil and ordinary axle grease has been used with success. They keep the germs and dirt away and protect the open sore from coming in direct contact with the air.

In some instances the cut is so deep as to cause the milk to flow through on the side of the teat. The raw wound may be healed, but it is difficult to get the parts to grow together so as to close the opening entirely while the cow is giving milk. If the cow does not give much milk, it is best to dry her up. In case that she cannot be dried up before the wound heals, the sore may be repaired after the cow dries up. This is done by recutting the skin next to the opening. A sterilized milking tube is inserted through the regular canal of

the teat. Then put rubber hands around the wound and teat just tight enough to hold the wound together. Be sure that the wound is thoroughly disinfected before the rubber bands draw it together. In a short time the opening will close together completely. Then the milking tube may be taken out. Leave the rubber hands on till the wound has completely grown together and there is no more danger of its separating.

STEPPING ON TEATS

The most serious and most painful teat wounds result from a cow's stepping on her own teats. This happens with cows having pendulous udders and long teats. It usually happens when a cow gets up in her stall after having laid down. At times one cow will step on another cow's teats. This usually occurs in the stall, especially where cows are crowded closely together in the barn.

When cows are thus crowded closely together and where there is no post or partition of any kind between the cows they are likely to injure each other's udders seriously. When cows are lying down in their stalls with their feet towards each other, one or both may stretch and push the hind feet against the udder of the cow lying next to her. A post or partition coming within a foot of the gutter prevents this danger, but adds to the inconvenience of milking.

Cow pox is another common cause of sore teats. This is contagious. The disease shows itself in numerous little water blisters on different parts of the teat. The disease is not serious, but causes considerable inconvenience to the milker and to the cow. The disease usually has to run its course. It lasts about ten days. The milker should be very careful not to carry the disease from one cow to another. He should carefully wash his hands in a disinfectant solution after milking affected cows. It is also a good plan to milk such cows last and thus avoid infecting those free from it.

The cow should be milked gently, so as not to rupture the little blisters until skin has formed underneath and they dry up of their own accord. Apply freely the vaseline or the turpentine and lard salve mentioned above.

Sore teats at times result from internal growths. Little lumps are formed on one side of the canal or opening in the teat. These at times become so serious as to completely obstruct the passage of the milk. If the trouble is not removed, the quarter itself will soon become swollen and sore. Sometimes such growths in the centre of the teat are very difficult to handle. About the best way to treat such a cow is to disinfect thoroughly a milking tube and insert it into the teat. Allow the tube to remain until the growth has ceased, and even until it has disappeared when the milking tube may be removed. The use of a teat slitter is not advisable except in case of necessity. Making an open wound internally simply makes additional trouble.

Another cause of sore teats is warts. These are especially troublesome if they are large and numerous. A good way to eliminate long warts is to take a thread soaked in a sterile solution and wrap it tightly around the base of the wart. In a short time the wart drops off. When this happens, the sore is entirely healed. The wart may be clipped off with a pair of sharp scissors, but this leaves a very tender sore on the teat. In case an open sore results, always apply a disinfectant and cover the wound with a salve.

Hard milking cows are objected to by most milkers. To some extent this condition may be improved by inserting a teat expander in the end of the teat. The same thing may be accomplished with a small, smooth, wooden plug crowded into the end of the teat and made to stretch the sphincter muscle. Whatever is inserted should be very thoroughly sterilized first. If the cow is not a desirable dairy animal, it is advisable to eliminate her from the herd. At least, it is not a good plan to perpetuate her blood and raise her heifer calves for future cows.

At times, and immediately after freshening, the opening of the teat is clogged. This is not serious, and may be remedied by inserting a sterile milk tube. Usually this trouble is only temporary. It is due to some gelatinous substance that has dried at the opening of the teat.

Two breeds of dogs are commonly used with sheep, the Scotch collie and the bob-tailed English sheep dog. The collie is quick, sagacious, learns easily and is a good worker. The bob-tail is rougher looking than the collie, but gluttonous for work. They are inclined to handle stock roughly, a trait that is not very commendable in a sheep dog. In picking a dog avoid those with narrow heads. A good working dog needs a brain and all the constitution possible.

It is well to get your sheep dog when he is quite young. He should come to know you as his master when he is not over six weeks old and his training should begin at this early age. He should be your constant companion and you should by all means feed him. If possible you should train him to take food from no hand save your own. Such a dog is not apt to pick up poisoned food. It certainly cultivates a dependence upon the master, which is the basis of successful training.

You should school yourself to treat your dog always with the utmost kindness, never using a harsh word and under no circumstances striking him with hand or stick and certainly never throwing anything at him. Once you lose the confidence of your dog he will never be of any service to you.

A sheep man who has had a good deal of experience training collies for this work outlines below just how he educates dogs for handling sheep.

It is well to start with a few very simple things that will inculcate obedience. My first lesson is to teach the puppy to "lie down." I always choose simple words for my command and I try to use correct English. I hardly think it right for even a dog to learn bad grammar. I don't say "lay down." I speak the words very slowly and distinctly and always accompany my command with an appropriate motion of the hand.

Dogs are quick to catch motions and I like to have a dog so trained that he will perform by motions as well as by words. I give the command and then press him down to the ground. Then I pat him. When he gets up, I repeat the command and in less than ten minutes, he will lie down with very little pressure on his back. This lesson is repeated three times a day for two or three days before trying another lesson. Patience is the important thing in this training, and persistence. After I know he knows, I will never let him disobey me. Even when he gets tired I pursue him and keep at him until he obeys. Next I try another simple lesson in the same manner. It may be to stop, when he is coming to me. I use the command, "hold." I often use a long forked stick to stop him, when I give the command. Then comes, "to heel." This will require some days. After a few of these very simple lessons, I take up, what I consider one of the most difficult lessons of all, which is to make him, under all circumstances, obey the order, "come to me." I have often spent three weeks on this. When you once start this, you must never give up. Often it means that you must punish your dog and still have him do what you can see must be very distasteful to him, viz., to come to the one whom he thinks has treated him badly. You must be very careful in choosing your punishment. What will work with one dog won't work with another.

Dogs are just like children in this respect. I have found that pulling the ears just enough to hurt a little is one of the best sorts of punishment for a collie. Some have responded well to chaining in some lonely place for an hour or more. I always pet a dog after punishing him.

You must teach your dog to come to you, even though he knows he is to be punished. You teach a puppy this so much better than a grown dog. When you once get started on this lesson, never let the dog get the advantage of you. Make him believe you have accomplished your purpose before you stop. Once I followed a dog two miles before I could get my hands on him to punish him for refusing to come to me. Then I punished him and petted him and talked to him very positively and let him go. He ran away again and I followed him for another mile and had to get some one to catch him for me. I punished him again and talked to him and this time he hesitated and then came to me. I petted him and made much over him and he never again disobeyed this order. He became one of the most obedient dogs I ever owned.

I keep at these simple lessons, until I have taught him to roll over, to jump a stick, to bring me my hat, to close the door, to play dead, and most anything that occurs to me. I have meantime taken him among the sheep, making him walk at my heels, or to lie down in a safe place near the sheep. I try to prevent any conflict between him and sheep that might attack him and I do not try to get him driving sheep for several months. I am now ready for his herding and driving lessons. The first lesson is to teach him to go back. I say, "go back, way back." I use different methods. Sometimes I throw a piece of meat away off from me and order him back. Again, I tie a duck or chicken out in the yard and send him back to this. It takes much patience. It is hard to get him to understand. Now, I teach him "to go around" by tying two or three chickens out and then on giving him the order, I go around the chickens, calling him and repeating the order as I go around. Then I have him lie down on the far side of the chickens. Then I teach him to bark, by saying "speak," clapping my hands and urging him to go at the chickens. I am very particular to teach him to move around to right or left, as I motion with my hands. When these lessons are well learned, I venture to let him drive a few sheep along a road as I walk in front and talk to him, motioning him to right and left and urging him to "speak." I have him hold back by the orders taught above, or "lie down." I teach him to move up "steadily" by motioning back with my hand. I give him these lessons for many days in a row before I let him try the sheep on in a field. I am always in front of the sheep. After he has learned to bring sheep after me well, I undertake to have him "go back" and "go around" by taking a half dozen buck lambs into a small lot and then I take him around them as I took him about the chickens. Soon he catches on and I work on him every day, until he has it well ground into him. Then I put the lambs out into a large field and send him around them.

After this he is ready to go around a large flock, and now it is a matter of practice only. Nothing will do him more good than to put him on the road for a day with a lot of lambs. He will soon pick up many things that just naturally come to a sensible dog. Within a year, he will know about as much about driving sheep as you do. Now, keep him always in hand, insisting upon his handling sheep gently and you will have a dog that will not only be a help and comfort to you, but he will be a source of pleasure always and his fidelity and loyalty to you will tend to make you a better man.

FEEDING LAMBS BY HAND

When a lamb has to be raised by hand it is a mistake to feed too much at a time, but hardly any mistake can be made in feeding too often. Milk from a fresh cow is better than from one that has been in milk a long time. The bandiest way to give milk is from a bottle with a rubber nipple. By getting a glass Y tube and putting rubber nipples on each fork, two can be fed at once. A newly-dropped lamb only requires two teaspoonfuls at a time given every hour. It should be fed at blood heat. The lambs seem to like it warm, and for best results it should be fed warm, as that is the way they get it from their mothers. Some sheepmen think it necessary to dilute the milk with a little water and then add a little sugar. Experiments along this line show that it is not necessary. There is more to be gained by warming the milk and by regular feeding. The bottle and nipple must be kept absolutely clean and free from sour milk or the lamb will refuse it. As the lambs grow they will take more milk and can be fed less frequently. A lamb two months old should be able to take two pints of milk a day, given in two feeds. This is besides the grass eaten and any grain that may be fed.

FLAXSEED POULTICE

To make a medium-size poultice have a cupful of water boiling in a saucepan; stir in sufficient flaxseed meal (nearly a cupful) to make it stiff enough not to run when spread. Boil a couple of minutes, and then heat until it is light and spoozy; spread on cotton, leaving a margin to turn up on the poultice, and cover with old muslin. Good "drawing" poultice.

LEGAL DEPARTMENT

SYNOPSIS OF HOMESTEAD REGULATIONS

For complete information on homesteading interested parties should procure the "handbook for the information of the public," issued by the Department of the Interior, Ottawa. Copies may be had free. The handbook gives full rules and regulations for the guidance of homesteaders and prospective homesteaders. The following is a synopsis of the regulations:

Land Available for Homesteading

All surveyed agricultural Dominion lands (excepting School Lands and Hudson's Bay Company's Lands) in Manitoba, Saskatchewan and Alberta, which are not disposed of and not reserved or occupied, are open to homestead entry. Lands within fifteen miles of a railway are reserved for soldier settlement. School Lands consist of sections 11 and 29 in each township Hudson's Bay Company's Lands consist of section 8 and the south half and the northwest quarter of section 26, in each township south of the north branch of the Saskatchewan river. In every fifth township namely, townships number five, ten, fifteen, etc., the company acquired the whole of section 26.

Making Entry

Application for homestead entry may be made by a person eligible under the provisions of The Dominion Lands Act and the orders in council respecting subjects of enemy states, either at the land agency for the district in which the land is situate, or at the office of a sub-agent authorized to transact business in the district.

Perfecting an Entry

A homesteader is allowed six months from the date of his entry within which to perfect the same by taking possession of the land and beginning his residence duties in connection therewith. Any entry not perfected within that period is liable to cancellation.

Residence Duties

A homesteader is required to perform the residence duties by residing in a habitable house on his homestead at least six months in each year during a term of three years.

"Residence," or "Residence Duties" for the purpose of the homestead law means actual and bona fide residence in a dwelling house by the entrant in person upon the homestead, or in accordance with the vicinity provisions. Residence duties cannot be done by a member of the homesteader's family or by any other person as proxy on his behalf.

Sleeping on a homestead at night for a period of six months in the year, while following elsewhere during the daytime a trade or calling other than agriculture, will not be accepted as residence within the meaning of the Act, unless the residence of the homesteader is established by his family living continuously on the homestead during such period of residence, and by the homestead being his own sole place of abode during such period.

Homestead duties must be performed during a period of three years. Residence may be calculated:

- (1) From date of entry, or
- (2) From date of commencement of residence, either before or after entry, or
- (3) From any date subsequent to date of entry or date of commencement of residence, or,
- (4) The performance of six months' residence in each of three calendar years.

Residence while land stands in name of another person will not be accepted.

Residence by the family only cannot be counted towards patent, but residence by the family admits of liberal protection in the case of an ordinary homestead entry.

Cultivation Duties

A homesteader who resides on his homestead is required to break a total of at least 30 acres of the homestead (of which 20 must be cropped) before applying for patent.

When the duties are being performed under the regulations permitting residence in vicinity the total required to be broken will be at least 50 acres (of which 30 must be cropped).

Application for Patent

Application for patent, after completion of the duties, be made by an entrant before an agent, or before a sub-agent for the district.

Failure on the part of a homesteader to apply for patent within a period of five years from the date of entry renders his rights to the homestead liable to forfeiture.

FEDERAL STALLION SCHEME

The farmers of any district, wishing to work for the betterment of horse breeding by encouraging the use of sound, individually excellent, pure bred sires, may form a breeders' club for the purpose of hiring a pure-bred stallion to travel their district for the benefit of the members. This club, by organizing under and adopting the constitution and by-laws, and conforming to the various rules and regulations may participate in the federal assistance given to such clubs as herein-after set forth:—

1. The club shall guarantee the stallion owner a definite number of mares at a certain service fee per mare, said mares to be in good breeding condition, and not affected with any contagious or infectious disease.
2. All stallions named by clubs for the purpose of securing government assistance must be submitted to an examination by an authorized veterinary surgeon.
3. The secretary of the club shall forward to the live stock branch, Ottawa, with the regular application, a list of its members, also a copy of the memorandum of agreement signed by both parties interested. This agreement shall not become binding until approved by the live stock commissioner.

4. The minimum service fee shall be not less than twelve dollars, and the maximum shall not exceed twenty-five dollars.

5. All service fees shall be collected by the club.

6. Payment of service fees shall be made as follows: one-third of the service fee for each guaranteed mare shall be paid by the club to the stallion owner at the end of the service season.

7. The remaining two-thirds of each service fee shall be paid when the mare proves to be in foal. That is to say, the remaining two-thirds shall be paid for only such mares as prove to be in foal.

8. At the end of the service season the stallion owner shall furnish the live stock branch with a sworn statement setting forth the number of mares bred to his horse and the name of each.

9. The livestock branch shall pay the club an amount equal to 33— per cent of the total amount paid to the stallion owner at the close of the service season on the actual number of mares bred but not exceeding the guaranteed number, on receipt of the stallion owner's statement and of a properly audited and sworn statement signed and declared by the president and secretary.

10. The live stock branch shall pay the club a second grant equal to 33½ per cent of the amount paid to the stallion owner on the total number of mares that prove to be in foal, that is, 33½ per cent of two-thirds the service fee paid for each mare that proves to be in foal on receipt of a properly audited and sworn statement signed and declared by the president and secretary of the club.

WHAT IS A LAWFUL FENCE?

By legislative acts the following have been defined to be lawful fences in the provinces of Manitoba, Saskatchewan and Alberta:

Manitoba

A legal fence in the province of Manitoba is defined in the act respecting boundary lines and line fences which contains the following section: Any fence coming within the meaning of a lawful fence in any by-law of a municipal council in that behalf is to be considered a lawful fence.

"The Municipal Act" provides as follows: The council of every municipality may also pass by-laws for preventing, regulating and removing barbed wire, buckthorn and other similar fences along or near streets and highways.

The council of every municipality may also pass by-laws:

(a) For settling the height and description of lawful fences and for regulating the kind, height and description and manner of maintaining, keeping up and laying down of fences along highways, or any part or parts thereof, and for making compensation for the increased expenses if any, to persons required so to maintain, keep up or lay down such last-mentioned fences or any part thereof.

(b) For regulating the height, extent and description of lawful division fences, and for determining how the cost thereof shall be apportioned, and for directing that any amount so apportioned shall be recovered in the same manner as penalties not otherwise provided for may be recovered under this Act.

(c) For providing for proper and sufficient protection by means of an upper rail against injury to animals by fences constructed wholly or in part of barbed wire or any other material.

(d) For regulating and controlling railway companies within the municipality, for enforcing the construction and management of gates, culverts and cattle-guards on the line of said railways at the crossing of streets, and for enforcing the opening and continuing of any street or streets across the line of any railway track, and for enforcing the construction and maintenance of ditches across and along the line of railway.

It will be seen from the above quotations that the legislature of the province of Manitoba has left it to the municipalities to decide what shall be a proper fence. There is no legal fence for the province of Manitoba, and there can only be a legal fence for a municipality which they may possibly, but not necessarily, change as soon as one steps over the boundary line into the next municipality.

The Railway Act of Canada provides that railway fences shall have a minimum height of 4 feet 6 inches and shall be sufficient to prevent cattle and other animals from getting on the railway.

Saskatchewan

A substantial fence in Saskatchewan must be not less than four feet in height above the level of the ground, or of any sand, or of any straw or other material that may have been placed or have drifted beside such fence shall be deemed a lawful fence if it consists:

(a) Of woven wire secured to posts not more than thirty-three feet apart; or

(b) Of not less than four barbed wires on posts not more than thirty-three feet apart, the wires being fastened to droppers not more than seven feet six inches apart; or

(c) Of three or more barbed wires on posts not more than sixteen and a half feet apart, the wires to be not more than fourteen, thirty and forty-eight inches from the ground respectively, or

(d) Of rails, boards or slabs not less than five in number, the lowest one not more than twelve inches from the ground securely nailed, tied or otherwise fastened to posts not more than sixteen and a half feet apart, and of one barbed wire at or near the top.

(e) A fence surrounding crops growing or in process of being harvested shall not be deemed a lawful fence unless it is situated at least eight feet from such crop.

(f) A fence surrounding stacks of hay or grain shall not be deemed a lawful fence unless it is situated at least twenty feet from such stacks.

Alberta

The Fence Ordinance of Alberta provides that a fence shall be deemed a lawful fence if it consists of:

"Not less than three barbed wires on posts not more than fifty feet apart, the wires being fastened to droppers not less than two inches in width and one inch in thickness or willow or other poles not less than one inch in diameter at the small end or wire dropper, the said droppers or poles being placed at regular intervals of not more than seven feet apart."

The Ordinance further provides that any fence within a rural municipality declared to be a lawful fence by a by-law or by-laws for restraining animals at large passed by such municipality shall be legal, but this subsection shall not apply to any fence immediately surrounding stacks of hay or grain, nor shall any fence surrounding growing crops or crops in process of being harvested be deemed a lawful fence, unless it is situated at least eight feet from such crop.

GRADES OF GRAIN

The Canada Grain Act defines the following grades for wheat, oats, barley, rye and flaxseed. In the wheat grades Marquis may compose the same proportion of the sample as Red Fife, these regulations having been drawn up before Marquis became the leading variety grown.

Spring Wheat

No. 1 Manitoba hard wheat shall be sound and well cleaned, weighing not less than 60 pounds to the bushel, and shall be composed of at least seventy-five per cent of hard red fife wheat.

No. 1 hard white fife wheat shall be sound and well cleaned, weighing not less than 60 pounds to the bushel, and shall be composed of not less than sixty per cent of hard white fife wheat, and shall not contain more than twenty-five per cent of soft wheat.

No. 1 Manitoba northern wheat shall be sound and well cleaned, weighing not less than 60 pounds to the bushel, and shall be composed of at least 60 per cent of hard red fife wheat.

No. 2 Manitoba northern wheat shall be sound and reasonably clean, of good milling qualities and fit for warehousing, weighing not less than 58 pounds to the bushel, and shall be composed of at least forty-five per cent of hard red fife wheat.

Any wheat not good enough to be graded as No. 2 Manitoba northern, shall be graded No. 3 Manitoba northern in the discretion of the inspector.

No. 1 wheat rejected for smut and scoured shall be graded as scoured of the grade to which it belongs.

No. 2 wheat rejected for smut and scoured shall be graded as scoured of the grade to which it belongs.

No. 3 wheat and lower grades rejected for smut and scoured shall be graded as scoured of the grade to which it belongs: Provided that wheat which is inspected No. 3 northern scoured or lower, may be graded in such regular grade, not higher than No. 3, as the inspector determines.

No. 1 wheat inspected as "No grade" for moisture and dried shall be graded as dried of the grade to which it belongs.

No. 2 wheat inspected as "No grade" for moisture and dried shall be graded as dried to the grade to which it belongs: Provided that, on the written order of the owner, any No. 1 dried or No. 2 dried wheat may be graded as No. 3 northern.

No. 3 wheat and lower grades inspected as "No grade" for moisture and dried shall be graded as dried of the grade to which it belongs: Provided that wheat which is inspected No. 3 northern dried, or lower, may be graded in such regular grade, not higher than No. 3 northern, as the inspector determines.

Winter Wheat

No. 1 Alberta red winter wheat shall be hard pure red winter wheat, sound and clean, weighing not less than 62 pounds to the bushel.

No. 2 Alberta red winter wheat shall be hard red winter wheat, sound and clean, weighing not less than 60 pounds to the bushel.

No. 3 Alberta red winter wheat shall include hard red winter wheat not clean enough or sound enough to be graded No. 2, weighing not less than 57 pounds to the bushel.

No. 1 Alberta white winter wheat shall be pure white winter wheat, sound and clean, weighing not less than 60 pounds to the bushel.

No. 2 Alberta white winter wheat shall be white winter wheat, sound and clean, weighing not less than 58 pounds to the bushel.

No. 3 Alberta white winter wheat shall include white winter wheat not clean enough nor sound enough to be graded as No. 2, weighing not less than 56 pounds to the bushel.

No. 1 Alberta mixed winter wheat shall be red and white winter wheat mixed, sound, plump and clean, weighing not less than 61 pounds to the bushel, and containing not less than 50 per cent red winter wheat.

No. 2 Alberta mixed winter wheat shall be red and white winter wheat mixed, sound, plump, clean, weighing not less than 59 pounds to the bushel.

Oats

Extra No. 1 Canada western oats shall be white sound, clean and free from other grain, and shall contain

95 per cent of white oats and shall weigh not less than 42 pounds to the bushel.

No. 1 Canada western oats shall be white, sound, clean and free from other grain, shall contain 95 per cent of white oats, and shall weigh not less than 36 pounds to the bushel.

No. 2 Canada western oats shall be sound, reasonably clean and reasonably free from other grain, shall contain 90 per cent of white oats, and shall weigh not less than 34 pounds to the bushel.

No. 3 Canada western oats shall be sound, but not clean enough or sufficiently free from other grain to be graded as No. 2, and shall weigh not less than 34 pounds to the bushel.

No. 1 black or mixed oats shall be sound, clean, free from other grain and weigh not less than 36 pounds to the bushel.

No. 2 black or mixed oats shall be sound, reasonably clean, reasonably free from other grain, and weigh not less than 34 pounds to the bushel.

Extra No. 1 feed oats shall be sound, except as to frost shall contain not more than two per cent of wheat nor more than two per cent of other grain, shall be reasonably clean, and shall weigh not less than 33 pounds to the bushel.

No. 1 feed oats shall be oats excluded from the preceding grades on account of damage other than heating, shall contain not more than five per cent of wheat, nor more than three per cent of other grain, shall be reasonably clean, and shall weigh not less than 34 pounds to the bushel.

No. 2 feed oats shall include oats weighing less than 34 pounds to the bushel or otherwise unfit for No. 1 feed.

Barley

No. 1 Canada western barley shall be plump, bright, sound, clean and free from other grain and shall weigh not less than 48 pounds to the bushel.

No. 2 Canada western barley shall be reasonably clean and sound but not bright and plump enough to be graded as No. 1, and shall be reasonably free from other grain, and weigh not less than 45 pounds to the bushel.

No. 3 extra Canada western barley shall be in all respects the same as No. 2 barley, except in color, weighing not less than 46 pounds to the bushel.

No. 3 Canada western barley shall be reasonably clean and reasonably free from all other grain; shall include weather stained and slightly strunken but sound barley and weighing not less than 45 pounds to the bushel.

No. 4 Canada western barley shall include all damaged barley weighing less than 45 pounds to the bushel.

Rye

No. 1 Canada western rye shall be sound, plump and well cleaned.

No. 2 Canada western rye shall be sound, reasonably clean and reasonably free from other grain.

All rye which is from any cause unfit to be graded as No. 2 rye shall be graded as rejected.

Flax Seed

No. 1 northwestern Canada flax seed shall be mature, sound, dry and sweet, and contain not more than twelve and a half per cent of damaged seed, and weigh not less than 51 pounds to the bushel of commercially pure seed.

No. 2 Canada western flax seed shall be mature, sound, dry and sweet, and contain not more than twenty-five per cent of damaged seed, and weigh not less than 50 pounds to the bushel of commercially pure seed.

No. 3 Canada western flax seed shall be flax seed which is immature or musty, or which contains more than twenty-five per cent damaged seed, and is fit for warehousing and testing not less than 47 pounds to the bushel of commercially pure seed.

BASIS OF SHARE RENTING

The proper basis for a fair and equitable share lease is that each party share in the products of the farm in the proportion that he shares in the cost of production. Keeping this in mind as the principle on which share leases should be arranged it is possible to work out a basis for dividing the products in almost any circumstances.

The two most common methods for dividing the products of the farm where renter and owner share proportionately are:

(1) One-third or one quarter to the land owner, and (2) one-half to the land owner. In older settled districts where farms are close together and comparatively close to elevators, the one-third share lease is the commonly accepted plan. In newer districts under more or less promising conditions, where the farm is distant from the shipping station and the tenant is under relatively higher labor and living expense, it is usual to allow the land owner one quarter of the total proceeds of the farm.

THE QUARTER OR THIRD SHARE LEASE

In the one-third or one-quarter share lease the following is the commonly accepted plan:

(1) The landlord furnishes nothing but the land, which is usually very inadequately equipped with buildings;

(2) The tenant furnishes the machinery and equipment, seed, and man and horse labor necessary to operate the farm, and pays all expenses except taxes on real estate and insurances on buildings;

(3) The owner gets one-third of the small grain delivered at the market unless it is too far away, in which case he pays a certain rate per bushel for delivery to the market;

(4) Any land used for cultivated crops is paid for in cash, and hay is usually put up by the tenant on half shares in the stack. If grass is seeded, the owner furnishes those seed.

This form of lease is largely an inheritance of pioneer farming and is gradually going out of use as the country develops and improvements are made. It is still used by absentee landlords or landlords who wish to relieve themselves of as much responsibility and risk as possible, but who prefer to rent on a share basis or are forced to do so.

THE ONE HALF CROP SHARE LEASE

The most common one-half crop share lease provides that:

(1) The landlord furnish all seed, pay all taxes and insurance on real estate, and one-half the cash expense for threshing;

(2) The tenant furnish all the horse, labor, machinery, and equipment necessary to operate the farm and pay one-half the cash expense for threshing;

(3) The landlord receive one-half of the grain either in the bin or delivered at the elevator, depending upon the distance to market;

(4) Hay be divided half and half in the stack and that the landlord furnish any grass seed sown.

One item which causes great dissatisfaction is feed for the horses. It is an almost universal practice that the horses be fed from undivided hay, but in the majority of leases the tenant is required to feed his own grain. As a result the tenant feels dissatisfied because the landlord does not share in all the feed expense for the horses, and the owner feels that his grain is being used if it happens to be stored on the farm. Many progressive landlords are giving leases that provide that the two parties share equally the cost of feed for horses. Where each party gets one-half the crops each should bear one-half the expense. Using undivided feed for horses is a good method of equalizing the expense, as the ordinary crop share lease favors the landlord.

Another point which is handled in various ways is the raising of colts. Probably the most common method and also the most satisfactory one is for the landlord to pay the service fee and for the two parties to own the colts in common, and to feed them from undivided feed. One very successful farm manager gives his tenants the privilege of raising only enough colts to maintain their work horses, the colts and work horses being fed from undivided feed. Another landlord gets one-half interest in all colts raised by his tenants and considers this a satisfactory return for furnishing one-half the feed for all the horses.

One advantage of the one-half crop share lease over the one-third crop share lease, from the viewpoint of a landlord, is that his furnishing the seed insures better seed and gives him an opportunity to prevent the introduction of noxious weeds through the seed used.

THE CROP AND STOCK SHARE LEASE

With the development of farming, the necessity and value of more live stock is becoming more and more appreciated.

(1) In the common form of crop and stock share lease the tenant supplies the machinery, the work horses, and the labor. The sales from crops are divided on a half-and-half basis as already described;

(2) For beef, cows, steers, hogs, sheep or young cattle, growing in value, the most satisfactory and equitable arrangement is for the two parties to own them in common and to divide the proceeds from sales equally;

(3) The owner furnishes the pasture, which is offset by the tenant's labor, and each furnishes one-half of the other feeds, whether raised or purchased;

(4) Often the tenant does not have capital to buy his share of stock and the owner furnishes all but charges him interest on one-half the value and deducts the purchase price of the stock when sold before making a division;

(5) Most landlords have a clause in the lease requiring the tenant to get the consent of the landlord before selling any live stock owned in common

(6) Other Cash items of farm expense are usually divided equally between landlord and tenant.

CONTRACT FOR HALF SHARE LEASE

The following form of an agreement covers most of points to be considered in renting on half shares. The provisions meeting the conditions of the interested parties should be selected. A lawyer should then be asked to incorporate them in a lease to insure legality in all respects. Many owners and tenants draw up their own leases, but if difficulties arise the lease may be found defective.

Half Share Crop and Live Stock Lease

This agreement, made this fifth day of February, 1919, by and between John J. Jones, Municipality of ... Province of ... hereinafter called the operator, and R. Q. Smith Municipality of ... Province of ... owner of the real estate herein-

WITNESSETH, that the operator hereby agrees to and with the owner, for the consideration hereafter named, to well and faithfully till and farm, during the seasons of farming in the years 1920, 1921, 1922, 1923 and 1924, commencing April 1st, 1920 and ending April 1st, 1924, in a good and husband-like manner, and according to the usual course of husbandry, the following described premises and land situated in the Municipality of ... Province of ... to wit; North one-half of Section fourteen (14), Township twelve (12), Range four (4), West, containing three hundred and twenty (320) acres more or less.

(1) The operator agrees to furnish, at his own expense, all machinery, horses, equipment, implements and utensils necessary for the proper operation of said land.

(2) The operator agrees to furnish all labor necessary to farm and cultivate said land.

(3) The operator agrees to sow and plant the said lands in such crops as may be agreed upon by the owner and operator, but the owner reserves the right of final decision in case of disagreement.

(4) The operator agrees to market all crops, live stock and live stock products, free of charge to the owner.

(5) The owner agrees to furnish all seed necessary to sow and plant said land and to pay one-half the cost of the cash threshing and twine hills.

(6) The owner agrees to furnish not less than twelve dairy cows, and a pure-bred dairy bull, and one-half of such number of brood sows, young cattle, feeding cattle and sheep as may be agreed upon.

(7) The owner agrees to furnish one-half the feed and all the pasture required for the live stock kept and used on said land, except poultry, and to pay the service fee for all mares bred, the owner thereby receiving one-half interest in all colts raised.

(8) The owner agrees to furnish power and a silage cutter for putting up silage and one-half the cost of a cream separator and a measure spreader.

(9) The owner agrees to pay the real estate tax and insurance on buildings and one-half the veterinary bills.

(10) The owner agrees that the operator may have without charge such amounts of milk and cream as are necessary for household use, and a garden of sufficient size to provide for household consumption. Also that the operator may keep and feed at his own expense not more than fifty hens.

(11) The owner is to receive as rent one-half of all products raised or produced on the above described property, one-half the increase from all live stock jointly owned, and one-half the returns from all sales of crops, live stock products, and live stock jointly owned, except as hereinafter or hereinafter provided for.

(12) The operator further agrees that he will not sell, remove or suffer to be removed, without the consent of the owner, any part of the crop raised or live stock in which the owner has an interest until final settlement; and until final settlement the title of all crops raised and of all live stock in which the owner has an interest shall be and remain in the owner.

(13) It is also agreed that in case the operator neglects or fails to perform any of the conditions and terms of this contract on his part to be done and performed, then the owner may enter upon said premises and take full and absolute possession of the same, and he may do and perform all things agreed to be done by the operator remaining undone, and to retain or sell sufficient of the crops raised on said premises that would otherwise belong to the operator if he had performed the conditions hereof, to pay and satisfy all costs and expense of every kind incurred in performing said contract with interest at ... per cent. per annum, and the residue remaining, if any, of said crops, shall belong to the operator after all conditions are fulfilled.

(14) The operator agrees to keep up and maintain in good repair all buildings, stables, granaries, fences and improvements on said premises and to return them in as good condition as at the commencement of the lease, natural wear and tear and unavoidable accidents excepted. The owner is to furnish the material but the operator is to do the hauling of said material. The operator also agrees to watch, care for and protect the shade trees and to cut no green trees and to commit no waste or damage to said premises or suffer any to be done.

(15) The operator further agrees to feed or use for bedding all straw produced and to spread the manure on the fields most in need of it; and to mow the roadsides and keep all noxious weeds from going to seed and to prevent the introduction of weeds not already present.

(16) The operator agrees not to sublet any part of said land without first obtaining the consent of the owner, and the owner reserves the right of free entry upon the premises for the purpose of making improvements thereon, and to plow or till certain fields when the lease is to be terminated.

(17) In case the owner and operator fail to agree in regard to any clause of the lease, or in regard to the manner of making a division of property jointly owned, then the matter in controversy shall be referred to a board of three men, one selected by the operator, one by the owner, and a third by the two so chosen. Both parties agree to abide by and accept any decision rendered by the three chosen arbitrators.

(18) It is further agreed that if the operator remains in possession of said premises after the expiration of the term which this agreement covers, such possession shall not be construed to be a renewal of the foregoing agreement, but an agreement which may be terminated upon ten days' notice given by the landlord in writing, either delivered to the tenant or sent to him in a sealed envelope, duly stamped and directed to him at ... which is hereby declared by him to be his usual post office address.

(19) And the landlord agrees that the operator, upon paying the rent and performing the covenants of this lease shall be peacefully and quietly have, hold and enjoy the said premises for the term aforesaid. In testimony whereof both parties have hereunto set their hands and seals the day and year hereinafter written.

Signed, sealed and delivered in the presence of (Witnesses) (Parties to Contract) A. P. Magnusson Robert White John J. Jones Seal R. Q. Smith Seal

SHARE BASIS FOR BEEF CATTLE

The usual basis for taking beef cattle on shares is for one party to furnish the cattle and the other to furnish feed, labor, shelter and everything needed for taking care of the cattle. Under such agreement the cattle are taken for a period of years, both parties sharing the increase equally. The following form of agreement covers an arrangement whereby 10 cows are taken by a farmer on shares. The agreement is for a period of three years. It reads as follows:

AGREEMENT FOR TAKING CATTLE ON SHARES

This agreement made in duplicate this first day of May, 1918, between William Braid, carpenter, of the city of _____, of the first part, and Malcolm Johnson, farmer, of the municipality of Quill River of the second part.

Whereas the party of the first part has furnished to the party of the second part 40 two-year-old grade Shorthorn heifers, branded S F on the left ribs and the two-year-old pure-bred Shorthorn bull "Lowset Prince" (159051) branded S F on the left ribs, which said heifers and bull the party of the second part has agreed to care for upon the terms and conditions hereinafter set forth. Now this agreement witnesseth:

(1) The party of the second part agrees to properly care for the said cattle, and all their natural increase, during the continuance of this agreement, to provide sufficient suitable feed, water, pasture and shelter for them at all seasons, to brand the calves with the registered brand of the party of the first part, vaccinate, at least every six months all cattle of the age of 18 months or under and provide all the equipment and materials needed for the proper caring for and handling of the above mentioned cattle and all their natural increase during the currency of this agreement.

(2) The party of the first part agrees to take from the herd each fall all such cows or heifers of the original herd of 40 as have not raised calves that season or which for any other good and sufficient reason are considered by both parties to be undesirable to keep longer. Proceeds from the sale of such cows or heifers belongs to the party of the first part. The party of the first part shall at once replace such cows or heifers with an equal number as good as the average of the original herd and over two years of age. If any of the above cattle die during the currency of this agreement each party shall give one-half in cash and replace the dead ones.

(3) This agreement, if not sooner determined in the manner hereinafter provided for shall terminate on the first day of May, A.D. 1922. At such time there is to be an equal division of all the natural increase. The party of the first part to have the first pick or choice and each party thereafter shall choose one animal alternately until all are divided, or if the party of the first part thinks fit, he may have all the first year's increase and leave the second and third year's increase to the party of the second part. All females of two years or over are to be in calf and all the original herd to be returned in calf on the termination of this agreement.

(4) The animals so selected from all the increase by the party of the second part shall be his remuneration for the care and handling of the said cattle as herein provided for.

(5) This agreement may be determined by either party giving the other six months notice of an intention to cancel the agreement, the termination of the agreement to take effect the first day of November in the year in which the notice shall have been given.

(6) It is distinctly understood that the property in the said cattle and the natural increase thereof shall be and remain at all times in the party of the first part.

In witness whereof the said parties have hereunto set their hands and seals the day and year as above mentioned.

Signed, sealed and delivered in the presence of John J. Jones

William Braid
Malcolm Johnson

PURE BREDS ON SHARES

The agreement herewith is a form of contract for taking pure-bred cattle on shares. In this particular agreement Holstein cows and heifers were taken by one party and handled as per the terms and conditions

here set forth. The same contract may be used for any breed of pure-bred dairy cattle, or for beef cattle, in the case of beef cattle, omitting, of course, reference to milk, the record work and the milking ancestry of the bull. Here is the contract:

This agreement, made the 14th day of June, 1914, by and between P. H. Smith and V. H. Smith, hereinafter known as parties of the first part, and John W. Edwards, party of the second part.

Witnesseth that for consideration stated, first parties agree to keep upon their farm, in a husband-like manner, certain hereinafter mentioned Holstein cattle belonging to party of the second part for a period of five years according to the conditions following.

The following cows—Fayne Johanna, Alcarta Prildis, Johanna Metchikie, Susan De Kol, Ieag Aptia Skylark, and certain other cattle which the parties hereto may agree upon as being fit to come under the conditions of this contract at the time they may be accepted at first parties' farm.

The said cattle are to be delivered at _____ Manitoba. The parties of the first part hereby agree to feed and properly care for the animals aforesaid and their offspring for a period of five years from the date of the receipt of the above cows.

Null calves are to be sold by the parties of the first part, with the consent and approval of the party of the second part. The proceeds thus attained, less the cost of selling, advertising, transferring, etc., to be invested in heifers dropped at approximately the same dates as were the bulls sold, as many heifers to be purchased as the proceeds from the sale of the bulls will permit.

In case any of the female offspring from the animals belonging to the party of the second part prove to be undesirable, first parties may, by and with the consent of the second party, dispose of them to the best advantage. The proceeds thus obtained to be used in replacing the animals sold in a similar manner as described in case of the bulls referred to above.

Parties of the first part, in return for their services in the caring for, feeding and breeding of the animal belonging to the party of the second part and their offspring and other additions to the herd as herein provided, are to receive the milk produced and one-half of the increase, the said increase to be divided at the expiration of this contract. The division of the offspring of the cows belonging to the party of the second part and those purchased by the proceeds of the sale of the bulls, is to be made by permitting the parties of the first part to divide the aforesaid animals into two groups, listing the names and numbers of the animals in each group, giving the party of the second part his choice of the two lots.

The expense of registration shall be borne equally by the two contracting parties. If the first parties wish to do official testing, the second party agrees to pay the fees of the association and the expense of the tester, aside from board and lodging, for the testing of the cows placed in the care of the parties of the first part, and also for half the association fees and tester's expense aside from board and lodgings of the tested.

The parties of the first part agree to use only a registered Holstein Bull whose dam has an official record, and to have the animals of the herd over six months old tested once a year for tuberculosis and to guard the herd from the introduction of infectious abortion through the breeding of grade cows from outside herds.

The party of the second part agrees to pay the taxes on the animals placed in charge of the parties of the first part, and one-half the taxes on the offspring of animals belonging to the party of the second part and additional animals purchased by the proceeds from the sale of bulls as herein provided. All of said animals to be listed with the assessor as property of the party of the second part.

This contract may be terminated upon the death of any of the parties hereto, but must be terminated in accordance with the above conditions, excepting, of course, the duration of the above contract as above stated.

..... (SEAL)
..... (SEAL)
..... (SEAL)

BASIS FOR TAKING SHEEP ON SHARES

The following form of agreement is suggested where sheep are taken on shares. (The names and places used in this and other agreements reproduced here are fictitious but the agreements as to and cattle are being handled satisfactorily to both parties under the terms outlined in the above agreement and sheep under the agreement hereunder set out):

This agreement made in duplicate this 5th day of November, A.D. 1918, between James Morgan, merchant, of the village of Warwick in the Province of Manitoba, of the first part and John Smith, farmer, of the municipality of Southend, in the Province of Manitoba, of the second part.

Whereas the party of the first part has furnished to the party of the second part 30 grade ewes, and one pure-bred Oxford ram, which said ewes and ram the party of the second part has agreed to care for upon the terms and conditions hereinafter set forth. Now this agreement witnesseth.

(1) The party of the second part agrees to properly care for the said sheep during the continuance of this agreement, to provide suitable feed, water, pasture and shelter for them at all seasons, to provide all help and labor required to herd said sheep, to attend them during the lambing season, to shear them and to prepare the wool for sale and deliver it on board cars or in the village of Warwick, and generally to provide all help, labor, equipment and materials, including sheep dip and a proper dipping vat, that shall be required in connection with the proper care, handling and marketing of said sheep and the products thereof during the currency of this agreement.

(2) The party of the second part agrees to maintain said flock at the present number, namely 30 ewes, by replacing losses by death or from other causes, for which the party of the second part shall not be responsible, out of the increase of said flock, the selection of lambs to replace such losses to be taken out of the joint property and to be made jointly by the parties of the first and second parts. If the ram is lost by death or otherwise he is to be replaced by the party of the first part.

(3) The said flock may be increased or decreased as may be mutually agreed upon.

(4) The party of the second part shall in the proper season, shear said sheep and deliver the wool in marketable condition on cars at most convenient shipping point, or in the village of Warwick, and said wool shall be sold in the joint names of the parties hereto, at such time and for such prices as shall be mutually agreed upon. The party of the second part shall deliver at the nearest station and load into cars the lambs which shall be available for sale, and said lambs shall be sold in the joint names of the parties hereto, at such time and for such prices as shall be mutually agreed upon. All the lambs shall be sold except such as shall be retained for maintaining the flock at the original number, namely, 30 ewes.

(5) The proceeds from the sale of such wool and lambs shall be divided as follows: One-half to the party of the first part and one-half to the party of the second part. The share of the party of the second part shall be his remuneration for the care and handling of said sheep as herein provided for.

(6) This agreement if not sooner determined in the manner hereinafter provided for, shall terminate on the first day of November, A.D. 1922, at which time the party of the second part shall deliver to the party of the first part the said flock of 30 ewes and one ram.

(7) This agreement may be determined by either party giving the other party six months' notice of an intention to cancel the agreement, the termination of the agreement to take effect the first day of November, in the year in which the notice shall have been given.

(8) It is distinctly understood that the property in said sheep and in the increase thereof, shall be and remain at all times in the party of the first part.

(9) Any other revenue derived from the said flock shall be divided, one-half to the party of the first part and one-half to the party of the second part.

In witness whereof the said parties have hereunto set their hands and seals the day and year as above mentioned.

Signed, sealed and delivered in the presence of John J. Jones

James Morgan
John Smith

LEASING A DAIRY FARM ON SHARES

The following form of lease is suggested where a farm on which dairying is the chief industry, is leased on shares:

Memorandum of Agreement between James Watson, of Caledonia, Man., lessor, party of the first part, and George Fisher, of Caledonia, Man., lessee, party of the second part:

Whereas the party of the first part leases to the party of the second part for the term of one year from and including the 1st day of _____, the premises known and described as _____ and consisting of approximately _____ acres.

The following points are agreed to by both parties:

(1) It is mutually agreed that the general type of farming shall be dairying and that each party shall furnish one-half of all the productive live stock to be kept on the farm, which stock shall be held in common, jointly, undivided, and share and share alike except the necessary teams for work, which are to be furnished by the tenant but are to be fed out of the undivided feed either produced on the farm or purchased.

(2) It is also agreed to keep a pure-bred bull of the _____ breed at the head of the herd to be purchased and owned jointly, said bull to be mutually satisfactory to both parties; that the best calves from the best cows are to be raised each year so as to maintain or increase the size of the herd and improve its quality.

(3) It is also agreed that each party is to bear one-half the expense for binder twine, for machine hire and fuel for threshing and silo filling, and one-half the expense for all seed, including grass seed, purchased.

(4) Buying and selling of materials, live stock, and other farm products shall be left largely with the party of the second part, but all sales or purchases of more than five dollars shall be made only with the knowledge and consent of the party of the first part.

(5) The party of the first part is to receive as rent and compensation one-half of the products raised on the above described property (except fodder and grain fed to stock) one-half the increase in number and growth of all live stock, one-half of the receipts for stock sold, one-half of the returns from creamery or otherwise for milk and cream, one-half of the increase and products from poultry, and in general one-half of all gross products of the farm, or their sale value, whether specifically mentioned herein or omitted.

(6) The party of the first part agrees to pay all the annual taxes; to furnish what new material may be required for hulling and repairing fences and exterior of buildings; to keep wells and pumps in repair; to keep barns and house in repair but does not bind himself to paint, decorate, or make other than absolutely necessary repairs; to purchase one-half of all the fuel which it may be necessary or expedient to purchase for stock in addition to that grown on the farm; to pay station services charge for all calls raised on farm; to keep properly insured the dwelling house, barns, and other valuable outbuildings.

(7) The party of the second part takes and leases the said farm and personal property in accordance with the foregoing provisions and undertakes and agrees to make his occupation and use of the same as profitable to the lessor as may be, and especially to take the best care of stock and other personal property and return same to lessor in as good condition as when received by him, ordinary aging and use and damage by fire, floods, winds, or lightning excepted; to carefully use, house and care for all machinery, tools, implements, and other personal property owned by first party; to furnish all machinery, implements, dairy apparatus, labor, and team work necessary to carry on the farm in proper manner; to see that all fences are kept in reasonable repair, and furnish labor for such repair, and to build new fences as necessary; leave all buildings in as good condition as when surrendered to him, natural wear and damage by the elements excepted; not to dispose of any straw, other forage, by removal or sale without lessor's consent; and carefully in all things safeguard and promote the interests of the lessor as well as his own, without regard as to whether the particular items or matters are herein set forth or omitted.

(8) The party of the second part further agrees that the lessor may at any time and all times enter to view the premises and all parts thereof; that he will give respectful attention to the advice and suggestions of the

lessor as to the management of the farm and stock; that as much land shall be left plowed when this lease shall terminate as was plowed when it commenced, and likewise as to amount of land in grass or alfalfa; that he will deliver to market all stock and produce sold, deliver milk or cream to cheese factory, creamery, or otherwise as may be mutually agreed upon, and do such hauling of feed, building material, etc., as may be used on the farm; that he will cut down, and keep cut so they will not mature seed or become a pest, all noxious weeds about the farm and in the fence rows; that he will, on or before March 1st of each year, and as occasion may render necessary, consult with the first party as to the crops to be grown, fields to be plowed, and the general rotation to be followed.

(9) The party of the second part shall have the privilege of taking such reasonable amounts of milk, eggs, poultry, potatoes, and other vegetables produced on the farm as he may need for family use, but if there is any surplus of the above products he shall deliver one-half to the first party, or in case of sale the proceeds are to be equally divided between both parties. In case any animals are butchered, the hides, meat, and other portions shall be divided equally between both parties, or such other arrangement made as may be mutually agreeable.

(10) It is the intention of this lease to record the important points upon which the parties have agreed, but if anything has been omitted, upon which the parties cannot agree, or if there be any controversy as to the interpretation of the conditions and terms herein written, then such matters shall be submitted to a board of three arbitrators to be chosen, one by each party to the lease and the third by the two so chosen; both parties mutually agree to accept as final and a bid by the decision of said board of arbitrators.

(11) At the expiration of this lease (unless it shall be renewed), or if it be sooner terminated, the parties agree that all jointly owned property shall be disposed of to the best possible mutual advantage or divided in such manner as may voluntarily agreed upon or as determined by a board of arbitrators as provided above.

(12) This lease may be continued from year to year at the pleasure of the parties hereto, but may be terminated at the expiration of any year by either party giving to the other three months' notice in writing of his wish to have same end.

In witness whereof the said parties have hereunto set their hands and seals this first day of March, A. D. 1918.

Signed sealed and delivered in the presence of John J. Johns.

James Wilson
George Fisher

AGREEMENT USED IN NORTH DAKOTA

A partnership basis for renting farms on shares was described recently in a publication of the North Dakota Agricultural College. The plan is this: The tenant furnishes the horses, farm machinery, labor, half the stock, half the feed for horses, pays half the threshers' bill. The land owner furnishes the other half of the stock, feed for the horses, etc. When anything is sold from the farm the returns are divided half and half. This plan has proved so satisfactory that in the eight years it has been in operation no tenant has given up his lease which, by the way, is made a continuous one that can be terminated by either party giving a specified notice.

WHAT ARE FIXTURES?

A "fixture" is a property which was originally a chattel or personal property which by reason of actual or constructive annexation to land has become a part of real estate and is therefore real property at law. A chattel may be attached to land and not be a fixture. It may not be attached to land and yet be a fixture. The general rule is this: If a chattel is attached to land so that it cannot be separated without violence or injury to the land, it is prima facie a fixture, and the onus of proving the contrary lies upon the one so asserting. If not physically attached to land other than by its own weight, it is prima facie a chattel and does not pass with the land. The onus of proof that it is a fixture in this case lies on the one so asserting. The question of whether a certain article is a fixture or not is one of mixed law and fact. The law settles what facts are elements of the problem. The evidence

must be admitted pro and con as to those facts. The elements to be considered the law fixes as follows:—

1. Whether the chattel is actually annexed to the land or not.

2. Its appropriateness to the use of real estate to which it is actively or constructively annexed.

3. The intention of the one who annexes to make the chattel a permanent accession to real estate.

There are two cases in which the question frequently arises. First, between landlord and tenant; and secondly, between vendor and purchaser. There is a distinction between the rules of law applicable to these two cases, the rules being construed much more strictly against a vendor than against a tenant. Improvements made by a tenant may not be considered fixtures in cases where they would be considered such if made by a vendor. The general rule in tenancies is that improvements made for trade or domestic convenience or for ornament by a tenant do not become fixtures and hence the property of the landlord. On the other hand, any substantial improvement made by the tenant becomes a part of the land and is the property of the landlord in the absence of an agreement to the contrary. It is wise for a tenant to remember also that if he makes improvements which are not fixtures as between him and the landlord, they may still be such if the landlord has mortgaged the property. The mortgagee may in that case prevent the removal where the landlord could not.

A fixture may be annexed to a building by screws, nails, bolts, mortar or cement, or it may be annexed to the land itself by having earth piled about its base. A chattel nailed to wooden plugs driven into holes in a cement floor has been held annexed to the real estate.

As to the appropriateness of the alleged fixture to the use of the real estate to which it is annexed, a loom for instance, in a woollen factory and attached to the floor, is appropriately annexed, whereas it would not be so if attached to a floor in a demonstration or a showroom. If a farmer fitted up an empty granary as, say, a planing factory and attached planing machines to the floor, they would not be appropriate to a farm. If he fitted a windmill to his barn to pump water for stock, it would be appropriate and there would be a presumption that it was a fixture.

Then, as to the intention, the court would presume what the intention was from a man's acts and would not allow the secret intention contrary to the normal intention to be proven. For instance, a tenant's secret intention to tear down a lean-to he erected to his landlord's barn could not be proven, neither could the secret intention of an owner to remove a hay fork before he sells his farm be proven. On the other hand, a pump attached to the floor of a vendor's house installed for the purpose of removing water in the cellar occasioned by an exceptionally wet year would not be presumed to have been attached with the intention of making it a permanent accession. There are also, certain contraptions or slings used for holding injured or sick horses upright. These, no doubt, are strongly affixed to the roof timbers of barns but they would not become fixtures as neither the intention would be to attach them permanently nor possibly would the second rule be satisfied, that is that they be appropriate to a farm. The sling would be appropriate at a veterinary hospital, but is not so at a farm.

The following is a list of chattels which, when attached or annexed to the land, will become fixtures as between vendor and purchaser and therefore go with the farm:

A pump nailed to the cribbing or driven into the ground (also if resting on the cribbing by its own weight); hay forks; fencing if it has been erected, even if temporarily taken down; blinds, shutters and storm windows; grain choppers; windmills; gas engines; cream separator; field granaries (even possibly if on skids); electric fixtures; lean-tos or additions to buildings or any buildings erected.

The fencing, fixtures, windmills and granaries, if on a permanent foundation, would, become fixtures as between landlord and tenant and the tenant is taking chances if he annexes any of the above list without a written agreement with his landlord. In the case of a sale the vendor can always protect himself by making an exception of the fixtures he wishes to retain. This reservation would not be binding unless in writing.

Manitoba

PAYMENT FOR A COW

S. T., Man.—"A sells a cow to B for \$60 cash and \$10 to be paid in two weeks' time. When B was to take the cow B failed to pay the balance, and after three months a letter to A stating that he would take the cow in the spring. He never came over during the winter months. Now the cow is dead. Whose loss is it?"

Answer—After payment of the \$60 the property in the cow passed to B. The loss, therefore, is B's.

DAMMING A RIVER

A. H., Man.—"Is it legal to put a dam in a river on your land to hold enough water for stock in winter, when the river freezes to the bottom. All I want to do is four or five feet of water, and there would be no question of stopping the flow of water or flooding anyone else's land?"

Answer—You have a right to put in a dam if you do no damage to property above your land, and the lower owners obtain an undiminished quantity of water of the same quality.

FARMERS KILLING BEEF

A. S., Man.—"Does a farmer living in Manitoba have to hold a license to kill and sell cattle, sheep or hogs that he has raised on his own farm? Do farmers need a license to operate a beef ring?"

Answer—It depends upon the by-laws of the municipality in which you reside. Municipal councils have power to pass by-laws regulating the sale of meat and meat products. Farmers do not need a license to operate a beef ring, but under the provisions of the Public Health Act, they are required to obtain a license for a slaughterhouse.

DIVISION OF PROPERTY

C. M., Man.—"How will the property of a man dying without a will be divided among his wife and three children? Can widow sell farm and stock and machinery, or can she rent farm?"

Answer—The widow gets one-third. She is entitled to live upon the farm for life if it is the homestead of the deceased; in other words, the place where he resided. The widow should take out administration to the estate of the deceased. She can sell the stock and machinery. One-third of the proceeds is hers—the balance belongs to the children in equal shares. Those who are now 21 get their share immediately, and the money for the others should be invested and paid over when they become 21. The widow can rent the farm. She can sell the farm to pay debts after being appointed administratrix. She cannot sell the farm without the consent of the children if they are over 21 years of age, or the consent of the regent-general if the children are infants.

SON BORN AFTER FATHER'S WILL MADE

Reader, Man.—"Father died when I was a year old. Made a will before I was born, leaving his property to my four brothers. I was born shortly after. I have been told that I cannot claim any of the said property, that the brother a little older than me would be considered the youngest son. I have also two older sisters. Could they claim anything?"

Answer—If you were born after the death of your father, you would have taken a similar interest in the father's estate as if the father had died intestate, but being born before your father's death, the parties to whom the estate was left in the will are entitled to the full estate.

QUESTION ON WILLS

Reader, Man.—"A man using a will form draws up a will for his brother, who is sick. The will bequeathes to the brother who drew it up, certain property. The man making the will was too sick to read it or do anything but sign his name. Will was witnessed by a brother-in-law and brother. The latter did see the other witnesses sign. Will this will stand law?"

Answer—If your statements as to what happened are accepted by a judge, this will could be upset. The testator must either sign in the presence of two witnesses, or then the testator must acknowledge his

signature in the presence of two witnesses. I take it from your letter that this was not done. Leaving aside this technical ground, it would appear that the will should be set aside on the ground of undue influence being exercised by the proposed beneficiary.

WIFE GETS PROPERTY

J. E. S., Alta.—"In case husband dies without a will, if there are no children, does the Alberta law give wife entire estate?"

Answer—Yes.

ARE U.S. DIVORCES VALID IN CANADA?

M. B., Man.—"If a husband gets a divorce from his wife in the United States, can she marry again, or does it just make him free to marry again? The wife lives in Canada."

Answer—Generally speaking, divorces granted by the American courts are not recognized as a valid dissolution of marriage by our Canadian courts, therefore neither husband nor wife who have been divorced could legally marry again in Canada. To answer your question definitely we would have to know where the parties were married; where the divorce was obtained; where the domicile of the parties was at the time application for divorce was made.

HUSBAND AND WIFE SEPARATED

V. S., Man.—"Husband and wife have been separated for eight years, neither seeing nor writing to one another in that time. Is it legal for the parties to marry after seven years' separation?"

Answer—Where a husband and wife have been continually absent from each other for a period of seven years, and there is no knowledge on the part of either of them that the other is living the husband or wife marrying the second time will be protected in a criminal action for bigamy, but the second marriage will not be valid if it should transpire that the other spouse is living at the time of the second marriage.

DOG WORRYING SHEEP

F., Manitoba.—"A drives down the road past B's place. A has his dog along. This dog runs off the road into B's field and puts the sheep belonging to B through an inside fence into the yard. Sheep tear themselves on rail fence and later cannot be got to feed in the field. Can B get damages from A on account of A's dog worrying B's sheep on B's own land which is fenced with rails?"

Answer—B is entitled to recover damages from A for the injury done to the sheep, but as apparently none of the sheep were killed and the injuries were of a slight nature, it will be a difficult matter for B to prove the amount of damage he has suffered. Instead of suing for damages, B may lay a complaint before a police magistrate against A, and in the case of a conviction the magistrate may make an order for the killing of the dog by the owner, and in default thereof may impose a penalty not exceeding \$20 and costs, and make a further order for the killing of the dog by any constable or other police officer.

CATTLE DAMAGE GRAIN

A. P., Man.—"Can cattle run any place where there is no association, or do we have to fence both cattle and grain? There was a field of grain on the side of a main road and there was one wire along one side of the road, and on the other side there was none. Grain was damaged. Can owners collect any damages for it?"

Answer—Unless there is a municipal by-law providing that a legal fence be erected, before the value of damaged grain can be recovered, you are liable for all damage done by trespassing cattle.

BULL BREAKS OUT

Reader, Man.—"My bull broke into neighbor's pasture and got one of his pure-bred cattle in calf. Could the said neighbor collect anything from me?"

Answer—If your animal was running at large, you are liable to a fine of \$10 to \$25, or in default of payment, ten days or one month's imprisonment. You are also liable for any damage your neighbor has suffered.

MUNICIPAL HERD LAW

O. W. S., Man.—"In this municipality we have to have all our land fenced on account of cattin being

allowed to run at large on the road allowances. As I understand it, all the councillors, as well as the reeve, are in favor of this old style farming, that is, turn the cattle on the road allowance and let them pick their feed wherever they please. Most of the farmers here are progressive enough to fence their cattle, but it is rather expensive to fence in one's own herd, besides fencing out the neighbor's herds. How can we remedy this nuisance?"

Answer—The municipal council must enact a herd by-law in conformity with the wishes of the majority of the ratepayers. As there have been several enquiries upon this point recently, we quote sec. 603 of "The Municipal Act," which deals with the whole question:—"Upon receiving a petition of the majority of the resident ratepayers within any rural municipality or any ward or any portion of a ward, the council of such municipality shall be obliged to pass a by-law making such provision respecting the running at large or impounding of animals as may be required by such petition having application to the whole municipality or such ward, as the case may be, and any such by-law so petitioned for shall be passed and entered in the minutes as a matter of course and in the usual form, and public notice of such by-law shall be posted up in at least two conspicuous places in each ward of the municipality, one of which shall be the post office, if any such there be."

RIGHT TO ROAD ALLOWANCE

A. M., Man.—"Is it legal for the municipality to deed or lease the road allowance to a private party? Could they convey the rights of a party living and owning alongside when it is an established custom here that the person who has land adjoining should have the grass and the wood next to him to the extent of half the road allowance?"

Answer—The municipality has power, by by-law, to deed or lease a road allowance that has been legally stopped up. To stop up a road allowance, notice of the intended by-law must be posted up one month previously in six of the most public places in the immediate neighborhood. The road allowance should be sold to the parties whose land adjoina the same, but if such parties refuse to become the purchasers at such price as the council thinks reasonable, then the municipality may sell to any other person for the same or a greater price.

LINE FENCE QUESTIONS

Subscriber, Man.—"A and B have two quarters adjoining. They each put up half of the line fence some time ago. A has rebuilt his front, which was in poor repair. Can B be made to re-build his part of the fence? If A rebuild B's fence, could he collect value of fence from B. B is a non-resident farmer, therefore not using fence for grazing purposes."

Answer—The line fence act provides that each of the adjoining land owners shall keep up and repair their proportion of the line fence after it has once been erected. The act is not very clear as to how an adjoining owner is to be made to repair his proportion of the line fence. We imagine that if A repairs the whole fence, he should have the fence viewers referred to in the act view the fence and make an award which, upon filing with the county court judge, becomes a judgement of the court for the amount he is entitled to.

LINE FENCE DISPUTE

A. M., Man.—"If I fence my quarter-section on all four sides before the adjoining quarter is bought, and later that quarter is bought, should the purchaser pay me for half the fence between the two quarters? If this party is delinquent and does not settle up, will I be within the law to pull down half the fence? Can I demand cash for that part of the fence, or must I take posts and barbed wire? If I take the latter, should I not charge for work done?"

Answer—When the owner of the adjoining quarter fences any part of his farm so that he gets the benefit of the line fence, you are entitled to recover from him one-half the value of the fence which he is using. This value should be paid in cash and is determined by three fence viewers appointed by the municipality. If the municipality has not appointed fence viewers, each party shall appoint one arbitrator and the two so appointed shall appoint a third arbitrator. The

finding of the fence viewers or arbitrators when filed in the county court shall have the force and effect of a judgment. Once the line fence is built it cannot be removed without the consent of all the parties interested.

ROADS AND BOUNDARY LINES

J. B. R., Man.—"I understand that all north and south boundary lines and road allowances angle off 12 degrees to the west of the magnetic north, and that the east and west road allowances run due east and west as per compass. Can you give me any hints as to the best survey boundary lines, there being no mounds put up by surveyors in the centre of sections."

Answer—North and south boundary lines and road allowances in Manitoba run true north and south, and east and west road allowances run at right angles thereto, that is, true east and west. The variation between true north and the magnetic north varies in different places. In the Winnipeg district the true north is about 12 degrees west of the magnetic north. There might be a very substantial difference between true north and magnetic north within a comparatively small area, so that your compass with an arrow pointing 12 degrees west of the magnetic north, no matter how accurate your compass, could not be relied on to show the true north, as at that particular place, owing to influences which we cannot here indicate, the variation between the true and magnetic north might be more or less than 12 degrees west. In the absence of surveyor's mounds in the centre of the sections it would be necessary for a person desiring to run a line to start from some boundary line or road allowance, the lines of which have been laid down by a surveyor. We do not think that any compass would be a reliable instrument with which to run boundary lines, only qualified surveyors with the proper instruments can do this work.

HOMESTEADER'S EXEMPTIONS

A. M., Man.—"What exemptions is a homesteader entitled to. My patent has not yet been granted to me."

Answer—A homesteader is entitled to the same exemptions as any other farmer is, whether his patent has issued or not. The list of exemptions is a long one, but the principal ones are these: Household furniture not exceeding in value the sum of \$500; clothing of judgment debtor and his family; fuel for six months; food for eleven months; three horses, mules or oxen; six cows; ten sheep; ten pigs; fifty fowls; agricultural implements to the value of \$500, and 180 acres of land.

EXEMPTION

H. B., Man.—"How many head of horses and cattle can a man on a rented farm hold against a judgment? That is so the man that has the judgment cannot touch his stock. What is a settler's exemption?"

Answer—The following animals are exempt from seizure under execution: 3 horses, mules or oxen, 6 cows, 10 sheep, 10 pigs, 50 fowls, provided that the word "horses" shall include colts and fillies, the words "oxen" and "cows" shall include steers and calves and heifers, respectively. This is provided that the horses are used by the judgment debtor in earning his living. Briefly, the exemptions in addition to the above in Manitoba are: bedding in common use, household furniture and effects to the value of \$500, clothing and fuel for six months, 12 books, a professional man's books, 1 axe, 1 saw, 1 gun, 6 traps, food for eleven months, tools and necessaries used by the judgment debtor in the practice of his trade to the value of \$500, articles necessary to the performance of religious services, land upon which the debtor actually resides up to 160 acres, houses, stables, barns and fences on the exempted farm, all the necessaries and seeds for the proper seeding and cultivation of 80 acres, the actual residence of a person other than a farmer, provided it does not exceed the value of \$1500.

RIGHT TO STRAW

W. W. F., Man.—"When a tenant leaves a farm who is entitled to the straw stacks that are on the place from the last crop threshed? Can the tenant that is leaving sell or take the straw, or can the landlord keep it and sell it, when there is no agreement except one-third of all the crop?"

Answer—There is no law on this matter. It is a question of fact as to what your agreement was when the tenancy was created. One-third of all the crop

would mean the landlord got one-third of the straw. One-third of all the crop delivered in the elevator would preclude the idea that straw was included, in which case the straw would belong to the tenant.

WHO OWNS THE STRAW?

W. M., Man.—"A rents his land to B on half crop shares. A supplies seed and pays half the threshing bill. B pays for all the twine and supplies all labor. Nothing was said about the straw, and now A wants to claim half the straw. Can A claim half the straw?"

Answer—We presume that the agreement was a verbal one and that its terms are as stated above. There are no cases on this subject so far as we are aware, but on a strict reading of the contract, it would seem that A's contention is correct, because the straw is a portion of the crop produced from the land, just as hay undoubtedly is. In former years straw had little value and the tenant usually burned it, from which fact it might be sought to prove a custom that straw belongs to the tenant, but it is very doubtful if such a custom could be established in this province.

RENTER'S RIGHT TO FEED

D. McC., Man.—"(a) Rented my farm for one year, furnishing stock and implements, seed and feed, renter to return seed and feed at end of term. Has renter any right to feed to his stock the sheaves and grain furnished by me? (b) If there are any sheaves left over at the end of year, to whom would they belong?"

Answer—(a) If your agreement was that you were to provide feed for the animals supplied by you, we do not think that the renter of course would be justified in feeding his own stock on your feed—the question is not one of law but one of fact. What was your real contract? We cannot, however, see that it makes any real difference if you have as much feed returned to you at the end of the year as you supplied. (b) If there are any sheaves left over at the end of the term of the original allotment, we think they belong to the landlord.

OUTLAWED DEBT; DANCING

S.B.A., Man.—1. "When is a debt considered outlawed in Manitoba? 2. Is there any law against dancing in schoolhouses in Manitoba if the trustees permit it and the ratepayers do not object?"

Answer—1. A debt is outlawed in Manitoba six years after its due date, if within the said period of six years no payment has been made, or no sufficient written acknowledgment of the debt has been given by the debtor. If payment on account has been made or written acknowledgment given, the debt will be outlawed six years after such last payment or written acknowledgment. 2. No.

SHOOTING DOGS

J.C.D., Man.—"Can a man shoot a dog in his sheep pasture without being liable?"

Answer—If the dog is pursuing or terrifying your sheep you are entitled to shoot him, otherwise not.

ARBITRATION ON SCHOOL SITE

R.S., Man.—"What is the law about the price that is to be paid for land for a school house where owner of land and trustees cannot agree?"

Answer—The Public School Act provides that the price shall be determined by arbitration. You have the right to appoint one arbitrator, the trustees to appoint another, and these two, with the Inspector of the district, would proceed to appraise the value of the land. The board of arbitration would also settle the question of who would bear the costs of the arbitration which might amount to a considerable sum. If the arbitrators allowed a larger amount than the school district had offered, we presume they would order the school district to pay the costs, but if no larger sum was awarded than had been offered by the school district, then it is likely you would have to pay the costs.

DIVIDING LINE FENCE

A.M., Man.—"In building a line fence what is the rule to determine which side my neighbor must build and which side I must build?"

Answer—There is no rule to determine which portion of the fence is to be built by the neighbor and which by yourself. You will have to get together and agree

on this point. If it is impossible for you to agree, you can build the fence together and divide the cost.

WIFE DIES WITHOUT WILL

J.S., Men.—"When a married woman owning property given to her by her husband dies intestate, can her husband sell her property without the consent of her children? What share is the husband entitled to? What share are the children entitled to? Would husband have to pay taxes for said property when living on the same? Should half the children consent to husband selling the property, and the other half object, what would be the result?"

Answer—Upon the death of a married woman intestate her husband is entitled to a one-third share in the estate. He is also entitled to a life interest in the home, which means that he has the right to use the home during the term of his natural life, and during this term he would have to pay the taxes on the property. The home could not, in any case, be sold without the consent of the husband. If the husband and the children, all being of the age of twenty-one years, consented, the property could be sold. If some of the children refused to consent a partition proceeding could be instituted in the courts for the sale of the property. The remaining two-thirds of the estate would be divided equally among the children.

COWS NOT AS REPRESENTED

A.B., Man.—"Made a deal for 4 cows on December 4, last, paying a good price, on the understanding these cows were first-class milkers. All were in calf. Three have calved, but have turned out very poor milkers. They are fed well. I got these cows on a twelve-month note. If they still prove unsatisfactory, am I entitled to cheer for keep, or am I entitled to keep calves, if I return them to the owner?"

Answer—Unless there was a representation as to the milking qualities of the cows which amounted to a warranty, you would have no recourse against the person who sold you the cows. While it is not necessary that the warranty should be in writing, still the fact that it is not in writing would make it difficult for you to prove in a court of law that the representation was made, that it amounted to a warranty, and that there was a breach of the warranty entitling you to damages. Even if there was a warranty you could not now return the cows unless it was a distinct term of the agreement that you could return the cows in case they failed to come up to the warranty. We are therefore of the opinion that you are liable for the amount of the note, and that you cannot return the cattle nor recover damages for breach of warranty.

EMPLOYER BREAKS AGREEMENT

E.G.I., Men.—"Hired with a man for one year. The agreement was that I was to have potatoes found the year round. Farmer runs out of potatoes and buys for himself but never says anything to me in any way. What can I do in the matter?"

Answer—If you had to buy potatoes because of your employer's failure to supply them to you, you would be entitled to recover from him the value of the potatoes purchased, otherwise you would have no claim for damages, as it is to be presumed he substituted some other food for the potatoes.

RAILWAY MUST PROVIDE FACILITIES

A.S.B., Men.—"Is there any law compelling the Canadian Pacific Railway Company to build a stock shed and unloading chute in connection with their stock yards at a country shipping point?"

Answer—The railway company is obliged to provide suitable facilities for loading and unloading stock. In case of its refusal to provide these facilities application should be made to the Board of Railway Commissioners.

MINOR GETS INTO DEBT

R.J.C., Man.—"Who is responsible, if the boy, being a minor, gets into debt?"

Answer—The parents are not liable for debts contracted by their children. While it is a general rule that contracts against minors are unenforceable an exception is made in the case of debts contracted for necessities, but the action is against the minor personally and not against his parents.

TRAPPING WOLVES

B.P.P. Man.—“(1) How close to a road allowance can I set traps for wolves? (2) If I trap a wolf, and he runs at large with the trap, and my neighbor catches him with hounds, who is entitled to wolf? (3) Does a married man need to send in an income tax form when his income does not exceed \$2000?”

Answer—(1) You can set traps for wolves on your own property right up to the road allowance. (2) If you are in pursuit of the wolf, or if he is on your property when caught, you are entitled to claim him otherwise he belongs to the person who catches or kills him. (3) If your income does not reach the \$2000 mark you are not obliged to make the return unless requested by the Department to do so.

EXEMPTIONS IN MANITOBA

X.G. Man.—“What are the exemptions from seizure on a quarter section either owner or renter?”

Answer—(a) The bed and bedding in the common use of the judgment debtor and his family, and also his household furniture and effects not exceeding in value the sum of five hundred dollars. (b) The necessary and ordinary clothing of the judgment debtor and his family, and the necessary fuel for the judgment debtor and his family for six months. (c) Twelve volumes of books, the books of a professional man, one axe, one saw, one gun, six traps. (d) The necessary food for the judgment debtor and his family during eleven months, but this exemption shall only apply to such food and provisions as may be in his possession at time of seizure. (e) Three horses, mules, or oxen, six cows, ten sheep, ten pigs, fifty fowls and food for the same during eleven months. Provided that the word “horses” shall include colts and fillies, the words “oxen” and “cows” shall include steers and calves and heifers respectively. Provided, also, that the exemption as to horses over the age of four years, shall apply only in case they are used by the judgment debtor in earning his living. (f) The tools, agricultural implements and necessary used by the judgment debtor in the practice of his trade, profession or occupation, to the value of five hundred dollars. (g) The articles and furniture necessary to the performance of religious services. (h) The land upon which the judgment debtor or his family actually resides, or which he cultivates either wholly or in part, or which he actually uses for grazing or other purposes. Provided the same be not more than one hundred and sixty acres; in case it be more the surplus may be sold subject to any lien or encumbrance thereon. (i) The house, stable, barns and fences on the judgment debtor's farm, subject, however, as aforesaid. (j) All the necessary seeds of various varieties or roots for the proper seeding and cultivation of eighty acres.

SHOOT NEIGHBOR'S DOG

Subscriber, Man.—“Neighbor dog has been coming over and chasing the hens from their feed. I accidentally killed it trying to scare it away. I tried to settle with my neighbor, but he is bound to go to law.”

Answer—You were not justified in shooting the dog in the circumstances stated, and it would make no difference that the shooting was accidental. The owner is entitled to recover from you in an action the value of the dog, which, of course, now that it is dead, is very great. Instead of using a rifle to frighten the dog you might have impounded it for trespassing on your property.

CHARGING FOR VETERINARY WORK

D.J.R. Man.—“Has a person a legal right to charge for branding, vaccinating, castrating and dehorning, also if called to assist with sick stock in Manitoba?”

Answer—The Veterinary Surgeon's Act prohibits anyone but a duly qualified and registered veterinary surgeon from practicing the profession of veterinary sciences or surgery, but the Act makes an express exception in the case of castrating animals. Branding would not be considered a branch of veterinary surgery and an unqualified person could therefore make a charge for branding. With respect to vaccinating and dehorning, we are of the opinion that an unqualified person could not make a charge for these services. The latter part of your question is too indefinite. It would depend entirely upon the nature of the services ren-

dered. If the services were of a professional nature you would not be entitled to make a charge therefor.

LAWYER'S CHARGES

R.D. Man.—“(1) What is the legal fee charged by lawyers for drawing up a transfer of property? (2) Does the vendor always have to pay costs of transfer? (3) What would be the approximate cost of obtaining Torrens title for a one-half section valued at \$15000 now under the old system? (4) In the matter of an agreement of sale drawn up by a lawyer, should not both vendor and purchaser be entitled to a copy of the agreement of sale without charge? Can lawyer charge purchaser who is paying him for drawing up agreement an extra fee of \$1 for making out his copy of agreement?”

Answer—(1) The fee for drawing a transfer is \$5 but in addition to drawing the transfer, if the lawyer is acting for a party in putting through a sale, his fees for the whole service will be based upon the value of the property to be dealt with. (2) If the sale is for cash, or if the deal is being closed out by transfer and mortgage, the vendor should furnish transfer. (3) It is impossible to say, as the cost will depend upon the state of the title. In some cases very little work has to be done by the solicitor, and in other cases a great deal has to be done, consequently his charges will vary. Ordinarily the costs would be around \$130, a large portion of which would be paid to the Government. (4) The vendor and purchaser are each entitled to one of the duplicate originals of the agreement for sale. If the original agreement for sale has been registered, and the purchaser requires a copy, the lessor is entitled to charge him \$1 for such copy.

LICENSE TO SELL MEAT

R.N.R. Man.—“I would like to know what this country is coming to. I can kill a hog or calf as well as any butcher in Winnipeg, and the other day made up my mind to kill a veal calf so went to one of the stores in town and asked what they were paying for veal. I was informed that they were not allowed to buy meat of any kind unless killed by a licensed butcher. Will you please let me know where I can take out a license, and the cost of same?”

Answer—According to recent regulations passed by the Provincial Board of Health all animals intended for sale must be slaughtered in a licensed slaughter-house which must be constructed and equipped according to regulations prescribed by the Board. These regulations preclude the killing of beef cattle by farmers for sale to the public or to dealers unless a license to operate a slaughter-house is first obtained. This law was passed in the interests of public health as people, not butchers, with inspected slaughter houses are liable to kill diseased meat, etc., etc. However, it works a hardship on many, yourself for example in this case. Effort is being made to have the law amended, though it looks as if the efforts would be unsuccessful.

FEEDING PIGS ON DEAD HORSES ILLEGAL

R.H. Man.—“Quite a number of horses died in this district and a neighbor has been hauling the dead horses home and feeding them to his pigs, and also hauling dirty swill for them from town. I would like to know should this neighbor be allowed to sell these pigs for food? He has a number of dead horses lying round his place.”

Answer—In the first place the regulations of the health department prohibit the feeding of offal to animals, and the law also requires the dead bodies of animals to be at once buried. Your neighbor is therefore acting illegally in feeding these dead horses to his pigs. In the interest of public health it may be your duty to notify the nearest constable of the facts of the case and it would be the constable's duty to prosecute the offender.

BOY WANTS TO LEAVE HOME

F.S.G. Man.—“Can a farmer boy eighteen years of age leave home when his mother is dead and his father living if there is good reason why he wants to leave home?”

Answer—Yes. The father has no power to compel a son of that age to remain at home.

Legal Questions and Answers

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MAKING OWN WILL

J.S.H. Man.—"Would it be legal for a man to draw up his own will, appointing his wife and son executors? If so, has that will to be signed before a witness?"

Answer—It is legal for a man to draw up his own will appointing his wife and son as executors, provided the will is all in the testator's own handwriting, and in this case it is not necessary that there should be any witnesses. If the will is not all in the testator's own handwriting, two witnesses are necessary. We would advise, however, in a matter of this kind, that you employ a solicitor to draw up your will, as very grievous consequences might follow if there is any error in the will.

LAWYERS' FEES FOR COLLECTING

C.J. Man.—"What fees are usually charged by lawyers for collections?"

Answer—Solicitor's fees on collections are 15 per cent on the first \$300 and 8 per cent on the excess up to \$1000.

AGE OF MARRIAGE FOR GIRLS

F.W. Man.—"When a girl is past 18 years, can she get married without her parents' consent if she is at home with her people? If a girl got married at the age mentioned, without parents' consent, could they take her home again?"

Answer—A girl does not need parents' consent if 18 years of age. Parents would have no control over her when married.

WIFE'S RIGHTS ON SALE OF FARM

M. E. M. Man.—"Can a wife recover a homestead that has been sold by her husband without the wife's signature? The said farm was sold unknown to wife. The said farm has been sold since 1914."

Answer—The Dower Act came into force on the 1st day of September, 1913. If homestead was sold before that date the Dower Act would not apply, and the wife's consent would not be required. If homestead was sold subsequent to September 1st, 1913, the wife could not recover the homestead unless it could be shown that the purchaser had knowledge that the vendor was a married man, and that the land was his homestead. If fraud could be proved, the sale could be set aside.

HUSBAND'S RIGHT TO PROPERTY

A.S. Man.—"A has no land of his own, and he marries a widow whom we will call B. A has his own horses and machinery and he works B's farm, makes it his home, and improves the place to double what it was worth before he started work. Now B has three children who grew up and left of their own free will, and do for themselves. If B dies without a will, is A entitled to a share or all of the property?"

Answer—Under The Dower Act which came into effect on the 1st of September, 1913, a married man is entitled upon the death of his wife to a one-third interest in the total value of the wife's estate, after all debts, funeral and testamentary expenses have been paid, and in addition he is entitled to a life interest in his wife's homestead. The expression "homestead" as applied to country lands, means a dwelling house, outside a city, town or village, occupied by the owner thereof as his or her home, and the lands and premises appurtenant thereto, consisting of not more than 320 acres.

PEDIGREE FOR COW

F. D. Man.—"Man from whom I purchased a pure-bred cow has failed to give me certificate and to have transfer made in my name. How should I proceed to obtain same?"

Answer—You are entitled to the certificate and are entitled to a transfer. We would think the easiest way out of your difficulty would be to write John Brant, National Live Stock Records, Ottawa, and get a transfer form properly filled out, then tender it to your neighbor for signature. He will doubtless sign it. We would suggest taking the matter up with the National Live Stock Records and they will doubtless penalize him in some way under their rules if he does not make a proper transfer. A threat of this will likely bring him to time. If these means are not sufficient you are

entitled to bring an action against your neighbor for a return of the certificates and to compel him to execute a transfer.

STALLION AT LARGE

R.X. Man.—"My mare was running loose with one or two other horses in the spring. A neighbor had a two-year-old stallion also running at large. The neighbor's horses came into our yard and got with said mare and served her. We find this mare is in foal. In there a fine for letting such a horse run at large, and what action have I against the owner for not being able to use the mare this winter and next spring."

Answer—It is unlawful to allow stallions, one year old or upwards, to run at large any time of the year. The penalty is a fine of not less than \$10 nor more than \$25. In addition to the fine you have a civil action against the owner of the stallion for damages. We cannot say what amount of damages you could prove. It would be for the judge to fix the amount of damages.

PUTTING OUT POISON

Reader, Man.—"What is the law about putting out poison in this province? If I put out poisoned bait to kill coyotes, and dogs are killed by it, am I liable for the value of the dogs, or what is the penalty?"

Answer—Anyone who puts out poisoned bait for wolves is liable to a fine of not less than \$20 or more than \$50, or, in default, three months in jail. Although we know of no decided case on the topic, we think one who sets out poison is also liable civilly in damages to the owners of the dogs poisoned by same.

Saskatchewan

COLLECTING HAIL INSURANCE

C. H., Sask.—"Made application for hail insurance on June 21, through the local agent, who appointed another agent to write up the application. On July we were badly hailed. Sent in claim right away claiming 50 and 75 per cent damage. The company wrote back and said, they did not receive the application until July 3, and said it was too late. I gave a note to cover the policy and have never had either the note or policy sent me nor have they tried to collect the note."

Answer—Usually when an insurance is effected a receipt is given covering the insured until the policy is issued. If your application was properly made there would appear to be no reason why you should not be able to collect the amount due. The fact that the agent delayed in sending your application would not affect your rights in this matter, provided you complied with terms of the insurance by giving notice of loss at the proper time.

HORSE BREAKS INTO GRANARY

X.C., Sask.—"Can I collect damages for a mare lost through taking a feed of wheat out of a neighbor's granary? My horses with some others including neighbors were together when they got the feed. Neighbor says he is not responsible as the granary was closed. It appeared to me not to be fit to hold wheat. There is free range here from the first of November to first of May and all horses have the same right."

Answer—The answer to this question will depend upon the fact whether the granary was properly secured. If you cannot recover, if not you will be able to recover. It would appear that same was not properly secured as the mare could not have secured the grain otherwise. Would advise you to consult a lawyer.

HORSE FALLS IN NEIGHBOR'S WELL

Reader, Sask.—"Neighbor's horses wandered onto my place and one fell into a well which was covered. Can I be compelled to pay for this horse?"

Answer—If your well was properly covered owner of horse could not compel you to pay for same. It would appear that covering was defective and if you are liable to pay for the horse.

LOANS FROM GOVERNMENT

Subscriber, Sask.—"(1) What is the mileage fee allowed veterinary surgeons and doctors in Saskatchewan. (2) Is there a provincial law prohibiting outside horses from being brought into a dry belt in Saskatchewan to be wintered, even if there is plenty of

feed? Where is the dry belt in Saskatchewan? (3) I bought a half section of land and the neighbor's fence was out a short distance on it when I bought it. I have heard that if it is not moved in a certain length of time he can own the land. If so, how long? (4) Will the government grant a new loan to cover an old one? To whom do you apply? (5) Can you give a loan company three months' notice and pay them up at any time?"

Answer—(1) There is no fee or mileage allowance fixed by law for veterinary surgeons or doctors. Their charges will vary with the nature of the services rendered, the cost of travelling and the remedies used. (2) There is no law in Saskatchewan prohibiting stock from being brought in for winter feeding. There is not legally defined "dry belt." (3) Your best plan is to have a written understanding with your neighbor that the fence is on your land with your permission, otherwise make him move the fence immediately. (4) The government will grant a loan for the purpose of paying off an existing mortgage. Write Saskatchewan Farm Loan Board, Regina. (5) You can pay off the mortgage at any time but must pay interest for the full period of the notice.

ASSESSMENT OF FARM LAND

Reader, Sask.—(1) What percentage of the value of occupied farm land may the municipal authorities assess for purposes of taxation? (2) Can a municipal assessment board assess one farmer 100 per cent and others from 60 to 75 per cent of the market value on farm lands? (3) When a person appeals against his assessment, and is refused a reduction by the assessment board, what steps should he take to secure the proper reduction in his assessment, and is he obliged to pay the exorbitant taxes after appealing for the same, and is refused the reduction necessary to put him on equal footing with other taxpayers?"

Answer—(1) Assessment must be made of fair value of land exclusive of value of buildings, and the assessment must be uniform through the neighborhood (2 & 3) Any taxpayer whose appeal has been dismissed by board can appeal to a judge of the district court. He must do so by giving notice in writing within eight days after the decision of the board. If you are not too late you should write to the secretary-treasurer of the municipality of your intention to appeal and the grounds upon which you appeal. You will then receive notice when to attend. If your appeal is not sustained you will have to pay the taxes levied.

THRESHER'S RESPONSIBILITY FOR EMPLOYEES

C.D., Sask.—"To what extent is a thresherman responsible for accidents or injuries to his employees while threshing?"

Answer—A thresher is liable for accidents if he has been guilty of negligence. The question of negligence is determined by the circumstances of each particular case.

DAMAGES FROM SCRUB STALLION

A.B.C., Sask.—"Two mares got in foal to a scrub horse running at large on the prairie last spring. Can I claim damages from owner on my own oath as I couldn't produce witnesses to prove same?"

Answer—If you saw the mare bred and have proof you can collect damages but not otherwise.

CONSENT FOR BOY'S MARRIAGE

R.J., Sask.—"Can a boy under 21 marry without parent's consent? How old must he be before he can run a car?"

Answer—A person under 21 years of age requires the consent of parents before he is entitled to marry. No person under 16 may drive a car.

SENDING CHILDREN TO SCHOOL

X.C., Sask.—"At what age can a boy leave school? Where would one apply for permission to keep a boy at home to assist in seeding? At what distance are children exempt from attending school during bad weather or winter months? Is distance computed by road allowance or as the crow flies?"

Answer—A boy over 14 may leave school. Attendance at school is compulsory during the whole school year. If the school is more than 2½ miles measured by nearest highway, when child is under 12, or 3½ miles when over 12, no penalty is imposed on parent if the child does not attend school.

SURVEYED ROAD ACROSS FARM

L.T., Sask.—"There is a government survey for a road at a corner of land recently acquired by me. It was surveyed six or seven years ago, but no work as ever been done it nor has land taken up by survey been paid for by municipality, survey is registered against land. Public are always travelling across land and in consequence gates are always down letting stock out. Have I any right to keep public from travelling across this land? If not can I make them shut the gates? Also can survey remain without any work being done on it for an indefinite period of time, or does municipality have to pay for it within any set time? What proceedings should I take to force the municipality to cancel the survey or buy the land taken up with the road?"

Answer—Before it would be possible to advise upon this matter it would be necessary to know the exact stage and circumstances in this case and a search at the land titles office would be necessary to ascertain exactly what had been done. Usually in the case of a registered survey the land used as a trail becomes vested in the government and an adjoining landowner would incur very heavy penalties if he obstructed the road. Would therefore recommend you to consult some local lawyer as in this case you will doubtless be obliged to do so before you can settle this question to your satisfaction.

LEGAL RATE OF EXCHANGE

A.B., Alta.—"What is the legal exchange on a cheque?"

Answer—The exchange charged on cheques is largely discretionary with the bank. Fifteen cents is what the ordinary charge would be on a small cheque.

LINE FENCE DISPUTE

A.E., Alta.—"Neighbor joined his fence to mine. Can I claim half the cost of the line fence?"

Answer—If your neighbor joins his fence to yours, he is liable to you for one-half the cost of the line fence, even though it is not quite straight. If he refuses to settle, you should get a copy of The Fence Ordinance and follow the provisions set out therein. Copy may be obtained from the Department of Agriculture, Edmonton.

BUYING AT AUCTION SALE

G.H., Alta.—"Bought two pigs at an auction sale. When I got them home found them lame and stunted. They have not improved nor are likely to. Have I claim against the vendor?"

Answer—If a man buys at an auction sale without any warranty he is supposed to examine what he is getting and has no come-back.

LEASING SCHOOL LANDS

A.J., Alta.—"When are school lands sold? To whom should I apply for the lease of school lands?"

Answer—School land sales are brought on from time to time by the Dominion government. For particulars as to leasing and sales, write to the Department of the Interior, School Lands Branch, Ottawa.

HOGS RUNNING AT LARGE

Reader, Alta.—"Is there a law in Alberta prohibiting hogs and sheep from running at large?"

Answer—Amendments to the Act Restraining Dangerous and Mischivous Animals passed in 1919 prohibit hogs from running at large at any time in any part of the province, and makes the owner of sheep liable for any damages done by sheep passing through, under or over any fence, whether lawful or not.

DRAWING UP A WILL

J.J., Alta.—"Does it make any difference who draws a will? Is it necessary to have a lawyer?"

Answer—It does not make any difference who draws a will, so long as it is properly drawn and witnessed, but a person who receives any benefit under the will should not be a witness to it, as, while the will is valid, the witness would not be allowed to receive anything under it.

GEESE RUNNING AT LARGE

X.A., Alta.—"Is there any law against geese running at large? A flock will do a lot of damage if they get into a wheat field."

Answer—Yes. See Stray Animals Ordinance, Chapter 80 of the Consolidated Ordinances of Alberta. You can obtain a copy of this Act from the Department of Agriculture, Edmonton.

GETTING A DIVORCE

W. W., Sask.—"What does a divorce cost in Saskatchewan? Does cause have to be given, husband and wife both wanting divorce? Which party would have custody of a baby boy eight months old?"

Answer—The total cost would be between \$300 and \$1,000. The court decides upon the question of custody according to circumstances, usually the innocent party is given custody of the child.

MAN DIES WITHOUT WILL

G. A. H., Sask.—"I would like to ask what is the law regarding estates in Manitoba when a man dies without a will. I understand a wife is entitled to a one-third interest. Does she forfeit her interest if she remarries again? Do the children come in for all the estate then, and when the children all come of age have they any say in the selling of the property?"

Answer—When a man dies without leaving a will his wife is entitled to a one-third interest in his estate. She does not forfeit this interest if she re-marries. The children of the deceased are entitled to equal shares of the remaining two-thirds of the estate. If there are debts, and there is no personal estate to pay the debts, an administrator has power, while the children are infants, to sell the real estate for the purpose of paying debts. If there are no debts, and no personal estate to provide for the maintenance and education of the children, the property may be sold with the approval of the Registrar-General or of a Judge of the Surrogate Court. After the children become of age, the property should be conveyed to them by the administrator, and they would then have the same right to sell that any other person would.

WHO IS THE HEIR

J. S., Sask.—" (1) How would the property of a man dying without a will be divided. He is married and has no children. (2) If A rents a farm to B, and B uses A's horses and machinery, and A finds the seed, what share of the crop would A and B have respectively?"

Answer—(1) The wife is entitled to all property. (2) There is no law on this subject. It is entirely a question of what has been agreed on between the parties. We think the usual practice is for each to take half and pay half the expense but there is no law on the matter. See articles on share farming in recent issues.

HOW IS PROPERTY DIVIDED

J. J., Sask.—"When man dies without making a will in what proportion is the property divided among wife and sons?"

Answer—The wife takes one-third and the children two-thirds.

LEAVING PROPERTY TO WIFE

E. H. H., Sask.—"If a man dies leaving all his property to his wife, could the family break the will if they were not left at least one dollar?"

Answer—A will, leaving property to wife, is perfectly legal. It is not necessary to leave anything to any other member of the family.

DIVISION OF PROPERTY

S. J. L., Sask.—" (1) How would the property of a man dying without a will be divided in Saskatchewan? He is married and there are no children. (2) A Man buys a piece of land, which the neighbor on adjoining land has piled stones on. Can neighbor he made remove these stones? If so, how? Neighbor has already been requested to do so, but has done nothing."

Answer—(1) All the property would go to the widow. (2) You can bring an action for damages if neighbor does not remove stones after having been requested to do so.

MARRYING WITHOUT CONSENT

Reader, Sask.—"A wishes to marry B's daughter, but B does not favor the marriage. What steps should A take to marry the girl? She is eighteen years of age. At what age is a girl free to marry without her parent's consent? Can A get a license without the consent

of B? How? If A marries the girl can B take her back? Can he claim damages from A for marrying her?"

Answer—A girl residing with her parents cannot marry until she is twenty-one unless she secures the consent of her parents. "A" cannot get license without this consent, or until the girl reaches the age of twenty-one.

WIFE'S RIGHT TO GO AWAY

Subscriber, Sask.—"Can a man stop his wife going to see her parents in the Old Country providing she finds the money for the journey herself out of her own private income?"

Answer—No. In this case the wife merely intends to leave her home temporarily for the purpose of visiting friends, but even if she intended to leave her home permanently, and so expressed her intention, there would be no legal means of preventing her doing so.

MARRIAGE OF COUSINS

Subscriber, Sask.—"Are first cousins allowed to get married in Canada?"

Answer—Yes.

QUESTIONS ON TRAPPING

A. D., Sask.—" (1) Is it lawful to trap wolves on vacant land? (2) If a man's dog gets in a trap set on vacant land, can he collect damages? If so, how much? (3) Can I set traps on my own land? (4) Is it lawful to leave traps set over night? (5) Can a man collect damages if his dog is caught in a trap on my land? If so, how much?"

Answer—(1) Yes. (2) Not unless dog were enticed by strong smelling meat or other bait. (3) Yes. (4) Yes. (5) Not unless dog enticed as above.

POISONING WOLVES

H. S. H., Sask.—"Is it against the law to poison wolves on your own property? Is there any law as to the distance poison may be placed from a public road if you are permitted to put it out?"

Answer—It is not unlawful to place poison for wolves on one's own land, but it must be placed so as not to be a danger to any animal passing along the highway. The distance will depend on circumstances.

NEGLIGENCE OF DOCTORS

R. J., Sask.—"Wife had an operation which was successful. Later X-ray treatments were ordered in course of which she was badly burnt. Can damages be collected from the doctors for negligence in X-ray treatment?"

Answer—The doctors have apparently been negligent and if you could prove this you could recover damages against them. It is however difficult to obtain the evidence of other doctors as "professional etiquette" prevents one doctor from pointing out the mistakes of another.

PLANTING TREES ON ROAD

X. M., Sask.—"Is it lawful to plant trees along side the fence on the road allowance? How far from the fence are you allowed to plant them? Can people be prevented from driving over them?"

Answer—It is not lawful to plant trees on the road allowance consequently they may be driven over with impunity.

DOCTOR'S BILL TOO HIGH

W. P., Sask.—"A was attended by physician B for fever. A moved away later and B sent him bill for \$480, which A considers too high. A offers \$400. B threatens to sell A's land if bill is not paid in full. Has he that power?"

Answer—B could only sell the land if he recovered judgment against A in an action for the amount of his bill. If the court considered the bill too high, it would only award such amount as it considers reasonable. After judgment recovered, it would be at least one year before B was in a position to make application for sale.

DOCTOR'S CHARGE

P. B. B., Sask.—"Engaged doctor for confinement case. When I went for him he was away, so left word but got other help. Went again to tell him not to come, but in meantime doctor had come. Claims

\$25 and automobile bill. I gave him \$5. Can he collect any more?"

Answer—Since you requested the doctor to come, you are bound to pay him a reasonable fee and the sum asked, whilst possibly rather high, could probably be recovered from you by action. It is very difficult to dispute a doctor's bill, and we would recommend you to endeavor to make a compromise by say meeting the doctor halfway. You will have to pay his livery bill in addition.

POWLS RUNNING AT LARGE

J. T., Sask.—"Neighbor's poultry have damaged my crops for years. Have notified him to shut them up. He refuses. Are chickens and geese free to run at large. Can I compel him to keep the fowls shut up? If they leave noxious weeds, can I claim damage?"

Answer—There is no law against fowls running at large. Your recourse is to seize the fowl when they are on your place and hold them until the owner pays damages. You would have difficulty in proving that the fowls carried noxious weed seeds on to your land. You might have difficulty too in seizing the fowls. The law specifies that the fowls must be seized while on your land. You might have trouble getting your hands on active hens. However, that is the law in the matter.

CHARGE FOR KEEP OF GELDING

L. M., Sask.—"A put notice in paper to the effect that stray gelding should be claimed by owner proving property and paying expenses. Four days later B claimed gelding. A made a charge of \$25 for animal's keep for two months. Is A entitled to this charge, and should he not have advertised the animal sooner?"

Answer—A cannot make this charge lawfully. If the owner and the finder of the animal are unable to agree as to the amount of expenses or damages, owner can complain against the amount to a justice of the peace and the justice of the peace shall determine the amount of the expenses or charges to be paid. Notice should be sent to the King's Printer by the finder within 10 days after the finding if the owner of the animal is unknown to him.

GAVE LAME HORSE IN TRADE

W.N.A., Sask.—"A and B traded horses, A to give old horse and a certain sum of money, and B to give a lame but strong horse. If horse did not get better, would A be obliged to pay money?"

Answer—If B represented that the horse would be better at or before the time of sale, A cannot be forced to pay, but it will be very difficult to prove this representation.

FARMER SELLING MEAT

S. H., Sask.—"Does a farmer have to have a legal slaughterhouse and a license to sell meat in local town?"

Answer—A farmer may sell the products of his own farm without having a pedlar's license. He does not require to have any particular kind of slaughterhouse.

UNGUARDED WELL

J. C., Sask.—"Mare fell into disused well on my neighbor's farm, and when found was dead. The well is not guarded in any way and stock is allowed to run at large in the district from November to May. Am I entitled to damages for loss of mare?"

Answer—A man is not allowed to have an unguarded well upon his farm, and you could, therefore, recover damages against him.

POST OFFICE HOURS

Reader, Sask.—"What hours must a village post office remain open?"

Answer—The hours depend upon the nature of the office but would probably be from 8 a.m. to 6 p.m.

CARRYING A GUN

Subscriber, Sask.—"Is there any law forbidding any one killing a dog that runs out to the road and charges at teams or people on horseback? Is there any law forbidding a man carrying a gun in the province of Saskatchewan?"

Answer—If it were the only way to protect self or animals in possession from injury it would be legal to kill the dog. There is nothing to prevent man from carrying gun.

COLLECTING FOR HORSE KEEP

W. W., Sask.—"Last fall took a horse to board for \$30. As feed was scarce this spring the owner told me to turn the horse loose and let him run until herd law came into force. Owner caught the horse and took him away, promising to pay for board when he received some wages due him, but has failed to pay same. This fall horse came back. Can I dispose of him to pay for board? He is only a pony and is not worth more than \$30."

Answer—If you are a livery stable keeper you have a lien on the colt for the amount of your bill, and if the owner does not pay the indebtedness within one month from the time that you detained the colt, you can sell the colt by public auction on giving two weeks' notice of sale by advertisement in the newspaper published nearest to your stable. If you are not a livery stable keeper you have only a common law lien and your proper recourse would be to detain the animal, but you cannot dispose of same without an order from the court; you should then sue for the amount of your bill and ask enforcement of your common law lien.

TIED CAN TO DOG'S TAIL

Subscriber, Sask.—"Missed my dog a few days last week, and when he came home he had a tin can wired on to his tail and had been castrated. Several dogs in this locality have met with similar treatment. (1) Has a man who owns a bitch a right to treat dogs in this way? (2) What redress have I if I can prove who did it? (3) Can I claim damages as my dog is a pure-bred spaniel and considered valuable."

Answer—(1) No. (2) Your redress is to bring an action for damages. (3) You can recover damages for the value of the dog and for trespass.

Alberta

SETTING OUT TRAPS

J. H., Alta.—"(1) Can a man set out traps on his own land to catch coyotes, the land being all enclosed by wire fence? (2) Is he liable if any dogs get caught in said traps?"

Answer—(1) Yes. (2) No.

THRESHER BREAKS AGREEMENT

Reader, Alta.—"Can a thresherman pull through or past your land in Alberta without threshing said land, when he formerly had agreed to thresh same, no reason having developed in the meantime why he should not?"

Answer—If you can prove the agreement and that you have suffered damages through its breach, you can hold the thresher liable in an action for damages for breach of contract. Better consult your lawyer.

ANIMALS AT LARGE

Alberta Subscriber—"(1) A's hogs and chickens damaged my crop. He refused to keep them home. Is he liable for damages, and can he be compelled to keep them home? The field is fenced, but not with a legal fence. Does this make any difference? Can he let his hogs run in the winter months? (2) Who is responsible where five of neighbor's chickens die as result of eating poisoned grain put out for gophers around the crop? What is the Alberta law in regard to gopher poison? (3) One of my horses, while running loose, crosses cattle guard on railway and is killed by train. Can I recover from railway, or am I liable for damages caused to engine?"

Answer—(1) The owner of hogs can be compelled to keep them at home under the provisions of "The Dangerous and Mischievous Animals Act." An injunction of the court might be obtained compelling the owner to keep his hens away from your crop, or you could detain and impound the fowl while on your premises until such time as you are paid the damages. (2) Provisions regarding the sale of poison may be found in "The Alberta Pharmaceutical Association Act," being Chapter 38 of the Statutes of Alberta, 1910, second session. In the absence of negligence in the placing out of the poison you would not be responsible for the loss of your neighbor's chickens who came upon your property and ate the poison intended for gophers. (3) Animals are not allowed to run at

large within half a mile of a railway crossing. If your horse got at large outside this distance and was killed, you should be able to recover damages to the value of the horse.

DOCTOR'S LIABILITY FOR TREATMENT

Reader, Alta.—"Man had leg broken about six months ago. Had doctor set same. Doctor has assured man all along that it was a fine set. Man not satisfied went to city. Had an X-ray taken, which showed leg set crooked and lapping. Expert surgeon said would have to be cut open, broken over and react to ever get well, which has been done. Can first doctor collect his bill? Can any action be taken to gain compensation for harm the first doctor has done the man? How would you proceed against him?"

Answer—You can refuse to pay the doctor's account, and if he sues can counterclaim for damages for improper treatment. The result would naturally hinge on the evidence given by other doctors.

DOCTOR NEGLIGENT

Reader, Alta.—"Young man broke his leg seven months ago. Doctor set same and attended same as regularly as he thought necessary. At about end of 5 months a trained nurse examined the leg, advised sending the man to the hospital. Have X-ray taken, which was done. X-ray showed very bad set and surgeon claimed it would never be well unless broken over and re-set, which has been done. First doctor maintains that leg need never have been broken and re-set.

Answer—According to your statement the country doctor has been negligent and is no doubt liable for damages. If you cannot get a satisfactory settlement with him personally, you should employ a reliable lawyer to bring action on your behalf.

BOY RUNNING A CAR

C. P., Alta.—"Can a person under 16 years of age operate an automobile. Can he run his father's car?"

Answer—The law prohibits any one under sixteen years of age from driving an auto, and there is no method by which any exception can be made to the law.

HORSE NOT AS REPRESENTED

J. O. S., Alta.—"A bought horse from B in May, 1919. B assures A the horse will work against any horse A owns. Horse proves of very little use to A. Can B compel A to keep horse and pay for it? Can A return horse and recover amount paid?"

Answer—A should have returned the horse, or notified B that the horse was not as represented, as soon as he found it out. A can refuse to pay balance, and if B sues him can defend and counterclaim in damages for the full balance or more, or he can pay into court what he considers he owes B and counterclaim for the remainder of the purchase price. A will have to explain cause of his delay in acting.

STALLION NOT AS GUARANTEED

J. B., Alta.—"A purchased pure-bred stallion from B for \$1,200, paying \$100 cash, balance over three years. B guaranteed the stallion 60 per cent foal getter. This was not put in the contract. B agreed to insure stallion, which he did not do. Stallion proves to be a 10 per cent foal-getter. Can A make B take him back?"

Answer—If A can prove that the verbal guarantee was a part of the original contract he would be able to succeed in compelling B to take back the horse. A can bring the action, or let B bring action against him on the note, when A can defend and counterclaim for damages. The chances are that B has parted with the notes, in which case A would have to take action himself. A should notify B at once, as the longer the delay the less chance A has to succeed.

POWER OF ATTORNEY

S. O. S., Alta.—"A gives B power of attorney. A now wishes this power to cease. What are the proper steps to take? The local bank holds the power of attorney papers. Should they be given back to A?"

Answer—A should write out and serve on B a revocation of power of attorney. He might also notify the bank that he has done so.

LOSS OF HEIFER AFTER PURCHASE

X. Y. Z., Alta.—"Bought cattle from A on time same to be left with A until after an auction sale, he promising to take care of them. When I went to take cattle home, one heifer was found drowned. A having neglected to go with the cattle or send anyone with them to their drinking hole. Heifer went through a hole in ice, and was drowned?"

Answer—If the note has been disposed of by A you will have to pay it and bring separate action against A for damages, the amount being for the value of the heifer. If A retains the note and brings action against you, you could counter-claim for damages for the value of the heifer paying the balance and costs into court. The question of A's liability would be a matter of evidence as to his negligence.

CARRYING FIREARMS

W. S., Alta.—"Can used firearms be carried across from Canada to the United States by an American citizen without duty on same?"

Answer—You are not very specific as to the facts of the case. If you are returning to the United States to reside you would not be required to pay duty on used firearms which would be admitted free as personal effects. Otherwise you would have to pay duty, unless the firearms are of American manufacture, in which case we are under the impression that the duty would be remitted.

LAW ABOUT PASSING AUTOMOBILES

F. J. R., Alta.—"Will you publish the law in Alberta in regard to automobiles and other vehicles passing each other, when going in the same direction? There is a dispute here in regard to the matter, some claiming that a person passing another going in the same direction shall turn to the right of the one ahead and that the one ahead shall turn to the left. Others claim directly opposite."

Answer—Section 29 of the Motor Vehicle Act of Alberta, 1918 provides that: "a motor vehicle being overtaken by any motor vehicle and the person in charge of such motor vehicle expresses a desire to pass it shall be the duty of the driver of any such vehicle so overtaken as aforesaid, as soon as practicable to turn to the right of the centre of the travelled portion of the highway, and give the person so making the request an opportunity to pass."

TROUBLE OVER LIEN NOTE

O. J. S., Alta.—"A bought a calf from B at an auction sale. A gave B a lien note for same. A sold calf without B's knowledge. If B wanted to collect note, would A have to produce the calf or would B have to hunt the calf up. What steps should B take?"

Answer—B would have to hunt up the calf in order to take possession of it under the lien. If he cannot locate the calf he can bring action against A, subpoena him as a witness, and thus make him tell what disposal he has made of the calf. He could at the same time obtain judgment against A for the amount of the note.

LAW ABOUT HOGS

F. B., Alta.—"What is the law concerning damage caused by pigs in neighbor's grain, in Alberta?"

Answer—Under the act for restraining dangerous and mischievous animals, an amendment was made in 1919 to the effect that no hog shall be allowed to run at large at any time in any part of the province, and the owner of any hog shall also be liable in a civil action for any damage done by it while running at large, whether or not the land upon which the damage was done is surrounded by a lawful fence. You have, therefore, a right of action for damages against the owner of the pigs.

CROSSING ANOTHER'S LAND

Reader, Alta.—"Have a lot of live stock that I have to haul water for, from the Red Deer River. The government road survey is not passable on account of cut banks and breaks, which causes me to have to cross another man's homestead. Can this man legally stop me from crossing with the water? If he has patent for his homestead can he stop me? If he has not a patent for his homestead can he stop me?"

Answer—If there is not an established trail across the homestead, the homesteader can stop you whether he has patent or not.

EMPLOYER AND HIRED MAN

The following questions cover a good many of the troubles that come up between the farmer and the hired man. Answers aim to give the information asked for by the inquirer as well as to be a guide to others who may find themselves confronted with the same problem. It is not supposed that these questions and answers cover every dispute that may arise between employers and employees,—it would be impossible to frame any set of answers that would apply in all cases—but they do cover some of the most common problems that come up. Should any reader—farmer or man—have anything that is puzzling him about his rights as an employer or an employee, a definite answer in his particular case will be made if the facts are fully and clearly presented. Write on one side of the paper only, and be clear on the main points. Address, Nor-West Farmer, Winnipeg, Canada.

HIRED MAN QUITS

G. F. C., Sask.—"Hired boy 17 years old to work on farm for one year. There was no written agreement. Boy left before expiration of year without justifiable cause. Can he collect for time he has worked?"

Answer—The contract is entire, and hired man, having left without justifiable cause, cannot collect for the time he has worked. This hired man, however, is a minor, and he could recover on a quantum meruit for the length of time he has worked, as he would not be bound by the entire contract unless it could be shown that the contract was for his benefit.

HIRED MAN IN TROUBLE

Reader, Man.—"Am working for a farmer by the year at \$66 per month. He allows me \$45 per month which is not enough to board myself and family, buy coal, etc. How can I better this? Took sick recently and sent for a doctor. Meantime employer hired another man and I boarded him. Employer deducted lost time from my wages telling me I was supposed to do the work, not the other man. Work all the time, Sunday included. Have a lease paper but nothing like this is mentioned in it. Can I give employer a month's notice and quit?"

Answer—You refer to a "lease paper" which, we take it, is the contract of hiring. Without this contract before us it is difficult to give you definite advice on the questions asked. If the contract provided for a yearly hiring at \$66 per month, you are entitled at the end of each month to payment of \$66, and if your employer refuses to pay you your monthly wage in full, you are entitled to leave, with or without notice. However if the contract provides that you are to receive \$45 per month and the balance at the end of your term of service, you must be content with this, even if it makes it inconvenient for you to live. Your employer had no right to deduct your wages for the time you were ill. If your illness should continue for a long period, he might be justified in dismissing you from his service but as he has not done this he is not entitled to dock you for the time you were ill.

HIRED MAN NOT SATISFACTORY

M. M., Man.—"Hired a man for the season for \$70 per month. He claimed to be experienced, but is not. Is sulky, unwilling to work, and, on the whole, quite unsatisfactory. Can I deduct any part of his wages on account of this?"

Answer—Your remedy is to terminate the engagement. If the man is inexperienced or refuses to work, you have grounds for cancelling the contract. Wages had better be paid up to the time of dismissal.

EMPLOYER USED UNFAIR LANGUAGE

G. H. S., Man.—"My employer and I had a quarrel in the course of which he used unfair language, and I left his employ without giving notice. He came after me and asked me to return, but I refused. Do you think I have a right to sue for wages?"

Answer—If your employer was abusive and used threatening language, you would be justified in leaving his employ and collecting wages for the time during which you worked for him. However, you state that his language was "unfair," and the fact that he sought you out afterwards and asked you to return to your work, rather indicates that you left without adequate cause, in which case, if your contract of hiring was an entire one, that is, for a definite period of time, you

would not be entitled to collect the balance owing to you. We are not in a very good position to advise you, owing to the fact that you have not given the terms of the contract of hiring.

SUNDAYS AND HOLIDAYS

Reader, Man.—"Does a hired man on the farm have to work on Sundays, or does he get every other Sunday off, where nothing about same is mentioned in the contract? Is a man supposed to do chores on Sundays? What are the legal holidays for a hired man on the farm in Manitoba?"

Answer—If nothing was said in the agreement about Sunday work, it would depend on the custom in the district. If other farmers gave their men every other Sunday off, you could claim the same. If there is no established custom and nothing was said about it in the agreement, the man is not so entitled. Doing the chores on Sunday is a matter that should be settled by mutual consent. The hired man should help although except in the absence of the employer, he would hardly be expected to do all the work. There is no established custom that we know of about holidays among farmers. There are no legal holidays.

HIRED MAN NO GOOD

R. J. B., Man.—"Man claimed to be experienced farm hand and hired for seven months at \$65 per month. Has proved himself inexperienced, sulky, unwilling to work and, on the whole, very unsatisfactory. When settling up, could I deduct any part of his wages and give to a man who has done good work—if so, how much?"

Answer—We do not think you are entitled to adopt the method suggested in your letter. Your remedy if a man refuses to work or is inexperienced, is to terminate the contract. If the contract is terminated by reason of the man's fault, he is not entitled to any wages if it was agreed, in the first place, that the money was not payable until the end of the term. If the money accrued due from month to month, he is not entitled to any wages for a month uncompleted.

EMPLOYER AN INVETERATE GRUMBLER

C. W. A., Man.—"I hired with a farmer in the spring for eight months at \$70 per month. Have worked steadily right along, holidays and all. He, however, is an inveterate grumbler, and life with him is miserable, although I do my best for him. I am a man of ten years' experience, with the best of references. I feel, however, that I cannot remain much longer in his employ, so what I like to know how much time or notice I must give before I can quit and claim my money?"

Answer—As the contract of hire was for a definite period of time, you cannot terminate your employment until the term of service is completed, without making yourself liable to your employer for damages for breach of contract. We doubt very much if your employer's disagreeable attitude towards you would be regarded as cause for leaving his service without notice. If you were engaged at a monthly wage, you would be entitled upon leaving your employment, to collect your wages for the time that you actually worked, but your employer, in claiming damages, would be entitled to recover from you any damage that he might sustain by reason of your leaving. If he could hire another man immediately, at the same rate of wages, then he would have no damages. We would advise you to try to stick it out to the end of your term of service.

WHAT IS MEANT BY A "MONTH?"

P. M., Sask.—"If a man hires by the month and began work on the twenty-fourth of the month, is his time up the twenty-fourth of the next month, or twenty-six working days from the day he started?"

Answer—Unless the agreement was otherwise, the month would be a calendar month and thus, the man's time will be up on the twenty-fourth of the month.

COLLECTING INTEREST ON WAGES

E. G., Sask.—"Can a hired man ask interest on wages due him while working on a farm, and after he left the farm if he is not paid at that time? Who will have to pay the expense if the hired man goes to a justice of the peace for collecting such wages and interest?"

Employer and Hired Man

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Answer—Hired man cannot collect interest on wage claim. The party who loses case will have to pay the costs which are fixed under the Master and Servants Act. These costs do not provide for a commission to the J.P. for collecting the money.

OUTFIT

H. B. S., Sask.—"I engaged on a threshing outfit at \$5 per day and board; nothing was said about part days. (1) What constitutes a day's work? (2) If the machine runs seven hours, can I collect a full day's pay? (3) What can I collect for two hours? (4) Are half-days recognised in law, or can the thresher make me take pay by the hour?"

Answer—(1) If nothing was said about this when you hired, a day's work will be whatever hours it is customary to work on a threshing machine in that locality. (2) No, unless seven hours constituted a day's work; if it was customary to work eleven or twelve, you could not collect a full day's pay for working seven. (3) For two hours you could collect only the proportion of the day it represented. If a ten-hour day was recognised and you worked two hours, your time would be two-tenths of a day. (4) The law would recognise half-days, unless you contracted to work the full day and, by your own fault, you did not do so.

LIABILITY OF GROOM

S. B., Alta.—"(1) Would a groom be responsible if the stallion he was travelling died during the season? (2) Does a homesteader have to pay school tax before he gets his patent?"

Answer—(1) The groom would be responsible for acts of negligence only. If the horse died through no fault of the groom's, he cannot be held responsible. (2) Yes.

HIRE MAN TAKES SICK

Reader, Sask.—"A hires to B as tractor operator by the month. Two or three days before his month is up, A falls sick, the strenuousness of the work and the quarters furnished doing much towards causing his sickness. As a result A is compelled to leave, with B's permission, and as he stays sick all summer, is unable to return to work, as he expected at first. Agreement is only verbal and without witnesses. Nothing was said about sickness. Is A entitled to a full month's wages or has B the right to deduct for the time A lost on account of sickness?"

Answer—A is entitled to a full month's wages.

HIRE MAN'S DUTIES

Reader, Sask.—"A hires a man for \$60 a month for seven months, verbal agreement, before a witness. Man now refuses to get up in the morning to be ready for work at 7 o'clock with a four-horse outfit. (1) Can I charge him up for lost time in the morning as he does not get out until 8 o'clock. (2) If he quits will I have to pay him? (3) If I discharge him will I have to pay him seven months' wages? (4) Can he collect wages if he does not do as asked to do in reasonable hours? (5) Should there be a written agreement stating time to get up and be ready to work at a certain time, and doing other chores such as pickling grain? (6) Is he entitled to every Sunday afternoon. He attends horses morning and noon."

Answer—A hired man is bound to comply with the reasonable orders of his master. If he does not do this you can discharge him, in which case you would only have to pay him for the time employed and would be entitled to make deductions for any time lost through his idleness. No written agreement is necessary, and the work and hours demanded by you are reasonable. It is also reasonable that he should have a half-day every week to himself.

PAYMENT FOR BREAKING TONGUE

Subscriber, Sask.—"A works for B on the farm and one day had occasion to draw a loaded wagon on to the barn floor. When the team got into the barn about two or three yards they could not pull the wagon any further on account of the floor being very wet and slippery. A tried to back up, and in doing so one of the horses fell and broke the wagon tongue. B offered him \$4.75 for this. It was an old wagon tongue which had been patched up. Had B the right to make A pay for the damage?"

Answer—We do not think in the circumstances that A could be charged with such carelessness as would entitle B to charge him with the value of the wagon tongue.

QUITTING JOB BY GIVING NOTICE

G. R., Sask.—"Man hired for eight months. Can he leave by giving a month's notice? Does the notice expire at the end of the month? Can he collect wages due him?"

Answer—If a man hires for eight months, he cannot legally terminate engagement before that time. If he has not engaged for any stated time, he must give a reasonable notice of his intention to quit. What is reasonable depends on circumstances, but thirty days is adequate, and if wages are payable by the month, it is proper that the notice should terminate at a period when wages are due and payable.

HIRE MAN DEFRAUDED OF WAGES

C. J. B., Sask.—"A hired to B for one year, but they could not get along, so A was discharged. A could not read or write, so B got him to sign a receipt for the wages due him, telling A he was signing a statement that he was quitting. A got no money. Can he collect his wages in spite of having signed the receipt?"

Answer—A is entitled to his wages in spite of the receipt. It is only a question of being able to convince the court that he did not actually receive the money for which he gave receipt.

HIRE MAN INJURED AT WORK

W. J. C., Sask.—"A hires with B at a stated wage per month. B instructs him to plow the summer-fallow eight inches deep. While doing this A is thrown from the plow, due to the plow striking a stone, and is ruptured. A consults a doctor, who advises him to be operated on. A is laid up for two weeks. Do A's wages stop while he is laid up? Who pays for the operation, A or B?"

Answer—A's wages would not stop while he was laid up. As to who should pay the doctor, it is a question as to who called him in. If A summoned the doctor, he must pay for the doctor's services.

RIGHT OF BOY TO WAGES

E. L., Sask.—"Can father collect a boy's wages if boy is over 18 years of age? Is the boy allowed anything for spending money? Is there any way the boy can collect his wages? If the employer hires the boy and pays the boy his wages, can the father collect them again?"

Answer—The boy is entitled to receive his wages personally, and if the employer refuses to pay he can be sued by the boy. If the employer pays the boy, the father cannot collect again.

FARMER BREAKS AGREEMENT

Reader, Sask.—"Married man hired to a farmer for a year at so much for the year, free house and all the milk, butter, meat and vegetables needed by the hired man and his family. Farmer failed to supply any butter, potatoes or other vegetables during May, June, July and August, so I gave notice that I was going to quit. Worked six months. Am I supposed to take half a year's wages or so much per month for the time worked?"

Answer—You are entitled to quit for the reason given, viz., breach of the agreement by your employer, but you cannot recover more than the half-year's wages. You were hired by the year and are entitled to wages for such proportion of the year as you put in.

DISCHARGING THE HIRE MAN

S. G., Sask.—"Can a farmer discharge a hired man without notice? If not, what notice should be given?"

Answer—If you have good cause for discharging the man, that is if he is no good, or refuses to work, he may be discharged without notice. Where men are hired by the month, it is customary to give a month's notice if you want to terminate the contract, except for such reasons as are stated above. If the contract is for a year or other stated time, the hired man cannot be discharged until the end of the period, except he is no good, refuses to work, etc.

HIRE MAN BECOMES DISAGREABLE

Reader, Sask.—"Engaged a man last spring for seven months, at a stated wage per month. After a time the

man became very disagreeable, would talk back and not do his work the way I told him, always telling me that if I would say the word, he would quit. No written agreement was made, but my wife heard the agreement made verbally. If I hire another man to take his place at higher wages, can I deduct the difference in wages from what is due the first man? Must I pay him all or any of his wages, and how soon?"

Answer—Although you do not say so, we assume that the man broke his contract by leaving before his time was up. If he did that, he is not entitled to any wages. If you discharged the man, you would have to pay him for the time put in.

INJURED BY EMPLOYER'S HORSE

O. R. B., Alta.—"Hired out for a month, and at the end of the first week, on Sunday night, whilst feeding oats, a horse knocked me to the ground and jumped on me, injuring me inwardly. The doctor visited me three times at the farm and told me I must take a good rest. Farmer would not pay doctor. What claims can I make?"

Answer—In the absence of negligence on your part you should be able to recover a month's wages from your employer. It is, however, a matter in which the farmer and yourself should get together and agree on the settlement, as no doubt you would both be out of pocket if you go into court.

MAN CANNOT GET SETTLEMENT

J. L., Alta.—"Have been working on a ranch for three years, and have had no settlement. Have had money off and on, but never any settlement. Am living on the ranch in separate house. If the farm was sold under the hammer, could I collect my back wages? Am hired by the year at so much per month."

Answer—If "under the hammer" means sale or foreclosure proceeding, under mortgage, you could not collect wages as a preferred claim. If you mean that the owner makes an assignment for the benefit of creditors, three months' wages would be preferred, and you would be pro rata with other creditors for the balance.

WORKING HOURS ON THE FARM

A. E. J., Alta.—"A hires in B on the understanding that he is to work ten hours per day in the field and look after the team. In keeping to this agreement A unhitched at 6 p.m., but B's watch was slow and he was dissatisfied. How many hours should A work?"

Answer—If there was a definite agreement about the hours per day, A should be governed by it. If the agreement was oral and not clear on this point, A should work the number of hours per day that hired men ordinarily put in at that locality. In court, ten hours would probably be considered a fair day's work.

CONTRACT WITH HIRED MAN

The hired man is a constant source of trouble and anxiety to the farmer. Disputes often arise on the question of wages and the term of service, and that there should be those disputes is not remarkable in view of the very slipshod manner in which the contract for employment is entered into, where the precise conditions are often only very vaguely indicated. If a proper written contract were entered into there would be no difficulty in defining the rights of the parties, but this is a counsel of perfection which is seldom practicable to follow.

The engagement is usually verbal and words and terms are employed, the precise legal effect of which are often quite contrary to the real intentions of the parties. The high wages paid at harvest time are a

great temptation to the hired man to leave before his contract or service is ended and the farmer not infrequently finds himself involved in a law suit and in loss owing to the lax method in which he has made the contract. A few hints to enable the farmer to secure protection will not be out of place.

The contract should be made for a fixed period at a fixed sum, for example, till "frees up" for \$500. But even though a monthly rate is stated it will not affect the time for which the service is to endure provided the period is stated. If, therefore, a man leaves his employment before the stated period has expired he has broken his contract, which is an "entire" one and he is not entitled to any wages even for the time during which he has worked. Where the wages are to be paid monthly or where the man is engaged merely at so much per month, he is entitled to receive his wages at the end of each completed month of service.

Where the contract is merely by the month the man must give reasonable notice of his intention to leave his employment. If he leaves without notice he is not entitled to receive any wages for any portion of an uncompleted month of service, and he may be liable to his employer in damages, or breaking or determining his contract without reasonable notice, and thus forfeit any wages which may have been earned by him, but not actually paid to him. A hired man may be dismissed on the grounds of incompetency or neglect of duty, or wilful disobedience to his employer's lawful and reasonable orders, and even a trifling disobedience may render the servant liable to be summarily dismissed. Insolent and disrespectful language, or improper conduct, are also grounds for dismissal, but a single act of insolence, unless very gross, would not justify an employer dismissing his hired man.

The man may leave without notice, if his life is endangered by any act of his employer, or by his employer's neglect of duty; for instance, his neglect to furnish board, or by his failure to carry out his part of the contract. But if the wages are payable monthly and are in arrears, the hired man is not justified in putting an end to the contract, and quitting the job, unless he has good grounds for believing that his wages will not be paid.

A man is entitled to receive wages whilst temporarily incapacitated, by reason of illness, even though the illness may have been caused by the man's own act, but if the illness is of such a nature as to render him incapable of carrying out his duties the employer may be justified in terminating the contract, but should notify the man of his intention to do so. The employer is not liable to pay for medical services to the man unless he, the employer, himself calls in the doctor, but he may, if he ratifies the act of the man, become liable to pay for the doctor called in. If, however, the employer pays the doctor, he cannot deduct the amount paid from the man's wages, unless there is an agreement between employer and man entitling him to.

Most of the troubles that come up between the farmer and hired man are the result of an imperfectly defined understanding at the time the engagement is made. Both parties should be as clear as possible in the essential points of the undertaking: length of service, wages, payment of wages, hours of labor, Sunday work.

The form of contract shown below is offered as a model to go by in drawing up an agreement in writing between a farmer and hired man. It is not a "model" agreement in that all the clauses may suit every condition but a model rather as to the form in which it is drawn and the language used to describe each party's undertaking:

SUGGESTED FORM OF CONTRACT BETWEEN FARMER AND HIRED MAN

THIS agreement made in duplicate this first day of April, A. D. 1920, between:
A. B., of the Post Office of Holland, in Manitoba, farmer, hereinafter called the employer
(of the first part)

—and—

C. D., of the City of Winnipeg, in Manitoba, hereinafter called the employee
(of the second part)

WITNESSETH:

(1) That the employer agrees to hire the employee and the employee agrees to work for the employer upon the terms and conditions hereinafter stated.

(2) The period of hiring shall be from the first day of April, A. D. 1920, to the first day of November, A. D. 1920.

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Employer and Hired Man

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(3) The employee agrees to serve the employer as a hired hand during said period; to perform under the direction of the employer the general farm work that shall be assigned to him, and to report to the employer and chattels of the employer that shall be entrusted to him in connection with his employment.

(4) Ten hours shall constitute the usual day's work, and the time spent in proceeding to and from work in the field shall be reckoned as part of the said ten hour period. In addition thereto, the employee agrees to look after and care for the horses that he works. During the harvesting and threshing seasons the employee shall work the number of hours that is customary in the surrounding neighborhood or district.

(5) The employee shall be entitled to have holidays on Empire Day and Dominion Day, and on Sundays shall only be required to assist with the ordinary chores of the farm.

(6) In the absence of the employer on business, the employee shall perform his usual work and also attend to the necessary chores.

(7) If the employee shall fall ill, or be unable, from accident or otherwise, to efficiently perform his work, and such disability extends over a period of four days, the employer shall have the right to terminate this contract upon payment to the employee of all moneys actually earned, together with the date of the termination of the contract. Provided, however, that should the employer hereinafter place of the employee the latter shall not be entitled to receive pay for the time that he shall be disabled, but the employer shall be entitled to deduct from the wages earned by the employee the excess (if any) that he is obliged to pay such substitute.

(8) The employee represents and warrants to the employer that he is a competent and experienced farm hand capable of handling horses and operating farm machinery, and of performing the general farm work contemplated by this agreement.

(9) The wages of the employee shall be \$..... per month, payable \$..... monthly, on the last day of each month, and the balance on the termination of this contract.

(10) The employer agrees to furnish proper living and sleeping accommodation and to furnish good and sufficient board for the employee.

In witness whereof the parties hereto have hereunto set their hands and seals the day and year first above written.

Signed, sealed and delivered
to the presence of

(Signed) E. F.

(Signed) A. B.

(Signed) C. D.

MISCELLANEOUS LEGAL QUESTIONS

LEGAL RATE OF INTEREST

L. M. Sask.—“What is the legal rate of interest in Saskatchewan? If I sign a note for lumber, at 10 per cent before and 12 per cent after due, do I have to pay that amount?”

Answer—The legal rate of interest is 5 per cent, that is if no agreement is made to the contrary. The parties may make whatever agreement they please.

BOARDING THRESHING CREW

A. J. C., Sask.—“How long is a farmer supposed to board a threshing crew in wet weather?”

Answer—There is no law in this matter. The terms of threshing are a matter of arrangement between the farmer and thresher. There is no law to decide the questions. It is simply a question of fact as to the bargain made.

CHARGE FOR AFFIDAVIT

J. G., Sask.—“What is the legal charge which a notary can make for drawing up an affidavit?”

Answer—If the affidavit only is taken the charge should be twenty-five cents. If the notary affixes a seal the charge will be one dollar.

CHANGING PERSONS NAME

J. P., Sask.—“Is it lawful to change one's surname? How can this be done?”

Answer—A man can use whatever name he chooses to call himself provided his object in doing so is not illegal but bona fide. You can change your name by executing the necessary deed at a cost of about \$25. Have a lawyer prepare the necessary papers.

DOES NOT WANT TELEPHONE

O. P. B., Sask.—“Telephone company is running a line along four quarters of my land. I told the man who was installing the line, that I did not want the telephone. He said they were going to put it there

anyway. Will the telephone tax be charged against my land, and to whom should I apply for exemption from the tax?”

Answer—It appears to be a very common practice to “railroad” a rural phone through. When the system was contemplated and before anything was done you, in common with all other owners of land who would be affected, should have received notice and have been given an opportunity to make objections. If the line has been sanctioned by the Minister of Telephones, your land will be charged, and you cannot escape the tax. You might, possibly, have an action for damages against those responsible for the inauguration of the system, but it would be very difficult to prove you were prejudiced, particularly if only a minority of owners object to the system. You can make a complaint to the Minister of Telephones who has power to exempt any land which would otherwise be subject to the tax.

PERSONS LIABLE FOR INCOME TAX

R. S., Alta.—“Who is required to file an income tax statement?”

Answer—Every person has to secure a form and make a return who during the year received or earned the amount fixed for his class, that is \$1,000 or more, or \$2,000 or more as the case may be. In other words, you must make a return if your gross income exceeds the amount fixed. You make the reductions showing your net income, and your statement is subject to revision by the taxation commissioner.

LIVERY TEAM RUNS AWAY

Reader, Sask.—“Who pays the damages if a man hires a livery team, and team runs away and smashes the rig and harness and damages horses? There was no driver with the team.”

Answer—This will entirely depend upon circumstances. If the accident was caused by the negligence of the man who hired the team, or his servant, he would be liable to make good the damage. If the damage was not caused by his negligence the owner of team would have to stand the loss. If the case came to court it would be decided on that basis.

HANDY RULES, RECIPES AND TABLES

SURVEYOR'S MEASURE

7.92 lns.—1 link. 4 rods, 100 links, or 66 ft.—1 chain.
25 links—1 rod. 80 chains—1 mile.

MEASURING THE CIRCLE

Circumference—Multiply the diameter by 3.1416.
Area—Square the diameter and multiply by .7854.
To find the cubical contents of a cylindrical container—tank, cistern, silo, etc.—square the diameter, multiply by .7854, and multiply this result by the length.

ACRES IN RECTANGULAR FIELDS

Finding the number of acres in a field of rectangular shape is easy. Here is the method: Find the length and width of the field in rods. Multiply these dimensions together and divide by 160. The result is the number of acres in the field.

To determine what part of an acre a garden or city lot is, find the length and width in feet. Multiply these together and divide by 43,560, the number of square feet in an acre. In the case of small fields of this kind it is better to find the dimensions in feet rather than rods because such measurements are more accurate.

ACRES IN CIRCULAR FIELDS

Those whose lands lie along rivers or creeks often have fields that are nearly round. The same is true also of hill farms. Proceed as follows to find the acreage of such fields:

Determine the average distance across the field in rods. Multiply this distance by itself and take four fifths of the product. Divide by 160, the number of square rods in an acre. The result is the number of acres in the field.

QUANTITY OF NAILS REQUIRED

Framing lumber—15 lbs. 10 penny nails and 6 lbs. 16 penny nails per thousand.

Framing joists—10 lbs. 16 penny nails per thousand.

Outside finish— $\frac{1}{4}$ inch, 20 lbs. 6 penny finish nails per thousand.

Outside finish— $1\frac{1}{4}$ inches, 20 lb. 10 penny finish nails per thousand.

Bridging—26 lbs. 8 penny nails and 36 lbs. 10 penny common nails per thousand.

Lath—6 lbs. lath nails per thousand.

Shingles—5 lbs. shingle nails per thousand.

LENGTH AND NUMBER OF COMMON NAILS

Size	Length	No. per lb.
6 penny	$1\frac{1}{4}$ in.	500
3 penny	$1\frac{1}{2}$ in.	300
4 penny	2 in.	168
6 penny	$2\frac{1}{4}$ in.	90
8 penny	3 in.	60
10 penny	$3\frac{1}{4}$ in.	46
12 penny	$3\frac{3}{4}$ in.	36
16 penny	4 in.	24
20 penny	$4\frac{1}{2}$ in.	16
30 penny	5 in.	13
40 penny	$5\frac{1}{2}$ in.	10
50 penny	6 in.	6

LENGTH OF RAFTERS

To find the length of rafter so as to give the roof one-third or one-half pitch, multiply the width of the building by .6 or .7 respectively. Thus to give the roof one-third pitch on a building 20 ft. wide, the length of rafters must be $20 \times .6 = 12$ feet. To give half-pitch, $20 \times .7 = 14$ feet, exclusive of projections.

PAINT REQUIRED

It is impossible to give a rule which will apply in all cases as the amount varies with the kind and thickness of the paint, the kind of wood or other material to which it is applied, age of the surface, etc. The following is an approximate rule:

Divide the number of square feet of surface by 200, and the result will be the number of gallons of liquid paint required for two coats; or divide by 16 and the result will be the number of pounds of pure ground white lead required to give three coats.

CAPACITY OF DIFFERENT SIZED SILOS

The following table shows the number of tons of corn silage in silos of different dimensions, and the number of cows that each silo will feed for 180 days, giving each

cow 40 pounds of silage per day. Corn silage weighs 40 lbs. per cubic foot; green oat silage about 33 lbs. per cubic foot. If green oats are used, this fact should be kept in mind, a silo filled with green oats contains approximately 25 per cent less feed than a silo filled with corn:

Diameter and Height	Capacity in Tons	Cows it will keep for 180 days, 40 lbs. per day
12x24	49	13
12x26	60	15
14x22	61	17
14x24	67	19
14x26	83	22
14x30	93	23
16x24	67	24
16x26	97	26
16x30	119	30

Corn yields from six to eight tons per acre and green oats 4 to 6 tons. To fill an 80-ton silo you would need approximately 16 acres of oats or 12 acres of corn. Build silos high rather than wide.

AVERAGE LIFE OF FENCE POSTS

Kind of Post	Years
Red Cedar	20.5
Bur Oak	15.3
White Cedar	14.3
White Oak	11.4
Pine	11.2
Tamarac	10.5
Hemlock	9.1
Elm	8.8
Ash	8.6
Red Oak	7.0
Willow	6.2
Poplar	5.2
Concrete	48.0
Stone	36.3
Steel	29.9

STRENGTH OF WOODS

Wood	Breaking wgt. in lbs.
Ash	14,000
Beech	12,000
Box	20,000
Bay	14,000
Cedar	11,000
Chestnut, sweet	10,500
Cypress	6,000
Deal, Christiania	12,400
Elm	13,400
Lance	23,000
Lignum-vitae	12,000
Locust	21,000
Mahogany	21,000
Mahogany, Spanish	12,000
Maple	10,500
Oak, American, white	12,000
Oak, English	12,000
Oak, seasoned	13,600
Oak, African	14,500
Pear	9,800
Pine, pitch	12,000
Pine, larch	9,500
Pine, American white	11,000
Poplar	7,000
Spruce, white	11,000
Sycamore	13,000
Walnut	7,800
Teak	14,000
Willow	13,000

WEIGHT OF RAFTERS PER SQUARE FOOT OF ROOF SURFACE

Size of Spruce, Hemlock, Rafters White Pine, Inches Spacing C. to C.	Hard Pine 6 spacing C. to C.		
	16 in.	20 in.	24 in.
Pds.	Pds.	Pds.	Pds.
2x4	1 $\frac{1}{2}$	1 $\frac{1}{5}$	1
2x6	2 $\frac{1}{2}$	1 $\frac{4}{5}$	1 $\frac{1}{2}$
2x7	2 $\frac{3}{4}$	2 $\frac{1}{10}$	1 $\frac{3}{4}$
2x8	3	2 $\frac{2}{5}$	2
2x10	3 $\frac{3}{4}$	3	2 $\frac{1}{2}$

Wooden purlins will weigh about 2 pounds per square foot of roof surface, when the distance between

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Handy Rules, Recipes and Tables

trusses is from 12 to 16 feet. Sheathing 1 inch thick will weigh about 3 pounds per square foot for the soft woods, and 4 pounds for hard woods and pitch pine.

LIME PLASTERING

Two bbls. will plaster 100 square yards, one coat; 3 1/2 bbls. will plaster 100 square yards, two coats; 1 bbl. will lay 1,000 brick but must be good lime. 1/2 bbl. will lay one perch of rubble stone; 2 bbls. will lay one cord of rubble stone; 3 bbls. will lay 100 cubic feet of wall.

Eight cwt. gypsum plaster will cover 100 square yards when mixed with 1,600 lbs. sand, or one part gypsum plaster and two parts sand; 2/3 bbl. of plaster paris will hard finish 100 square yards; 1 1/2 bushels of hair will do 100 square yards of plastering. For 100 square yards 1,500 lbs are required; 1/2 of a yard of sand is required for every barrel of lime.

BRICKWORK

Five courses of brick will lay one foot in height on a chimney; 16 bricks in a course will make a 6ue 4 inches wide and 13 inches long, and 6 bricks in a course will make a 6ue 6 inches wide and 16 inches long.

Bricks are usually estimated at 25 to the cubic foot. They usually lay five courses to each foot in height.

For an 8-inch wall allow 17 bricks for each square foot of surface.

For a 12-inch wall allow 25 bricks for each square foot of surface.

One cask of good lime to a load (about 20 hushels) of sand is sufficient for 1,000 or 1,100 bricks.

WEIGHT TABLES PER CUBIC FOOT

Lbs.		Lbs.	
Pine, yellow.....	34	Earth, loose.....	94
Pine, white.....	34	Mortar.....	110
Ash.....	53	Mud.....	102
Oak, white, dry.....	54	Marble, Italian.....	169
Poplar.....	23	Marble, Verm't.....	165
Poplar, white.....	33	Water, salt.....	64
Walnut.....	41	Water, rain.....	62
Walnut, black.....	31	Ice.....	57 1/2
Stone, common.....	158	Hay, baled.....	95
Sand, wet.....	126	Hay, Opressed.....	25
Brick, common.....	102	Coal, Leaks'wa.....	50
Clay.....	120	Coal, Lehigh.....	58

SHINGLES ON A ROOF

Here is a table showing the number of shingles needed per 100 square feet of roof, laid at various exposures to the weather and the weight of shingles per 100 square feet.

Ins. to weather	4'	4 1/2'	5'	5 1/2'	6'
Shingles					
per 100 sq. ft.	900	800	720	655	600
Weight in lbs.	216	192	173	157	144

For hip roofs add 5 per cent to these figures. A bundle contains 250 shingles. Shingles are bought by the thousand.

DRAFT OF PLOW

These figures were compiled from only a small number of tests, and, therefore, have a comparative value only.

RELATIVE DRAFT OF WALKING, BULKY AND GANG PLOWS

	Size of furrow in inches	Total draft in pounds	Draft per sq. in. of furrow slice in pounds
Plow			
Walking.....	14x6.5	440	4.83
Bulky.....	16x8	470	4.93
Gang (2 btm.)	14x5	700	5.00

DOUBLE DISC AND MOLDBOARD PLOWS

Moldboard.....	12.7x6.93	526.7	6.98
Double-disc....	10x4x12 (depth)	785.4	6.29

Figures for double-disc and moldboard plows are result of three tests in stiff timothy sod. The double-disc plow pulled 10 per cent more easily than the moldboard plow, when the furrow turned is considered.

STRENGTH OF ROPE

The strength of rope depends chiefly on the kind and quality of the fiber from which it is made. Ordinary manila rope conforms very closely in weight, strength,

etc., to the following figures. The ratio between the breaking load and the safe load is generally taken as 6 or 7 to 1; that is, the safe load is one-sixth or one-seventh of the breaking load.

INFORMATION CONCERNING MANILA ROPE

Diameter	Weight per 100 feet	Feet per pound	Breaking load in pounds	Safe load in pounds
3/16	2	50	230	35
1/4	3	33 1/3	400	55
5/16	5	20	900	130
3/8	7 2/3	13	1620	230
1/2	13 1/3	7	2880	410
5/8	16 1/3	6	3640	520
3/4	23 2/3	4 1/2	5440	775
1	28 1/3	3 1/2	6480	925
1 1/4	45	2	10,120	1445
1 1/2	65	1 1/2	14,600	2085
1 3/4	97	1	21,500	3070
2	113	5/6	25,200	3600
3	262	1/3	56,700	8100

HORSE POWER OF STEAM ENGINE

To compute, multiply the average pressure on the piston of the cylinder in pounds by the velocity of the piston per minute in feet, and divide the product by 33,000. For example: Piston is 15 inches in diameter, stroke 2 1/2 feet, strokes per minute 80, steam pressure 70 lbs. What is the horse power?

15x15x78.54=176.72 square inches in piston.
176.72x70=12370 lbs. steam pressure on piston.
12370x200=2474000 lbs. moved 1 foot per minute.
2474000+33000=75 normal horse power.

In the above example the factor 200 is the velocity in feet per minute of the piston, viz., 80x2 1/2. Available horse power is from 75 to 90 per cent of nominal.

HORSE POWER OF GAS ENGINES

Roberts' formula is:

$$D^2XLRXN = \text{H.P.}$$

18000
D2=diameter of cylinder multiplied by itself.
L=length of cylinder.
R=revolutions per minute.
N=number of cylinders.

What would be the horse-power of an engine the cylinder of which was 4 1/2 inches in diameter, stroke of which was 4 1/2 inches in diameter, stroke 5 1/2 inches, revolutions per minute 800, number of cylinders 4? The formula would work out as follows:—
4 1/2 x 4 1/2 x 5 1/2 x 800 x 4
=20 77H P

WOOD VERSUS COAL

The following table shows the number of cords of various common woods required to equal one ton of common coal:

Ash.....	1.10 cords
Birch.....	1.70 cords
Elm.....	1.00 cords
Maple.....	1.00 cords
Oak.....	0.97 cords
Poplar.....	1.55 cords
Cedar.....	2.10 cords
Fir.....	1.40 cords
Hemlock.....	1.60 cords
Jack-pine.....	1.50 cords
Spruce.....	1.60 cords
Tamarack.....	1.15 cords

WEIGHT OF GASOLINE AND KEROSENE

An imperial gallon of gasoline weighs from 6.4 to 6.6 lbs. An imperial gallon of kerosene weighs 6 lbs. These are approximate weights. The legal way to measure gasoline and kerosene is by the standard gallon.

GRADES OF COAL

Coal is graded and priced according to size. The finer the coal the larger the percentage of dirt, rock and slate. The following is the basis for determining the various grades:

Coal measuring from 3/16 of an inch to 9/16 is called buckwheat, that from 9/16 to 1/2 of an inch, pea; that from 1/2 of an inch to 1 1/4 inches, nut; that from 1 1/4 to

1 1/4 inches, stove, and that from 1 1/4 to 3 inches, egg
Buckwheat is the cheapest and egg the highest priced
grade.

LEGAL WEIGHTS PER BUSHEL

The following are the legal weights, per bushel, in
Canada, for the following farm products:—

Barley.....	48 lbs
Beans.....	60 lbs.
Beets.....	50 lbs.
Buckwheat.....	48 lbs.
Blue Grass Seed.....	14 lbs.
Carrots.....	50 lbs.
Clover Seed.....	60 lbs.
Flump Seed.....	44 lbs.
Indian Corn.....	56 lbs.
Oats.....	34 lbs.
Onions.....	50 lbs.
Parasnis.....	45 lbs.
Peas.....	60 lbs.
Potatoes.....	60 lbs.
Rye.....	56 lbs.
Timothy Seed.....	48 lbs.
Turnips.....	50 lbs.
Wheat.....	60 lbs.

MEASURING BUSHELS IN ROUND GRANARY

Find the diameter of the granary in feet. Multiply
this by itself and multiply this product by .7854.
Convert in cubic inches by multiplying by 1728.
Divide the result by 2218 and the result is the number
of bushels in the bin, providing the grain in the bin is of
standard weight per bushel. If it is overweight,
allowance must be made, shown in the following
example: Granary, 10 feet in diameter contains a
depth of 8 feet of oats weighing 40 lbs. to the measured
bushel. The solution is as follows:

$$\frac{10 \times 10 \times .7854 \times 1728}{2218} = 489 \frac{1}{2} \text{ bushels}$$

Each bushel is 6 lbs. overweight, consequently 489 1/2 x 6
gives 2937 lbs. of oats additional to add to the result
already obtained. The 2937 lbs. equal 86 bushels,
approximately. This, added to 489 1/2, shows that the
bin in question contains 575 1/2 bushels.

MEASURING GRAIN IN RECTANGULAR BIN

Multiply the length in feet by the width in feet by
the depth in feet, multiplying this result by 1728 to
convert to cubic inches. Divide this sum by 2218, the
number of cubic inches in a bushel. If the grain is
over standard weight, proceed as outlined above.

MEASURING HAY IN STACK

The usual practice is to allow 512 cubic feet per ton.
Multiply the width of the stack by the length by one-
third the overthrow and divide the result by 512. The
answer gives the number of tons in the stack. If the
stack was 14 feet wide, 27 feet overthrow and 41 feet
long, you would find the tons by multiplying 14x27x41
and dividing by 512. The answer would be 10 tons
and 46 cubic feet or approximately 10 tons.

SUITABLE DISTANCES FOR PLANTING

	Apart each way
Apples—Standard.....	25 to 40 feet
Apples—Dwarf (bushes).....	10 to 15 "
Pears—Standard.....	16 to 20 "
Pears—Dwarf.....	10 "
Cherries—Standard.....	18 to 20 "
Cherries—Dukes and Morellos.....	16 to 18 "
Plums—Standard.....	16 to 20 "
Peaches.....	16 to 18 "
Quinces.....	10 to 12 "
Currants.....	3 to 4 "
Gooseberries.....	3 to 4 "
Raspberries.....	3 tn 5 "
Blackberries.....	6 tn 7 "
Grapes.....	8 to 12 "

CUBIC FEET PER TON OF HAY

In a stack, from 10 to 15 feet in height, standing 30
to 60 days, 512 cubic feet are usually reckoned per ton.
The higher the stack and the longer it stands the more a
cubic foot weighs and the fewer are required per ton.
A stack 15 feet high that has stood 60 days or more,
422 cubic feet may be taken to the ton, and in a stack
20 feet high, that has stood 60 days, 343 cubic feet is
taken for a ton. The foregoing figures are for prairie

wool. Alfalfa or slough hay stacked 30 to 60 days,
goes 512 cubic feet per ton; stacked over 60 days, 422
cubic feet. Clover and timothy stacked over 30 days
run 422 cubic feet per ton.

POISON FOR RATS

Dissolve half-an-ounce of strychnine sulphate in one
pint of boiling water. Then add nine pint of thick
sugar syrup and stir well. Thoroughly moisten wheat,
oatmeal or bread crumbs in this solution and place
where the rats can get it. Do not handle with the
hands. Do not put out the poison where poultry,
dogs, cats or other animals can get at it and clean up all
uneaten portions after the rats are out of business.

GESTATION PERIOD IN FARM ANIMALS

Mares.....	330 to 340 days
Cows.....	265 to 275 days
Sheep.....	144 to 150 days
Sows.....	112 days

In mares the period of heat after foaling occurs
within 9 days or less, recurs every 18 or 21 days and lasts
from 3 to 5 days. The cow comes into heat every 18 to
21 days throughout the year, except for from 6 to 12
weeks after calving, and remains in heat for about 12
hours. Ewea vary in the time they come into heat
after lambing. Sows may come in heat within three
days after farrowing. They are almost certain to
come in heat in from 3 to 6 days after the pigs are
weaned. The period of heat recurs every 18 to 21 days.

THE HEIGHT OF A HORSE

Height in horses is expressed in hands and inches,
four inches representing a hand. Use a straight stick
long enough for the purpose. Place the stick in a ver-
tical position just back of the front feet and take the
height level with the top of the withers.

YEARLY RECORDS BY DIFFERENT BREEDS

The following comparisons of one year productions
will be of a great deal of interest to anyone thinking
about entering the dairy business, but who has not
definitely decided which breed will most satisfactorily
fit his needs. It shows the average of all advanced
registry cows of each breed in the United States:—

Breed	Milk	Fat	Test
Holstein-Friesian.....	14,961	511	3.42
Guernsey.....	9,021	450	4.99
Jersey.....	7,876	422	5.35
Ayrshire.....	9,594	390	3.97

GRAIN PER HUNDRED POUNDS GAIN

The ability of animals to make use of food is shown
in the table below. The figures show the number of
pounds of grain of each kind required to produce one
hundred pounds of flesh in growing animals.

	Barley	Oats	Peas	Wheat	Mixed
	lbs.	lbs.	lbs.	lbs.	lbs.
Hog.....	418	472	439	452	432
Sheep.....	453	518	422	582	434
Cattle.....	914	1032	911	1090	871

Ability to utilize food economically varies with the
age of the animal. The figures are for growing animals.

WEIGHT OF CALVES AT BIRTH

Professor C. H. Eckles, of Minnesota, gives the
following average weight at birth of calves of the dairy
breeds:—

Breed	No. of calves	Av. weight lbs.	Av. weight lbs. dams	Weight of calf to dam p.c.
Jersey.....	253	55	867	6.3
Holstein.....	229	89	1137	7.8
Guernsey.....	57	71	996	7.1
Ayrshire.....	80	72	983	7.3
Brown Swiss.....	5	100	1123	8.9
Dairy Shorthorn.....	30	73	1216	6.0

Prof. Eckles found that male calves weigh about
five pounds more than females; that the first calf of a
heifer is smaller than subsequent calves; that breed is
unquestionably the largest factor in influencing the size
of calves at birth; that the feed and care of the dam
have practically no influence.

FLY REPELLANT FOR COWS

- Lard—1 gallon.
- Sulphur—2 pounds.
- Kerosene—1 pint.

Handy Rules, Recipes and Tables

This repellent is in the form of a grease and should be applied with a cloth or brush. It is said to be effective.

Here is another fly repellent for cattle recommended by the Iowa Agricultural College:—

1½ quart of any standard sheep dip; 1½ quart of fish oil; 1 pint of oil of tar; 1 quart of coal oil; ½ pint of oil of pennyroyal. Mix these in 10 gallons of lukewarm soft water in which a bar of laundry soap has been dissolved. Spray the cows each morning after milking. The best way to spray is with a pump sprayer fitted with a fine nozzle and set in a barrel.

SOME TABLES FOR THE CONCRETE USER

General information for the man who contemplates using small or large quantities of concrete for building purposes.

Concrete mixing board for 2-bag batch, 0 ft. x 10 ft. in size.

6 pcs. 7/8 in. x 12 in., 10 ft., surfaced one side, and two edges (any width of plank may be used, 12 in. is specified only for convenience.)

5 pcs. 2 in. x 4 in. x 0 ft. rough.

2 pcs. 2 in. x 2 in. x 10 ft. rough.

2 pcs. 2 in. x 2 in. x 9 ft. rough.

Concrete board for 4-bag batch 12 ft. x 10 ft. in size.

12 pcs. 3/4 in. x 13 in. x 10 ft., surfaced one side and edges. (Any width of plank may be used; 12 in. is specified only for convenience.)

5 pcs. 2 in. x 4 in. x 12 ft. rough.

2 pcs. 2 in. x 2 in. x 10 ft. rough.

2 pcs. 2 in. x 2 in. x 12 ft. rough.

Measuring boxes for sand and stone or gravel. For 2-bag batch, 1, 2, 4 mixture.

4 pcs. 1 in. x 11½ in. x 2 ft. rough.

2 pcs. 1 in. x 11½ in. x 4 ft. rough.

2 pcs. 1 in. x 11½ in. x 6 ft. rough.

Note—The 2 pieces 4 ft. long and 2 pieces 6 ft. long have an extra foot in length at each end to be made into a handle.

For 2-bag batch, 1, 3, 0 mixture:

2 pcs. 1 in. x 11½ in. x 2 ft.

2 pcs. 1 in. x 11½ in. x 3 ft.

2 pcs. 1 in. x 11½ in. x 5 ft.

2 pcs. 1 in. x 11½ in. x 6 ft.

Note—The two planks 5 ft. long and two 2 pieces 6 ft. long have an extra foot in length at each end to be made into a handle.

Table showing area covered by mortar produced from one barrel of Portland Cement mortar (3.8 cu. ft. Cement Paste) No Lime

Composition of Mortar	Thickness of Coat	Square ft. of Area Covered
1 Cement, 1 Sand	1 inch	67
	¾ inch	90
	½ inch	134
1 Cement, 2 Sand	1 inch	101
	¾ inch	139
	½ inch	208
1 Cement, 3 Sand	1 inch	140
	¾ inch	187
	½ inch	280

TABLE SHOWING QUANTITY OF MATERIAL FOR CORNER POSTS

One-half single load (15 cu. ft.) of sand required per barrel of cement; one small single load (15 cu. ft.) of screened gravel or stone required per barrel of cement. Proportions, 1 part Portland cement to 2 parts sand to 4 parts gravel.

Length Feet	Size of post.		No. of posts per bbl. (4 bags) Cement	Weight per post pounds
	Top Inches	Bottom Inches		
6	12	12	2½	900
7	12	12	2½	1,050
8	12	12	2½	1,200
9	12	12	2	1,350
9	10	10	3	040
9	6	6	8	337
7	24	24	½	4,200

Thickness of walls and quantities of materials for different heights of basements. Proportions: 1 part Portland cement to 2½ parts of sand to 5 parts of stone

Height of Basement Feet	Depth of Foundation below ground level Feet	Thickness of Wall at bottom Inches	Thickness of Wall at top Inches	Cement per 10 feet of length of wall Bags	Sand per 10 feet of length of wall Cu. ft.	Gravel or stone per 10 ft. of length of wall Cu. ft.
6	4	6	6	12	14½	29
8	6	10	8	20	29	58
10	8	15	10	24	57	114

Materials for One Cubic Yard Compact Plastic Mortar. Based on Barrel of 3.8 Cubic Feet.

Cement Sand	Relative Proportions By Parts	Cement Bbls.	Sand Cu. ft.	Packed Cement		Loose Sands	
				Bbls.	Cu. yds.	Bbls.	Cu. yds.
1	0	1	0	8.31	0		
1	1	1	1.9	6.73	0.47		
1	1	1	3.8	5.01	0.71		
1	1	1	5.7	4.00	0.84		
1	2	1	7.6	3.32	0.03		
1	3	1	9.5	2.84	1.00		
1	3	1	11.4	2.48	1.05		
1	4	1	13.3	2.20	1.08		
1	4	1	15.2	1.98	1.11		
1	4	1	17.1	1.80	1.14		
1	5	1	19.0	1.65	1.16		
1	5	1	20.9	1.52	1.18		
1	6	1	22.8	1.41	1.19		
1	6	1	24.7	1.32	1.21		
1	7	1	26.6	1.23	1.21		
1	7	1	28.5	1.16	1.22		
1	8	1	30.4	1.10	1.24		

SHOWING THE QUANTITIES OF MATERIALS AND THE RESULTING AMOUNT OF CONCRETE FOR TWO BAG BATCH

Kind of Concrete Mixture	Proportions by parts			Two-bag Batch Materials		
	Cement	Sand	Stone or gravel	Cement	Sand	Concrete
1:2:4 Concrete	1	2	4	Bags	Cu. ft.	Cu. ft.
1:3:6 Concrete	1	3	0	2	3¾	7½
				2	5¾	11½

Kind of Concrete Mixture	Size of Measuring boxes, inside measurements	Water in gal. per med. wet mixture	
			Sand
1:2:4 Concrete	2 ft. x 2 ft.	2 ft. x 4 ft.	10
1:3:6 Concrete	2 ft. x 3 ft. x 11½ in.	3 ft. x 4 ft. x 11½ in.	13½

WEIGHT OF FUELS

Anthracite coal—55 to 65 lbs per cubic foot
 Soft coal—50 to 55 lbs per cubic foot
 Charcoal—18 to 18½ lbs per cubic foot.
 Coke—28 lbs. per cubic foot.
 A bushel of anthracite coal weighs about 67 lbs.; soft coal, 60 lbs.; charcoal, 20 lbs.; and coke 40 lbs.

HORSE POWER OF SHAFTS FOR GIVEN DIAMETER AND SPEED

Diam of Shaft Inches	Revolutions per Minute			
	100	125	150	175
1 3/16.....	2.4	3.0	3.0	4.2
1 7/16.....	4.3	5.4	6.5	7.6
1 11/16.....	6.5	8.0	9.7	11.2
1 15/16.....	10.0	12.5	15.0	17.5
2 3/16.....	14.0	17.8	21.0	24.5

Diam. of Shaft Inches	Revolutions per Minute			
	225	250	300	350
1 3/16.....	5.4	6.0	7.2	8.4
1 7/16.....	9.8	10.8	13.0	15.2
1 11/16.....	14.6	16.0	19.4	22.4
1 15/16.....	22.5	25.0	30.0	35.0
2 3/16.....	31.5	35.6	42.0	49.0

HOUSEHOLD WEIGHTS AND MEASURES

All measurements are taken level

3	teaspoonfuls.....	1	tablespoonful
16	tablespoonfuls (dry material).....	1	cupful
14	tablespoonfuls (liquid).....	1	cupful
2	cupfuls butter, packed solidly.....	1	pound
2	cupfuls sugar.....	1	pound
2	cupfuls meat, finely chopped.....	1	pound
2 3/4	cupfuls powdered sugar.....	1	pound
2 3/4	cupfuls brown sugar.....	1	pound
2 3/4	cupfuls oatmeal.....	1	pound
4 3/4	cupfuls rilled oats.....	1	pound
4	cupfuls flour.....	1	pound
9 or 10	eggs.....	1	pound
2	tablespoonfuls butter.....	1	ounce
4	tablespoonfuls flour.....	1	ounce
45	drops of water is a teaspoonful.		
1	teaspoonful equals 1 fluid dram.		
1	dessertspoonful equals 2 teaspoonfuls, or 2 drams.		
1	tablespoonful equals 2 dessertspoonfuls, or 4 teaspoonfuls.		
2	tablespoonfuls equals 8 teaspoonfuls, or 1 fluid ounce.		
1	common size wineglassful equals 2 ounces, or 1/2 gill.		
1	common size tumbler holds 1/2 pint		
A	small teacup is estimated to hold 4 fluid ounces, or 1 gill		
1	pound of wheat is equal to about a pint		
1	pound and 2 ounces of Indian meal is equal to 1 quart.		
1	pound of sugar is equal to about 1 pint.		
1	pint of pure water weighs a little over 1 pound.		

AVERAGE WEIGHTS OF GRAIN FEEDS

Grain	1 quart Weights	1 pound Measures
	Pounds	Quarts
Barley meal.....	1.1	0.9
Corn meal.....	1.5	0.7
Oats, ground.....	0.7	1.4
Wheat bran.....	0.5	2.0
Wheat, ground.....	1.7	0.6
Shorts.....	0.8	1.3

HEIGHTS OF TABLES, SINKS, ETC

The height of a table, sink bottom, etc., are responsible for tired backs and rounded shoulders, because of undue stooping and the strain on the arms and shoulders. The following figures show the proper level of working surfaces for the height of the housekeeper:

Height of Woman	Proper Height of working surface
4 ft. 10 in.....	27 inches
5 ft.....	28 inches
5 ft. 2 in.....	29 inches
5 ft. 4 in.....	30 inches
5 ft 6 in.....	31 inches
5 ft. 8 in.....	32 inches

ICE NEEDED DURING SUMMER

An average farm household uses from three to five tons of ice in a season. On dairy farms it is customary to allow 1,000 lbs. storage capacity of ice per cow, where cream only is cooled, and two or three times this amount if the whole milk is cooled. Ice weighs 57 lbs. per cubic foot, or 35 cubic feet weigh one ton as ordin-

arily stored; but on account of waste, from 40 to 50 cubic feet per ton should be allowed. From these data the size of ice house required to hold the ice needed in the house and dairy can be easily calculated.

NUMBER OF EGGS IN BROOD

Turkey, 12-15.	Geese, 15-18.
Quinn, 15-18.	Hen, 12-15.
Pea hen, 10.	Pigeon, 2.
Ducks, 9-12.	

WATERPROOFING CLOTH

Dissolve ten pounds of resin in four gallons of hot linseed-oil. Pour into a tub to which a wringer is attached. Fold cloth evenly lengthwise, making a strip nine inches wide. Pass through the hot oil. As soon as well soaked, pass through the wringer. Spread on fence or ground immediately until thoroughly dry. Drying may take a week or more. This solution will treat about fifty yards of cloth.

LEGAL WEIGHTS AND MEASURES IN CANADA

In Canada the law provides, with respect to weights, that the unit shall be the standard pound (avoirdupois) of 7,000 grains, one-sixteenth part of the standard pound shall be an ounce (437 1/2 grains), one hundred pounds a cental, and two thousand pounds a ton, and that four hundred and eighty grains shall be an ounce troy.

As regards measures: That the unit or standard measure of capacity, as well for liquids as for dry measures, shall be the gallon, containing ten standard pounds weight of distilled water, weighed with the water and air at a temperature of sixty-two degrees Fahrenheit; with the barometer at thirty inches, that the quart shall be one-fourth part of the gallon, and the pint one-eighth part of the gallon, and that eight gallons shall be a bushel.

This gallon, commonly known as the "Imperial gallon," contains 277.274 cubic inches.

The standard measure of length is the yard, one-third part of which it is provided shall be a foot, and the twelfth part of such shall be an inch.

IMPERIAL MEASURE

Special note should be made of the fact that certain standards of weights and measures used in some of the states of the United States are not legal (though frequently used) in Canada. These standards are not so large, being about 20 per cent smaller in capacity than the legal standards in Canada, i.e., the Imperial pint, quart and gallon.

The following tables show the legal weight in Canada of certain commodities by the barrel, bushel, bag, etc.:

COMMODITIES BY THE BARREL

Every barrel, half barrel, bag, sack or package must have recorded thereon the name of the packer and the brand and the weight of the contents, and in the case of feed, the composition thereof.

	Net Weight in Dominion	
	Standard Pounds Barrel	Half-barrel
Flour.....	196	98
Meal.....	196	98
Rolled Oats.....	180	90
Rolled Wheat.....	100	50

APPLES

Barrels used for packing apples must be 26 1/4 inches between the heads inside measure, 17 inches in diameter at head, and have a middle diameter of 18 1/4 inches, containing as nearly as possible 96 quarts. Boxes used for packing apples must be not less than 10 inches deep, 11 inches wide and 20 inches long, representing as nearly as possible 2,200 cubic inches. Every such package (barrel or box), must be marked with the name of the person or corporation doing the packing, the name of the variety and the grade, viz: Fancy, No. 1, No. 2, No. 3.

The weight of a barrel of apples varies considerably according to the variety. The standard weight accepted by the railway companies is 165 pounds. The average would probably be about 155 pounds. This includes weight of the barrel, which is about 15 pounds.

VEGETABLES AND OTHER ARTICLES

Unless a bushel by measure is specially agreed upon it must weigh the number of pounds set opposite each article.

Bushels	Weight in Dominion Standard Pounds
Artichokes.....	56 lbs.
Barley.....	48 lbs.
Beans.....	60 lbs.
Beets.....	50 lbs.
Buckwheat.....	48 lbs.
Bituminous coal.....	70 lbs.
Bluegrass seed.....	14 lbs.
Carrots.....	50 lbs.
Castor beans.....	40 lbs.
Clover seed.....	60 lbs.
Hemp seed.....	44 lbs.
Indian corn.....	56 lbs.
Lime.....	70 lbs.
Malt.....	36 lbs.
Oats.....	34 lbs.
Onions.....	50 lbs.
Parsnips.....	45 lbs.
Peas.....	60 lbs.
Potatoes.....	60 lbs.
Rye.....	56 lbs.
Timothy seed.....	48 lbs.
Turnips.....	50 lbs.
Wheat.....	60 lbs.

COMMODITIES BY THE BAG

A bag of any of the articles mentioned, must weigh the number of pounds set opposite the name of such article.

Bags	Weight in Dominion Standard Pounds
Artichokes.....	84 lbs.
Beets.....	75 lbs.
Carrots.....	75 lbs.
Onions.....	75 lbs.
Parsnips.....	65 lbs.
Potatoes.....	90 lbs.
Turnips.....	75 lbs.

A barrel of potatoes shall mean, unless a barrel of specified size, kind or content by measure is agreed upon, 165 Dominion Standard pounds of potatoes.

EGGS

When eggs are described as sold by the standard dozen, the dozen shall mean one pound and a half.

TABLE OF WEIGHTS AND MEASURES AVOIRDUPOIS WEIGHT

16 drams.....	1 ounce
16 ounces.....	1 pound
7,000 grains.....	1 pound
14 pounds.....	1 stone
100 pounds.....	1 hundredweight or cental
20 hundredweight.....	1 ton

DRY MEASURE

2 pints.....	1 quart
4 quarts.....	1 gallon
2 gallons.....	1 peck
4 pecks.....	1 bushel

LIQUID MEASURE

4 gills.....	1 pint
2 pints.....	1 quart
4 quarts.....	1 gallon

A cubic foot of water weighs almost 1,000 oz., and contains almost 8 1/4 gallons.

SURFACE, SQUARE OR LAND MEASURE

144 square inches.....	1 square foot
9 square feet.....	1 square yard
30 1/4 square yards.....	1 square rod
10 square chains.....	1 acre
160 rods, or 4,840 square yards.....	1 acre
640 acres.....	1 square mile

CUBIC OR SOLID MEASURE

1,728 cubic inches.....	1 cubic foot
27 cubic feet.....	1 cubic yard
128 cubic feet.....	1 cord

MEASURE OF TIME

60 seconds.....	1 minute
60 minutes.....	1 hour
24 hours.....	1 day
7 days.....	1 week
52 weeks.....	1 year
12 months.....	1 year
365 days.....	1 year
366 days.....	1 leap-year
100 years.....	1 century

The mean solar year is equal to 365 days, 5 hours, 48 minutes, 46 seconds, or nearly 365 1/4 days.

Every year whose number is divisible by 4 is a leap year, unless the number of the year ends in two ciphers, in which case the number must be divisible by 400. Thus, 2000 and 2400 will be leap years, but 1900 was not a leap year.

ANGULAR MEASURE

60 seconds (").....	1 minute
60 minutes (').....	1 degree
90 degrees (°).....	1 right angle

MISCELLANEOUS

12 articles.....	1 dozen
12 dozen.....	1 gross
12 gross.....	1 great gross
20 single things.....	1 score
24 sheets of paper.....	1 quire
20 quires.....	1 ream

APOTHECARIES MEASURE FOR FLUIDS

60 minims.....	1 fluid drachm
8 fluid drachms.....	1 fluid ounce
20 fluid ounces.....	1 pint

TROY WEIGHT

For gold, silver and jewels

24 grains.....	1 pennyweight (dwt.)
20 dwts.....	1 ounce
460 grains.....	1 ounce
12 ounces.....	1 pound
5,760 grains.....	1 pound

MEASURE OF LENGTH

Mile, geographical, admiralty knot, or nautical mile, 6,080 feet—1.15 mile statute.

League—3 miles.
Degree—60 geographical, or 169.121 statute miles.
Inch—72 points or 12 lines.
Nail, 1/4 yard—2 1/4 inches.
Palm—3 inches.
Hand—4 inches.
Quarter (or a span)—9 inches.
Foot—12 inches.
Cubit—18 inches.
Yard—36 inches.
Pace, military—2 feet 6 inches.
Fathom—6 feet.
Rod, pole, or perch—5 1/2 yards.
Chain (100 links)—22 yards (4 poles).
Link—7.92 inches.
Cable's length—100 fathoms, 600 feet.
Furlong—40 rods, 220 yards.
Mile—8 furlongs, 80 chains, 320 rods, 1,760 yards, 5,280 feet, 63,360 inches.

CIRCLES, SPHERES AND CYLINDERS

Diameter of a circle x 3.1416 gives circumference.
 Diameter squared x .7854 gives area of circle.
 Diameter squared x 3.1416 gives surface of sphere.
 Diameter cubed x .5236 gives volume of sphere.
 One degree of circumference x 57.3 gives radius.
 Diameter of cylinder x 3.1416, and product by its length, gives the surface.
 Diameter of cylinder squared x .7854, and product by the length, gives volume.
 A circular acre is 235,501 feet, a circular rod 117,752 feet in diameter. The circumference of the earth is about 24,855 miles, and the diameter about 7,900 miles.

TREATING POSTS WITH PITCH

Coal tar pitch is a perfectly good preservative for fence posts. The method of treatment to follow is to place the posts on end in a cylindrical tank with the pitch at least six inches above the ground line of the

posts. The pitch should be heated to 220 degrees F. The air in the cells of the wood expands and part of it is driven out. Remove the posts to a rectangular tank, in which the pitch is at 110 degrees F. The lower temperature causes the air remaining in the cells to contract, and the partial vacuum thus formed is filled with the oil or pitch. Poplar posts treated in this way should last from twenty to thirty-five years.

WOOD VERSUS IRON PUMPS

The advantages of a wood pump over an iron pump for shallow wells is: 1. The wood pump costs less than an iron pump of the same capacity. 2. A wood pump will not affect the taste of the water. 3. A wood pump will last longer than an iron pump, because the water does not affect the wood pump by eating into the tubing as it does the pipes of an iron pump, especially is this true if the iron pipes are not galvanized. 4. A wood pump is more easily repaired as it does not require any special wrenches to take it to pieces. Any man with a claw hammer, a monkey wrench, a sledge hammer and a rope can install or repair a wood pump.

DRAFT OF WAGONS

The height of the wheels and the width of the tires are the chief factors that determine draft in wagons. The effect of these two factors are shown in the following tables. The high wheels measured 44 inches in front and 56 inches in rear; the medium 36 inches in front and 44 inches in rear; the low 24 inches in front and 28 inches in rear. The wheels were steel with tires 6 inches wide. The actual weight of the loaded wagon was with high wheels 3762 lbs.; with medium wheels, 3580 lbs.; with low wheels 3362 lbs.

EFFECT OF HEIGHT OF WHEELS ON DRAFT

Road	Condition of road	Height of wheels	Draft per 2000 lbs. net load
Gravel	1-in. sand, small loose stones.	High	159.9
		Medium	161.9
		Low	185.3
Dirt	Dry, hard; no dust.	High	130.0
		Medium	134.0
		Low	132.0
Sod	Wet and spongy, low wheels cut ruts 3 to 4 ins. deep	High	325.2
		Medium	362.7
		Low	472.5
Sod	Dry and firm; no ruts	High	204.1
		Medium	259.9
		Low	300.6
Freshly Plowed Ground	Dry and cleddy	High	475.0
		Medium	542.0
		Low	628.0

EFFECT ON WIDTH OF TIRE ON DRAFT

Surface	Condition	Tire Width	Draft
Gravel	Hard surface, no ruts	Narrow	218.4
		Broad	163.8
Gravel	Dusty, dry	Narrow	230.1
		Broad	156.7
Dirt	Dry, hard, no ruts or dust	Narrow	137.3
		Broad	104.8
Meadow	Surface sticky, firm underneath	Narrow	208.1
		Broad	308.0
Meadow	Soft, narrow tire ruts, 5 to 6 in. deep; broad-tire ruts 1 1/2 to 2-in. deep	Narrow	569.0
		Broad	323.6
Meadow	Moist, firm, narrow-tire ruts, 3 1/2-in. deep; broad-tire ruts 1/4 to 1-in. deep	Narrow	420.8
		Broad	305.0

In the above test of draft with broad and narrow tires, the net load was 2000 lbs., the broad tires 6 in. wide and the narrow tires 1 1/2 in. wide.

STANDARD PROPORTIONS IN CONCRETE WORK

The proportions have reference to the quantities of cement, sand and gravel that is deemed best for a particular kind of work. For example, a 1-2-3 mixture is one in which the materials are mixed in the proportion of 1 part (by volume) of cement, 2 parts of sand, and 3 parts of screened gravel or crushed rock. 1-3-3 mixture, for watertight work and beams that carry great weight.

1-2-4—mixture, for reinforced beams, floors, walks, tanks, troughs, fence posts, etc.

1-2 1/2-5 mixture, for ordinary floors, retaining walls, foundations, etc.

1-3-6 mixture, for sub-foundations and heavy walks where the concrete is placed in great masses.

Farm concrete work is usually done with cement and gravel, hence this sand factor is eliminated, and where unscreened gravel is used a 1-4, a 1-5 or a 1-6 mixture corresponds respectively to a 1-2-2, a 1-2 1/2-5 or a 1-3-6 mixture. It is a mistake to assume that a 1-6 mixture where unscreened gravel is used is the same as a 1-2-4 mixture in which the three materials are separate. If unscreened gravel is used instead of sand and screened gravel or rock, the proportions used should be as shown above.

DETERMINING THE SPEED OF PULLEYS

(1) Find the number of revolutions of the driven shaft when the diameter of the driving pulley and its speed are given, multiply the diameter of the driving pulley by its number of revolutions per minute, and divide the product by the diameter of the driven pulley; the quotient will be the speed of the driven pulley expressed in revolutions per minute.

Example: Driving pulley is 24 inches in diameter and makes 125 revolutions per minute. At what rate would a pulley 8 inches in diameter be driven?

$$24 \times 125 = 375 \text{ revolutions per minute.}$$

(2) To find the diameter of the driven pulley when the diameter and number of revolutions of the driving pulley are given, multiply the diameter of the driving pulley by the number of its revolutions and divide the product by the number of revolutions the driven pulley is to make.

Example: What would be the diameter of pulley making 375 revolutions per minute if the driving pulley is 24 inches in diameter and makes 125 revolutions per minute?

$$24 \times 125 = 375 \text{ 8 inches in diameter}$$

(3) To find the number of revolutions of the driving pulley when its diameter and the diameter and speed of the driven pulley are given, multiply the diameter of the driven pulley by its revolutions and divide the product by the diameter of the driving pulley expressed in revolutions per minute. Example:

$$8 \times 375 = 125 \text{ revolutions per minute}$$

(4) To find the diameter of the driving pulley, multiply the diameter of the driven pulley by the number of its revolutions per minute and divide the product by the number of revolutions of driving shaft; the quotient will be the diameter of the driving pulley required. Example:

$$8 \times 375 = 125 \text{ 24 inches in diameter}$$

CORRECT SIZE OF CISTERNS

Under average conditions, in figuring the size of cistern needed to hold all the water received from a roof, allow 6 1/2 gallons capacity in the cistern for each square foot of the roof area. Roof areas require the following sizes of cisterns 10 feet deep:

Area of Roof	Size of Cistern in feet	Storage in gallons
1000	10 x 10	6,250
1200	12 x 10	7,500
1440	12 x 12	9,000
1680	14 x 12	10,500
1800	15 x 12	11,250
2040	17 x 12	12,750
2100	20 x 12	15,000
3000	20 x 15	18,750

CAPACITY OF PUMPS

To determine the capacity of a pump square the diameter of the cylinder in inches, multiply by the length of the stroke in inches, multiply by the number of strokes per minute and divide the product by 352.

The
Ex
15 in
3 x 3

GEN

&...

A/c

An't

Ass'd

Bal.

Bhl.

B.L.

e. g.

Co.

C.O.

Cr.

Com.

Cons.

Cwt.

Dft.

Disc'

Do. o

Do.

Dr.

E. &

Ea.

Exec.

Exp's

Fol.

Fr'd

Fr't

Guar.

Gal.

Hb'd

Ina.

Inat.

Invt.

Int.

Misc

Mo.

Nat.

No.

Pay't

Ed.

Per an

Pk'gs

Per.

P.O.

Prem.

Prox.

Ps.

Rec'd

R.R.

Ship't

Sund's

S.S.

Ult.

Size of

Chimn

16 x 16

16 x 24

16 x 28

16 x 40

15 x 52

20 x 20

20 x 24

AMC

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When

Handy Rules, Recipes and Tables

The answer will be the number of gallons per minute.
 Example:—Diameter of cylinder, 3 inches; stroke
 15 inches; number of strokes per minute, 30.
 $3 \times 3 \times 15 \times 30$

11.5 gallons per minute

352

GENERAL ABBREVIATIONS USED IN BUSINESS

&	and
A/c or acc't	account
Am't	amount
Ass'd	assorted
Bal.	balance
Bhl.	barrel
B.L.	bill of lading
e. g.	for example
Co.	company
C.O.D.	collect on delivery
Cr.	creditor
Com.	commission
Const.	consignment
Cwt.	hundred weight
Dft.	draft
Disc't	discount
Do. or ditto	the same
Dos.	dozen
Dr.	doctor
E. & O.E.	errors and omissions excepted
Ee.	each
Exch.	exchange
Exp's	expenses
Fol.	folio
Fw'd.	forward
Fr't.	freight
Guar.	guarantee
Gal.	gallon
Hh'd.	hogshead
Ins.	insurance
Inat.	this month
Inv't.	inventory
Int.	interest
Mdse.	merchandise
Mo.	month
Nat.	clear
No.	number
Pay't	payment
Pd.	paid
Per an.	by the year
Pk'gs.	packages
Per.	by
P.O.	post office
Prem.	premium
Prox.	next month
Pc.	pieces
Rec'd.	received
R.R.	railroad
Ship't.	shipment
Sund's.	sundries
S.S.	steamship
Ult.	last month

NUMBER OF BRICKS IN CHIMNEY

Size of Chimney	No. of flues	Size of flues	No. of bricks required per ft. in height
16 x 18 in.	1	8 x 8 in.	30
16 x 24 in.	1	8 x 16 in.	40
16 x 28 in.	2	8 x 8 in.	50
18 x 40 in.	3	8 x 8 in.	70
16 x 52 in.	4	8 x 8 in.	90
20 x 20 in.	1	12 x 12 in.	40
20 x 24 in.	1	12 x 16 in.	45

AMOUNT OF HAY AND OATS FOR HORSES

An authority on feeding horses gives this rule for determining the quantity of hay and oats to feed. Give no more hay than will be eaten in from 1½ to two hours. The hay should be sufficient to satisfy hunger, but not enough to cause engorgement. Under ordinary conditions, one pound of oats to every 100 pounds of the horse's weight makes a reasonable ration for the day. It is best to give the grain in equal parts with each meal. If it is expedient on account of horses doing hard work to feed more grain, best results will be obtained by feeding a fourth meal late in the evening. When this is not possible, the extra grain may be

divided among the three meals, giving one-quarter of the total quantity in the morning and at noon and the remaining half at night.

SURVEY AND DIVISION OF DOMINION LANDS

The Dominion lands throughout the Western provinces are surveyed into quadrilateral townships containing thirty-six sections, of as nearly one mile square, each, as the convergence or divergence of meridians permit—as hereafter explained—together with allowances for roads, which vary somewhat, according to the system used.

The sections are bounded and numbered as shown in the township diagram below:

N					
31	32	33	34	35	36
30	29	28	27	26	25
19	20	21	22	23	24
18	17	16	15	14	13
7	8	9	10	11	12
6	5	4	3	2	1
S					

This shows a township divided into thirty-six sections omitting the road allowances which, in the first system, are one and a half chains (99 ft.) wide around each of the 36 sections.

A section contains six hundred and forty acres.

Each section is divided into quarter sections containing one hundred and sixty acres each.

Townships are numbered consecutively, from south to north, and each row of townships thus formed is given a range number. The ranges start from a principal or initial meridian, and are numbered consecutively. The first initial meridian passes a few miles west of Winnipeg in longitude, approximately, 97° 27' 09" west of Greenwich. Ranges are numbered from this meridian as a starting point, both eastward and westward.

From all other initial meridians ranges number westward only. If the numbers for townships, range and meridian are given, the exact location is known.

The second initial meridian is located in west longitude 102° (nearly), the third in 106°, and so on, each initial meridian after the second being 4° west of the preceding one.

There is also a coast meridian in British Columbia governing that system. The lines bounding a township on east and west sides are true meridians, and those on the north and south sides are chords of parallels of latitude passing through the corners of the township.

The townships are laid out, allowing exactly eighty chains for each section (on the base lines) with a road allowance adjoining each section; and the meridians between the townships are drawn from such bases north or south to the length of two townships "to the correction lines."

The townships south of each base measure in width therefore more than 480 chains, exclusive of the road allowances, whereas those north of the base measure less than this.

The distance between the base lines is equal to the length of four townships.

Correction lines are those upon which the "jog" resulting from the lack of parallelism of meridians is allowed—are township lines running east and west equi-distant from the bases.

The distance between "correction lines" is equal to the length of four townships.

Farmer's Manual

The international boundary, or 49th parallel of latitude, is made the first base line. The second base is between townships four and five, the third between townships eight and nine, and so on, northerly in that regular order.

The first "correction line" is between townships two and three, the second between townships six and seven and so on northerly.

Each quarter section occupies a space half a mile square.

HOW TO TELL ANY PERSON'S AGE

The following table of figures will enable you to tell how old the lady may be. Just hand this table to a lady and request her to tell you in which column or columns her age is contained; then add together the figures at the top of the columns in which her age is found and you have the great secret. Thus, suppose the age to be seventeen; you will find that number in the first and fifth column. Add the first figures of these two columns.

1	2	4	8	15	32
5	5	5	9	17	33
5	5	5	10	18	34
7	7	7	11	19	35
9	10	12	12	25	35
11	11	13	13	21	37
18	14	14	14	22	38
15	15	15	15	23	39
17	18	20	24	24	40
19	19	21	25	25	41
21	22	22	25	25	42
23	23	23	27	27	43
25	26	28	28	28	44
27	27	29	29	29	45
29	30	30	30	30	46
31	31	31	31	31	47
33	34	35	40	48	48
35	35	37	41	49	49
37	38	38	42	50	50
39	39	39	43	51	51
41	42	44	44	52	52
43	43	45	45	53	53
45	45	45	45	54	54
47	47	47	47	55	55
49	50	52	56	56	56
51	51	53	57	57	57
53	54	54	58	58	58
55	55	55	59	59	59
57	58	60	60	60	60
59	59	61	61	61	61
61	62	62	62	62	62
63	63	63	63	63	63

COLLEGES AND UNIVERSITIES

The following list gives the principal universities and colleges in Canada:

- Arcadia University, Wolfville, N.S. Arts and science.
- University of Alberta, Edmonton. Arts and science, medicine, agriculture, pharmacy and law.
- University of British Columbia, Vancouver. Arts and science, agriculture.
- Dalhousie University, Halifax, N.S. Arts and science, law, medicine and dentistry.
- Laval University, Montreal (French). Arts and science, law, medicine.
- University of Manitoba, Winnipeg. Arts and science, medicine, law.
- Manitoba Agricultural College, Winnipeg. Agriculture.
- McGill University, Montreal. Arts and science, law, medicine, dentistry, pharmacy, agriculture.
- McDonald College, Ste. Anne de Bellevue, Que. Agriculture.
- Queen's University, Kingston, Ont. Arts and science, engineering, medicine.
- University of Saskatchewan, Saskatoon. Arts and science, agriculture, law, civil engineering, pharmacy.
- Western University, London, Ont. Arts and science, medicine.
- Brandon College, Brandon, Man. Arts, science, music.
- University of Emmanuel College, Prince Albert, Sask. (Church of England) Theology.
- Emmanuel College, Saskatoon (Church of England)

Ontario Agricultural College, Guelph, Ont. Agriculture and domestic science.

Ontario Veterinary College, Toronto. Veterinary science.

College of Agriculture, Truro, N.S. Agriculture.

Royal College of Dental Surgeons, Toronto. Dentistry.

Redley College, St. Catharines, Ont. School for boys.

St. Alban's School, Brockville, Ont. School for boys.

Upper Canada College, Toronto. School for boys.

Alma College, St. Thomas, Ont. Ladies' college.

Bishop Strachan School, Toronto. School for girls.

Halifax Ladies' College and Conservatory of Music, Halifax, N.S. Music.

Ilavergal College, Toronto, Ont. Music.

St. Margaret's College, Toronto. College for women.

HEIGHT AND WEIGHT OF MEN

Table of average height and weight of men, based on analysis of 74,162 accepted applicants for life insurance as reported to the Association of Life Insurance Medical Directors.

Height	Age	Age	Age	Age	Age
	15-25 lbs.	30 lbs.	40 lbs.	50 lbs.	60 lbs.
5 ft.	120	128	133	134	131
5 ft. 1 in.	122	129	134	135	134
5 ft. 2 in.	124	131	135	138	137
5 ft. 3 in.	127	134	139	141	145
5 ft. 4 in.	131	138	143	145	144
5 ft. 5 in.	134	141	148	149	148
5 ft. 6 in.	138	145	150	153	153
5 ft. 7 in.	142	150	155	158	158
5 ft. 8 in.	146	154	160	163	163
5 ft. 9 in.	150	159	165	167	168
5 ft. 10 in.	154	164	175	172	174
5 ft. 11 in.	159	169	175	177	180
6 ft.	165	175	180	182	185
6 ft. 1 in.	170	181	186	188	189
6 ft. 2 in.	175	188	194	194	192
6 ft. 3 in.	181	195	203	201	...

The following gives a fair indication of proper proportion in height and weight of women.

Height	Lbs.
5 ft.	100
5 ft. 1 in.	106
5 ft. 2 in.	113
5 ft. 3 in.	119
5 ft. 4 in.	130
5 ft. 5 in.	138
5 ft. 6 in.	144
5 ft. 7 in.	150
5 ft. 8 in.	155
5 ft. 9 in.	163
5 ft. 10 in.	169
5 ft. 11 in.	176
6 ft.	180
6 ft. 1 in.	186

MISCELLANEOUS TABLES OF QUANTITIES, ETC.

12 unite.	1 dozen
12 dozen.	1 gross
12 gross.	1 great gross
20 unite.	1 score
56 lbs.	1 firkin of butter
14 lbs.	1 stone (avoir.)
28 lbs.	1 quarter (avoir.)
2 1/2 stones.	1 pig of iron
8 pigs.	1 fother
3 inches.	1 palm
4 inches.	1 hand
18 inches.	1 cubit
21.8 inches.	1 bible cubit
2 1/4 ft.	1 military pace
6 ft.	1 fathom
5280 ft.	1 mile
6075 1/2 ft.	1 nautical mile
8 nautical miles.	1 league
30 degrees.	1 sign
90 degrees.	1 quadrant
12 signs (360°).	1 circle

Handy Rules. Recipes and Tables

TABLE OF SIZES OF NAILS AND NUMBER TO THE POUND

Size	Length	Nails per lb.
3 penny	1 inch	557
4 penny	1 1/4 inch	535
6 penny	1 3/4 inch	282
6 penny	2 inch	177
7 penny	2 1/4 inch	141
8 penny	2 3/4 inch	101
10 penny	3 inch	68
12 penny	3 1/4 inch	54
20 penny	3 3/4 inch	34

Sizes run from 3 to 20 penny.

STRENGTH OF CLEAR SOUND ICE

Ice when 2 inches thick will bear men on foot; 4 inches, men on horseback; 6 inches, teams with light loads; 8 inches, teams with heavy loads; 10 inches of thickness will sustain a pressure of 1,000 pounds per square foot.

LIGHT AND SOUND

Sound travels at the rate of 1142 feet in a second 4 3/4 seconds to the mile.

Light passes through space at the rate of 186,000 miles per second, coming from sun to the earth in 8 1/4 minutes.

ROMAN NOTATION TABLE

I	1
II	2
III	3
IV	4
V	5
VI	6
VII	7
VIII	8
IX	9
X	10
XI	11
XII	12
XIII	13
XIV	14
XV	15
XVI	16
XVII	17
XVIII	18
XIX	19
XX	20
XXX	30
XL	40
L	50
LX	60
LXX	70
LXXX	80
XC	90
C	100
CC	200
CCC	300
CCCC	400
D	500
DC	600
DCC	700
DCCC	800
CCCCC	900
M	1000
MM	2000
MMM	3000
MDCCC	1800
MDCCC or MCM	1900
MCMX	1910
MCMXV	1915
MCMXIX	1919

Any letter placed before a letter of greater value indicates subtracting of its value; thus IX means 10-1 or 9. A bar over letters increases them 1000 fold;

thus DC̄ is 600,000.

VALUE OF FOREIGN COINS IN CANADIAN CURRENCY, WITH NAME OF UNIT (Prior to World War)

Argentina	Peso	\$0.965
Austria Hungary	Crown	.203
Belgium	Franc	.193
Bolivia	Boliviano	.382

Brasil	Millreis	\$0.546
Canada	Dollar	1.00
Central America	Peso	.470
Chili	Peso	.965
China (varies)	Tael	.54
Colombia	Peso	1.00
Cuba	Peso	.926
Denmark	Crown	.269
Egypt	Pound	4.943
Ecuador	Sucre	.487
Finland	Mark	.193
France	Franc	.193
Germany	Mark	.238
Greece	Drachma	.193
Haiti	Gourde	0.965
India	Rupce	.324
Italy	Lira	.193
Japan	Yen	.498
Liberia	Dollar	1.00
Netherlands	Florin	.402
Norway	Crown	.269
Peru	Libra	.487
Peru	Tonno	1.704
Portugal	Millrois	1.080
Rumania	Lei	.193
Russia	Rouble	.516
Spain	Peata	.193
Sweden	Crown	.269
Switzerland	Florin	.193
Turkey	Medjidie	.880
Uruguay	Peso	1.034
Venezuela	Bolivar	.193

APPROXIMATE VALUE OF VARIOUS METALS

Per Pound Avoirdupois	
Steel	0.06
Lead	.10
Zinc	.10
Arsenic	.16
Antimony	.20
Copper	.30
Tin	.60
Nickel	.60
Sodium	1.10
Mercury	1.67
Cadmium	2.40
Potassium	3.50
Bismuth	3.75
Tungsten	4.50
Molybdenum	4.50
Magnesium	8.50
Chromium	10.00
Thallium	45.00
Uranium	550.00
Vanadium	575.00
Indium	1,250.00
Osmium	3,050.00
Iridium	4,500.00
Ruthenium	8,000.00

Troy Weight Per Pound

Silver, \$9.60; gold, \$240; platinum, \$1,200; palladium, \$1,500.

A troy ounce of pure gold is worth \$20.67184, and of British standard gold, \$18.94918.

Pounds per barrel

Flour and meal, 196; rolled oats, 180; rolled wheat, 100; beef, pork and fish, 200; salt, 280.

Artichokes, beets, carrots, onions, parsnips, potatoes and turnips are sometimes sold by the bag, the weight being 50% greater, respectively, than that fixed for the bushel, excepting that weight per bag for parsnips is placed at 85 pounds.

CANADIAN WHEAT EXPORTS

Wheat crop of Canada and exports of the crops for the years named for a series of years:

Year	Crop		Exports
	1910	1911	
1910	193,260,400	61,875,000	
1915	188,075,000	108,740,000	
1917	233,743,000	152,200,000	
1916	262,781,000	179,781,000	
1915	393,542,000	291,734,000	
1914	161,280,000	86,402,000	
1913	231,717,000	132,047,000	
1912	224,159,000	115,584,000	

	Crop	Exports
1911	230,924,000	98,158,000
1910	182,049,000	64,783,000
1909	165,788,000	66,660,000
1908	107,466,000	57,812,000
1907	96,852,000	48,040,000
1906	125,505,000	46,728,000
1905	106,097,000	47,393,000
1904	69,029,000	20,644,000
1903	78,495,000	30,032,000
1902	93,769,000	44,795,000
1901	84,815,000	41,338,000
1900	47,868,000	23,985,000
1899	54,400,000	25,906,000
1898	63,896,000	21,100,000
1897	47,120,000	29,473,000

To April 1, 1920.

SEEDTIME AND HARVEST OF THE WORLD		
Country	Seedtime	Harvest
Australia, New Zealand and Chile	May-June	January
East India and Upper Egypt	July-Aug.	Feb.-Mar.
Lower Egypt, Syria, Cyprus, Persia, India, Asia Minor, Mexico	Aug.-Sept.	April
Algeria, Central Asia, China, Japan, Morocco	Aug.-Sept.	May
Turkey, Greece, Italy, Spain, Portugal, South of France	Sept.-Oct.	June
Roumania, Bulgaria, Austria-Hungary, South of Russia, Germany	Sept.-Oct.	July
Switzerland, France, South of England	Sept.-Oct.	July
Belgium, Holland, Great Britain	Oct.-Nov.	August
Denmark, Poland, Lower Canada, B.C., Man., Sask., Alta.	Sp. Wh. Mar.-Apr.	August
Scotland, Sweden, Norway, North of Russia	Spr. Wh. April	Sept.-Oct.
Peru, South Africa, Argentina	May-June	November
Burmah	May-June	December

WHEAT CROP OF THE WORLD

Wheat crop of the world as reported in bushels by International Institute of Agriculture, Rome, and other reliable sources (000 omitted):

	1910	1918	1917	Average,
	Bus.	Bus.	Bus.	1909-13
Canada	196,361	180,975	233,743	197,119
U.S.	940,987	921,438	636,655	686,691
Guatemala	252			
Argentina	184,268	223,636	80,115	157,347
Brazil			3,307	
Chile	21,591	23,120	22,494	20,316
Uruguay		13,060	5,390	7,314
Belgium	9,895			14,583
Denmark		6,330	4,206	4,916
France	177,978	225,736	134,575	317,254
Germany		90,336	81,791	152,119
Italy	160,563	179,368	139,999	183,200
Luxemburg		512	388	
Netherlands	9,915	5,431	3,452	4,976
Norway	1,139	1,087	439	307
Portugal			5,560	8,683
Spain	133,939	135,709	142,674	130,446
Sweden		9,003	6,904	7,907
Switzerland	3,524	7,995	4,556	1,481
U. Kingdom		96,079	68,350	63,314
Brit. India	280,075	370,421	382,969	350,736
Japan	29,800	32,923	34,745	25,274
Korea	7,144	6,155		
Algeria	25,559	49,774	23,151	33,071
Egypt		32,555	29,834	34,000
Morocco		22,697	15,656	
Tunis	7,000	8,451	6,963	6,063
Union of S. Africa	10,150	8,833	4,790	4,620
Australia	75,138	114,734	152,420	84,943
N. Zealand	6,659	6,808	5,951	7,855

Comparable totals, 17 countries.. 2,267,074 2,500,639 2,007,886 2,213,622

PER CAPITA WHEAT CONSUMPTION—PRE-WAR ESTIMATES

The per capita consumption of wheat, in bushels, including wheat flour reduced to wheat equivalent with an allowance made for quantities used for seed, is as follows for countries named in pre-war period:

Canada	9.5	Netherlands	4.2
Belgium	8.3	Roumania	4.0
France	7.9	Denmark	3.5
Spain	9.1	Chile	3.4
United Kingdom	6.0	Germany	3.2
Switzerland	6.0	Russia	2.7
Australia	5.5	Servia	2.5
Italy	5.4	Sweden	2.5
United States	5.3	Egypt	2.5
Uruguay	5.3	Portugal	1.8
Argentina	5.2	British India	1.8
Bulgaria	5.0	Mexico	1.8
Austria-Hungary	4.3	Japan	1.5

WHEAT CROPS OF THE WORLD

Year	Bushels	Year	Bushels
1897	2,296,268,000	1909	3,581,519,000
1898	2,948,305,000	1910	3,475,055,000
1899	2,783,885,000	1911	3,551,795,000
1900	2,910,751,000	1912	3,791,051,000
1901	2,955,975,000	1913	4,127,437,000
1902	3,060,116,000	1914	3,585,916,000
1903	3,180,813,000	1915	4,004,480,000
1904	3,192,542,000	1916	3,153,097,000
1905	3,327,084,000	1917	1,916,050,000
1906	3,434,354,000	1918	2,358,875,000
1907	3,133,965,000	1919	2,267,074,000
1908	3,182,105,000		

BRIEF POINTS OF BUSINESS LAW

Ignorance of law excuses no one.
 The act of one partner binds all the others.
 A contract made on a Sunday is void.
 A principal is liable for the acts of his agents.
 An agent is liable to his principal for errors.
 A receipt for money paid is not legally conclusive.
 A signature made with a lead pencil is good in law.
 An agreement without consideration, expressed or implied, is void.
 A contract made with a minor cannot be enforced.
 A note made with a minor is voidable.
 Each partner is liable for the whole amount of the debts of his firm.
 A partial payment of an outlewed debt revives the obligation.
 Notes obtained by fraud, or made by an intoxicated person, are not collectible.
 If no time of payment is specified in a note, it is payable on demand.
 A note which does not state upon its face that it bears interest, will bear interest after maturity.
 An indorser may avoid liability by writing "without recourse" under his signature.
 Don't accept a note until you are certain that it is dated correctly, specifies the amount of money to be paid, names the person to whom it is to be paid, includes the words "or order" after the name of the payee. If the words "or order" after the name of the payee. If it is intended to make the note negotiable, states a place where payment is to be made, states that the note is "for value received," and is signed by the maker or his duly authorized representative.

CARE OF ROPE

The first point in caring for rope is to keep it dry. Ropes which have become wet should be thoroughly dried in the sun before being coiled up or put away. Hay ropes used in the barn, which may absorb moisture from the hay, should be removed from the mow when not in use. Dry and wetting is detrimental to rope fiber. A rope always kept dry will last considerably longer than one alternately wet and dry. In coiling up a rope it should be oiled each time in the same direction, as the strands are twisted or "with the sun." When the rope is uncoiled the end first laid down should be drawn up through the centre. Whenever the rope is unbound from the end last laid down there is always a tendency for it to twist. The same is true of hinder twine, and for this reason if it is unwrapped from the outside it will twist and snarl. Rope should be kept dry and clean.

DRY CLEANING CLOTHES, ETC.

The dry process of cleaning fabrics consists in soaking them in petroleum ether (benzoline, petrol, etc.), which removes the oil and grease to which the dirt adheres, the dirt being subsequently removed by shaking or brushing. The petroleum spirit should be stored in earthenware pots or galvanized tanks covered with lids. There should be two or more of these receptacles, the fabrics being allowed to soak for several hours in one tank, and then removed to others; the greater part of the dirt is always removed in the first tank, and the other tanks are kept for the final cleaning. After soaking, the fabrics are dried either in the open air or on steam-heated chests in a closed chamber, to which a fan is attached in order to remove the fumes. The fabrics are subsequently brushed or shaken in order to remove the dust or dirt. Stains that resist this treatment are removed with a little caustic soap and methylated spirit, which are rubbed on with a rag, and washed off again with a rag that has been damped with methylated spirit. When the benzoline has become dirty, it is distilled and recovered; but the distillation must be performed in a steam-heated still, and on no account must a light be brought near any rooms in which dry-cleaning is carried on. The vapors are injurious to the health of the workpeople.

BRIGHT BLACK PAINT FOR STOVES

Use Brunswick blacks and black japans, or prepare a suitable paint as follows: Procure 7 lb. of Swedish pitch, 3 lb. of resin, $\frac{1}{2}$ lb. of lampblack, $\frac{1}{2}$ lb. of litharge, $\frac{1}{2}$ gal. of hotted oil, and $\frac{1}{2}$ gal. of American turpentine. Melt the pitch and resin in a suitable vessel, then add the lampblack, and stir well. In another vessel heat the oil to about 200° F., and add this to the resin and pitch, following with the litharge, which should be added slowly, constantly stirring, otherwise the contents may boil over. Let the mixture remain over the fire for about fifteen minutes, then remove it, and allow to cool down somewhat, when the turps should be added very slowly. Pass through a fine sieve before using.

THE FARM MEDICINE CHEST

Every stock owner should keep on hand some of the coal tar disinfectants. Carbolic acid is no doubt the best of them, but it has to be used with the greatest care because of its poisonous properties. Creolin or Zenolium will give just as good service in most cases, and have the advantage of being non-poisonous.

The uses of a disinfectant on the farm are various. They should be used more freely in the stables, especially after any outbreak of contagious disease. The navel opening of newly-born foals, calves or lambs should be dressed with a 10 per cent watery solution as soon as possible after birth to guard against "navel ill." They should always be used in case of any operation such as castration, or the docking of lambs. Before operating, the hands of the operator should be disinfected by washing in a 10 per cent solution, the knife to be used also to be treated, and after the operation all cuts or wounds should have some of the solution poured into or applied to them. They are of the greatest importance in the treatment of any kind of wounds, accidental or otherwise. In summer the parts will not become flyblown, and in cold weather they tend to prevent the injurious effect of frost.

In the treatment of lice on animals they are of the greatest value; a good strong solution of about 15 to 20 per cent. will destroy most forms of vermin. Generally speaking, about 10 to 15 per cent watery solution is strong enough for any purpose, but in the case of creolin or zenolium it may be used much stronger with perfect safety. Carbolic acid has to be used with the greatest care, and is not a safe application in the hands of an inexperienced person.

Purgatives

Epsom salts is the most common purgative for cattle. A timely dose of from one to two pounds, if given on the first indication of constipation, will generally prevent impaction of the third stomach and guard against this serious and often fatal disease. In treating inflammation of the udder in cows, a dose of salts will always hasten recovery.

Barbadoes aloes is the ordinary purge for horses. The dose is one ounce with a little ginger added. It may be made into a ball and given that way, or pulverized and given in a drench with water.

Raw linseed oil is a nice bland purgative for either horses or cattle, and will not gripe like salts or aloes. The dose for an adult animal is about one and a half pints, and for foals or calves from one to four ounces.

Turpentine is a useful vermifuge. Two ounces, mixed with half a pint of raw linseed oil, will banish most forms of worms. The dose should be given on an empty stomach, and no food allowed for two hours after drenching. Turpentine is also very useful in case of cattle bloating. In the first stages of bloating about four ounces mixed with a pint of oil will often control the trouble.

Tonics and Stimulants

Ginger is a useful carminative, and should be added to any of the drastic purgatives, such as salts or aloes. It has a tendency to relieve intestinal pain, and mildly stimulates the appetite. Dose, one tablespoonful.

Gentian is a digestive tonic, and is useful in stimulating the appetite in cases of debility. Dose, a tablespoonful.

Sulphate, or nitrate of potash, stimulates the kidneys, and is a useful drug if used in moderation. It is used much too freely by some stable men. A dose of a dessert-spoonful in a bran mash once a week helps to keep the kidneys of highly fed horses in good working order.

Other Preparations

An ounce each of sugar of lead and sulphate of zinc dissolved in a pint of water makes a valuable healing lotion for wounds or sore shoulders which have a raw surface. It is also a good application for scratches or other eruptions on the legs of horses.

A handful of charcoal mixed now and again with the food of young pigs has a strong tendency to keep them in good health, especially in winter. It supplies some of the ingredients they get by rooting in the ground in summer. Lime water good enough for veterinary practice can be made by putting about a quart of lime in a pail of water, stirring till the lime is dissolved, and laying the pail aside till the lime settles, then pouring off the pure liquid. It is an antacid, and a pint given with the milk at each feeding will correct any tendency to diarrhoea and often prevents attacks of dysentery and white scour.

Sulphur is a favorite medicine with many farmers, who greatly overrate its medicinal properties. Made into an ointment, it will destroy lice, but it is not as effective as an application of some of the coal tar disinfectants.

The judicious use of the aforementioned simple drugs will have the effect of helping to keep stock in good health, but, after all, if a farmer finds a really sick animal on his hands and employs professional aid to treat it, he will in the long run be further ahead than the man who acts as his own veterinary surgeon.

RECOVERING TOOLS FROM WELLS

Small tools accidentally dropped into a deep well can be recovered easily with the simple device made as follows: An old huggy spring is cut in half and the two sections are inserted in one end of a three-foot length of iron pipe with their concave curved sides facing each other. The end of the pipe is flattened slightly to permit the pieces to be fitted and wooden wedges are driven in to hold them firmly in place.

To recover a hammer, auger, wrench, or other similar implement, the ends of the springs are separated and a nail or stick is placed between them. The contrivance is then lowered into the well by means of a rope attached to a wire ball at the opposite end of the pipe, and alternately raised a few inches from the bottom and dropped again. When the springs come astride the object sought the latter dislodges the stick or nail and the springs grasp the object itself, holding firmly so that it can be brought to the surface.

CRACKED CIRCULAR SAWS

If a circular saw is cracked it can be repaired, so that the crack will go no further, and if the crack is deep it can be so remedied that there will be no danger in using

It. Ascertain the end of the crack, then drill a 3-16 inch hole so that the crack will end in that hole. Countersink on each end and put in a rivet. Do not let the rivet stick its head over the face of the saw.

If the crack is deep put another rivet about half an inch from the edge. If the saw is too hard to drill heat two irons about 1 1/4 square or round, square up the ends and set the saw between the ends so that they will meet over the place where the hole is to be drilled. When the saw is dark blue, the temper is out. It might be a possibility that this will spring the saw in some cases, therefore would advise drilling the hole without any change in temper. Prepare a drill that is harder than usual, use no oil, but water.

The reason why a circular saw cracks is, in most cases, due to incorrect filing. In filing a saw, never let a flat file with its square corners touch the bottom of the teeth you are filing; if you do, you will make a short cut that will start the crack.

CLEANING FURS

(a) Rub with hot roasted bran, allowing the bran to enter the fur well. Then shake the fur and well brush. (b) Moisten bran with hot water and well rub it into the fur with a piece of clean flannel. Now take some dry bran and a clean dry flannel, and rub this well in until the wet bran and the fur have become dry. To remove the bran, give the fur a good shake, a sharp but light beating with a brush and brush with a soft brush. (c) Mix and heat in an oven equal parts of flour and fine salt, and thoroughly rub the hot mixture into the roots of the fur. Now well shake the fur, then throw it over the back of a chair, fur side upwards, and brush out any of the mixture left, using the end of a soft brush, and giving sharp "dabs" so as to get in the bottom of the channel formed by the parting of the fur, blowing well all the time.

CLEANING AND RENOVATING CARPETS

For beating free from dust, a carpet is best hung over a horizontal 3 in. square rail, about 12 ft. long, supported at each end by a rope suspended from an upright about 10 ft. high and about 4 in. by 3 in. in cross-section. The uprights are driven into the ground to the depth of 2 ft., and struts are fixed at each side. The rail should have a hole bored at each end to allow for a thin rope being passed through. This rope works in pulleys fixed in the sides of the uprights at the top, and allows the rail to be either lowered or raised, which will be found very convenient when heavy carpets are being handled. The rail is lowered to receive the carpet; then, by hauling on the ropes, it is raised till the carpet clears the ground, and is kept in position by twisting the rope round a large nail driven into the uprights. The carpet should be beaten till thoroughly free from dust. Malacca canes about 4 ft. long are suitable for the purpose, being tough and not easily split or broken. Next lay the carpet out on a clean and level floor, and brush all over with a fibre carpet broom. To clean the carpet, obtain some benzoline, soft soap, and an ordinary flat scrubbing-brush; dip the brush in the benzoline, and apply just a touch of soap; then vigorously scrub the carpet. Work on a space of about 2 ft. square each time, till the whole carpet is covered. This treatment will clean and revive the colors in the carpet wonderfully; and as the benzoline evaporates very quickly, the carpet will be practically dry as soon as finished. Hanging the carpet in the open air for a few hours will free it from all smell of the benzoline. Occasionally, stains are very obdurate, and special treatment is necessary. In the case of a rusty-looking stain on a Wilton carpet, place a large dinner plate or tray underneath the stained portion. Mix equal parts of cream of tartar and citric acid (this can be bought ready mixed under the name of salts of lemon), saturate the stained portion with hot water, and rub on the salts with a smooth piece of wood or stone until the stains disappear; then well rinse in clean cold water and hang the carpet up to dry. Or, instead of salts of lemon, oxalic acid, followed by a very weak solution of chloride of lime (bleaching powder), may be used; this is suitable for very light colored carpets. One of the best methods of reviving all-wool carpets is to wipe the surface with a large swab of soft cloths or with a very soft bristle brush well charged with a

solution made by dissolving an oz-gall (procured from a butcher's) in a pail of water. Before using the solution the carpets should be well brushed or beaten to remove dust.

WATERPROOFING TARPULIN

Spread out the sheet, well clean it with hot water and washing soda, and, if possible, hang it up to dry. Melt 2 1/2 lbs. of tallow in 1 gal. of good boiled linseed oil; rub this well into the cover with a big pad of cotton waste, hang up to dry, and repeat the operation until the inside has received two coats and the outside three. If the cover has been allowed to dry properly after each coat of oil, it will be perfectly waterproof and quite supple, and will not crack, as when oak varnish or other driers are mixed with the oil. If the cover is given a coat of oil on the outside once yearly, the fabric will remain waterproof for ten years in constant use. The name can be painted on the cover with ordinary tube oil paints thinned out with gold-size.

FROSTING WINDOWS

To make a window resemble frosted glass, take whitening, and with two-thirds of raw linseed oil to one-third of white Japan driers mix to a rather stiff consistency. Then with turpentine reduce to a condition to work easily under a camel-hair brush. Spread the mixture quickly and evenly on the glass. Then take finely threaded cloth, roll it into a ball, and cover with a clean cotton cloth, and proceed to go carefully over the freshly laid-on whitening, softly tapping it, until the frosted imitation is brought clearly and prettily into relief. The mixture can be tinted with color if desired before it is thinned for application.

PREVENTING RUST ON MACHINERY

Melt to gether 1 lb. of tard (free from salt), 1 oz. of gum-camphor, and 1 oz. of clear resin. Skim the mixture carefully, and stir in it a sufficient quantity of fine blacklead to give it the color of iron. After cleaning the machinery, thoroughly smear it with the mixture, and allow it to remain thus for twenty-four hours. Then go over it with a soft cloth, rubbing it clean. Machinery treated in this way has been found to retain its brightness for several months.

FILLING JOINTS BETWEEN FLOORBOARDS

Prepare strips of wood of suitable lengths, plane them so that they fit into the joints, coat them with glue and drive them into the joints. When the glue is dry the strips should be planed down so that they are flush with the boards. If the boards are laid on a foundation, the cracks could be filled with sawdust, the whole floor covered with thick brown paper or felt, and the linoleum or carpet then laid.

WATERPROOFING BOOTS

Put some beeswax in a jar, well cover with castor oil or neat's-foot oil, and stand on the hob till the wax melts. Stir, and allow to get cold, when it should look like duffing; if it is too thick add more oil. Now warm it again, and while soft apply to the leather with a stiff brush. Warm the boots before a slow fire, then give a second coat. If desired, a little ismiphack or gasblack can be added. The oil dries in and helps to waterproof, and the wax forms a coating through which water does not penetrate.

WATERPROOFING FELT HAT

(a) For waterproofing a soft hat, sponge the inside of the hat with a warm solution of soap, 2 oz. to the pint, then apply a solution of alum, 2 oz. to the pint, and dry. If the hat is a light-colored one, it could be dipped first in the soap, and then in the alum; this method will be more effectual than the first one. (b) Felt hats are rendered almost waterproof during manufacture by treating with a solution of shellac in spirit. The shellac not only renders the hats waterproof, but also gives the stiffening required, and allows of the necessary shaping and blocking. A felt hat, if not properly waterproof, could be treated inside with a solution containing 2 oz. of shellac in 1 pt. of methylated spirit, but a black felt hat would show the coating, and would need the addition of a little aniline black to the solution. The solutions must be used sparingly, for if they soak through the hat a stain will result.

WATERPROOFING STRINGS

There are two suitable methods of waterproofing strings. (a) They should first be dyed with the ordinary dyeing materials, either fast aniline dyes, or others, such as logwood black, fustic, etc. After dyeing, the twines may then be passed through a warm soap bath (1 lb. to 1 gal.), and then through an alum bath (1 lb. to 1 gal.). By this treatment an insoluble alumina soap will be deposited within the fibres of the twine, and will render it quite waterproof. The length of time in which the twine remains in the bath must be so regulated that it is thoroughly wetted before leaving, otherwise only a surface coat will be put on, and the treatment will not be so effective. (b) The twines may or may not be dyed previously. They are simply passed through boiled linsed oil, and the excess squeezed out by running through a mangle, the rollers of which are covered with flannel. To keep the twines flexible about 5 to 1 per cent. of castor oil may be added to the boiled oil, and if the twines are not dyed the latter can be colored with aniline colors soluble in oils.

CURING RABBIT SKIN

The skin must be fresh flayed and cleaned of all fat and particles of flesh by scraping it with a blunt knife whilst stretched, fur inwards, upon a rounded surface such as a baluster rail. Then steep it in a solution made by mixing thoroughly together when dry 3 parts alum and 1 part common salt, and then adding as much warm water as will dissolve the mixture. The quantity depends on the size of the skin. To ascertain when it has soaked long enough, squeeze the liquid from it. Then double it, with the skin side outwards, so as to make a crease, and when the line shows when the soaking can be stopped. The soaking usually takes about forty-eight hours. Make a paste of flour and water, and, having rinsed the skin, dip it for a minute in the warm gruel. Then wash it clean with cold water, and dry it. When about half dry, stretch again on a board, and rub with pumice. Small skins, when freshly flayed, can be cured by being soaked for a few days in a solution of tan. This can be made by boiling oak bark or oak galls in rain or distilled water, or by dissolving tannin in soft water. Fill a pot with oak bark, and boil it in twice as much water for three hours. Use the solution cold, and take out and rub the skin as often as possible during the process.

CEMENTS FOR CHINA AND GLASS

There are many cements for repairing china and porcelain. (a) For large articles, plaster-of-Paris worked up with alum solution may be used; or plaster-of-Paris may be stirred into a clear solution of gum arabic. This should be used immediately, but is useless if the vessel to be mended has in hold water. (b) A cement which is said to stand both heat and water is made by calcining and grinding oyster shells. These are then reduced to the finest powder possible with a miller, and the whole is beaten into a paste with white of egg. In using this preparation the broken parts should be pressed well together. (c) A good cement for repairing broken glass is made by placing in a wide-mouth bottle a small quantity of glue, just covering it with water, and allowing it to stand overnight; next day the excess of water is poured off and the glue is covered with methylated spirit. The bottle is then placed in a pan of water and heated until the glue is melted, then a little whiting is shaken into it, the bottle removed from the pan, cooled, and tightly corked. Sometimes a small piece of gum mastic, together with some ammoniacum, is added to such cements. (d) Cover 1/2 oz. of gelatine with strong acetic acid, and, after standing, melt it down by placing the bottle in hot water. Both these cements are ready for use if they are placed for a few minutes in hot water. (e) Coagulate milk and acetic acid and wash the casein in water. It is then dissolved in a cold saturated solution of borax, and a clear solution obtained, which is mixed with finely powdered quicklime. This should be applied to the broken parts quickly, and the whole bound tightly with cord and gently heated. (f) A sulphur paste for porcelain is made with 7 parts of sulphur, 5 parts of white pitch, 1 part of bleached shellac, 7 parts of glass meal, 2 parts of gum elemi, and 2 parts of mastic. (g) A very strong cement for glass or por-

celaine may be obtained from casein dissolved in a soluble silicate of soda or potassium. To prepare pure casein, skim the milk of all cream and stand it in a warm place till it curdles. It should then be filtered, washed with water, tied in a cloth, and boiled in water. It should be allowed to dry on blotting paper, and can then be kept for a long time. (h) A waterproof cement for attaching glass to wood, slate, etc., is made by mixing together 3 parts of litharge (by measure), 3 parts of white lead, 3 parts of plaster-of-Paris, and 1 part of powdered resin. Make into a paste with boiled linsed oil, and use at once. For a transparent cement, boil (singlass in spirit of wine. (i) A cement to repair porcelain or glass and to withstand heat is made by rubbing up in a mortar white of egg and a little dry lime. Paint this on the broken edges, put the articles together, then paint strips of calico with the mixture and lay them over the broken parts outside, and allow to stand for several days. A coat of oil paint could then be put on, and would render the whole waterproof. (j) Silicate of soda or potash (commonly known as water glass) sticks well to glass, and will stand heat. Either of these, however, attacks and slightly roughens the glass. (k) Another heat-resisting cement for glass is the following: Pulverise together in a mortar 1/2 oz. of powdered glass, and 1 oz. of flourspar until they are reduced to an impalpable powder, then mix with 3 oz. of silicate of soda, and work it into a smooth paste, which sets very rapidly. (l) A reliable cement for repairing glass and china vessels is a saturated solution of soda glass in pyrochloric acid. (m) With the following cement, the articles is required to dry slowly in a warm place: 1 1/2 parts of white lead and 6 parts of pipeclay, carefully dried, are incorporated with 5 parts of boiled linsed oil, heated on a water-bath. (n) To repair a broken washhand basin, cover the inside of the parts to be joined with ordinary oil paint, then lay on a strip of calico, or thin canvas, and paint the outside. This is not very neat, but it lasts well.

CEMENTING EARTHENWARE

(a) Canada balsam forms a very efficient cement for earthenware; it will stand a considerable amount of strain, and is not affected by water. The Canada balsam sold by chemists is the crude resin obtained from the Canadian pine, and is in the form of a sticky syrup. Place some of this in a tin and heat it in the oven until all the volatile matter has been driven off and the residue becomes hard on cooling. Grind the resin into small pieces and place it in a wide-mouth bottle; add sufficient benzol to just cover the resin, and keep in a warm place. When the cement is required, put the bottle in a pan of water and gradually warm it. Apply the cement (using a glass rod) to the surfaces to be united, warm them, and bind together until the cement is quite hard. The excess of cement should be pared off with a sharp knife. (b) Sulphur has proved a good material for mending cracked earthenware. The sulphur should be melted, not too fast, over a bright fire in an iron pot or ladle or crucible and poured into the cracks. When melted, the sulphur is of a brownish color and is scarcely noticeable in certain light brown ware, but the addition of a little graphite will render the sulphur darker. (c) Another cement for cracked earthenware may be made by melting 2 parts of resin and stirring in about half as much plaster-of-Paris, which must be perfectly dry. The addition of a little burnt umber will darken this cement so as to make the join less noticeable.

PREPARING GLUE

In preparing glue for use, the cakes should be broken into small pieces by wrapping them in canvas and striking with a hammer. If the canvas is not used, the glue will fly into small fragments, many of which will be lost. Put the glue into a clean vessel and cover with cold water, allowing it to remain until the next day, when it will have absorbed some of the water and will present the appearance of pieces of jelly. Place this into the inner vessel of a glue-pot, and just cover with water, then keep the water boiling in the outer vessel for two or three hours. To test for thickness, dip the brush into the glue, and if it just runs easily without breaking into drops it is fit for use. Some workmen test the thickness by rubbing between the finger and thumb.

but this test requires experience. The inner pot should never be placed on the fire direct, or the glue will burn and become worthless. Glue freshly made is stronger than stale glue. The water used should be clean and hot.

CEMENTING RUBBER ARTICLES

For repairing articles made of rubber, rough well with a rasp the parts that are to be stuck together then with a clean brush remove all the dust. Now apply to each of the materials a coat of india-rubber solution, and when nearly dry (the solution dries quickly in dry or warm weather or in the warmth of a fire, but open-air drying is best) give a second coat, and then a third. The solution should be laid on evenly all over with the second finger, and in testing to see whether the solution is dry enough use the finger, but only in the centre of the surface of the material, for if touched at the edges it will not adhere. The solution is dry enough when it just sticks to the finger without any coming off.

UNIVERSAL CEMENTS

Under the name of universal cements are known many useful preparations that strongly adhere to almost any substance—wood, metal, leather, glass, etc. (a) Reduce 2 oz. of clear gum arabic to powder, and dissolve it in a little water. Dissolve $1\frac{1}{2}$ oz. of fine starch and $\frac{1}{2}$ oz. of sugar in the gum solution, and heat the mixture over a water-bath until the starch becomes clear. The cement should then be as thick as tar, and should remain so. It can be kept from spoiling by dropping in it a lump of camphor, or a little oil of cloves or saffron. (b) There are two universal cements that appear in the form of brown sticks: (1) shellac, and (2) a mixture of 2 parts of shellac and 1 part of Venice turpentine. These materials are melted and then cast into sticks. (c) Dissolve 8 oz. of sugar in 24 oz. of water in a glass flask on a water-bath, and to the thin syrup add 2 oz. of slaked lime. Keep the mixture at a temperature of about 70-75 C. for three days, shaking frequently; then cool, and decant the clear liquor. Mix $4\frac{1}{2}$ oz. of this liquor with the same quantity of water, and in the mixture steep 16 oz. of fine gelatine for three hours after heating, to effect solution. Finally, add to the mixture $1\frac{1}{2}$ oz. of glacial acetic acid and 15 gr. of pure carbolic acid. The latter serves as a preservative. (d) Dissolve 2 oz. of isinglass or fish glue in proof spirit, and add 1 oz. of pulverised gum ammoniac. Mix with a saturated solution of 2 oz. of mastic in alcohol, heat over a slow fire, and afterwards place in well-stoppered bottles. For use, the material should be heated. This is especially suitable for china and glass.

STRONG PASTE

(a) Paste made with flour or starch and cold water rarely answers the purpose. It is desirable to boil the paste, or to make it with boiling water to produce a translucent material, this giving far stronger results. (b) To make flour paste, get 1 qt. of water and 3 oz. of alum. Heat until the alum has dissolved, and when cold add flour to the consistency of cream; then let the mixture boil, stirring it at the same time. By adding a little powdered resin and a clove or two before boiling, the past will keep for a year and can be softened with water when dry.

LINOLEUM POLISH

Dissolve 1 oz. of beeswax in 10 oz. of turpentine by the aid of slight heat, and add 10 oz. of linseed oil and $\frac{1}{2}$ oz. of spirit of salts. Having washed the linoleum, smear on the mixture and well polish with a soft duster or brush. The surface is a suitable finish for a ball-room, but far too slippery for ordinary domestic use, for which purpose a much smaller proportion of wax in the turpentine will be better.

CHEAP GLOSSY RED PAINT

The basis of cheap glossy paints is either resin varnish or cheap oak varnishes. To prepare a resin varnish that would answer the purpose, place 7 lb. of pale resin in a suitable vessel over the fire until melted, then take the vessel well away from any light or fire and add 1 qt. of benzine, 1 pt. of boiled oil, and 2 pt. of cheap oak varnish, stirring thoroughly until all the ingredients are blended together. If on cooling the

preparation should thicken, add more benzine. To prepare a signal red or vermilionette or red oxide color, obtain these pigments in the form of paste paints and thin them down with a small quantity of benzine, and finally stir into the varnish described above. These paints, if applied warm, dry with a hard enamel-like surface in about four hours; if applied in the usual manner, they take about six hours to dry.

ZINC WHITE PAINT

This is a durable non-poisonous zinc white paint for all classes of work. Procure 14 lb. of pure zinc white ground in oil, 2 oz. of resin of manganese, 1 pt. of pale boiled oil, $\frac{1}{2}$ pt. of raw linseed oil, and $\frac{1}{4}$ pt. of turpentine. Mix all well together except the resin of manganese, which should be rubbed into a paste with oil and then mixed into the paint with the other ingredients. If a glossy surface is required, add to the above $\frac{1}{2}$ pt. of pale oak varnish.

BLUE PAINT

This is a non-poisonous sky-blue paint suitable for the insides of bird cages. Make a varnish by dissolving sealing-wax of the required color in refined naphtha or methylated spirit. Crush the sealing-wax before dissolving, and apply with a spirit varnish brush. Any color warehouse should be able to supply a suitable blue paint ground in varnish; the main thing is to avoid paints containing lead.

CEMENTING LEATHER

(a) Dissolve guttapercha in bisulphate of carbon until of the consistency of treacle. Shave well the parts to be cemented and then apply a little cement evenly to them. Warm them for about half a minute, apply one against the other quickly, and press hard. Keep the bottle well corked and in a cool place. (b) Melt 16 parts of guttapercha, 4 parts of gum rubber, 2 parts of yellow pitch, 1 part of shellac, and 2 parts of linseed oil, and apply as above. (c) Take 1 lb. of guttapercha, 4 oz. of india-rubber, 1 oz. of pitch, 1 oz. of shellac, and 2 oz. of linseed oil. Melt all together. The composition will harden when kept, and must be melted for use.

BLACK PAINT

For a glossy black paint that will withstand the weather, procure 7 lb. of drop black in turps, 7 lb. of best black paint in paste, 1 lb. of patent driers, 1 pt. of outside oak varnish, $\frac{1}{4}$ pt. of japan gold-size, and $\frac{1}{2}$ pt. of turpentine, and thin down with boiled linseed oil. Adding the drop black in turps gives the paint good staining properties, whilst the oak varnish and gold-size give the required gloss and make the paint durable for outside work. Good results may also be obtained by mixing to the desired consistency drop black ground in turpentine with more turpentine, then adding a very small quantity either of boiled oil or japan gold-size, to prevent the paint rubbing up when dry. The work should be given two coats of this paint and then finished off by applying two coats of a good durable outside oak varnish.

MIDDLE GREEN PAINT FOR OUTSIDE WORK

Get 14 lb. of middle Brunswick green in paste, $\frac{1}{4}$ lb. of patent driers, $\frac{1}{4}$ pt. of gold-size, $\frac{1}{2}$ pt. of boiled oil, and $\frac{1}{2}$ pt. of outside oak varnish, and thin down to the proper consistency with turpentine. This paint dries hard and clear with a good gloss and is quite durable for outside work. Adding a coat of good outside oak varnish will give finish and durability to the work.

DARK GREEN PAINT FOR OUTDOOR USE

Procure 4 lb. of deep Brunswick green paint in paste, 4 oz. of patent driers, $\frac{1}{4}$ pt. of boiled oil, $\frac{1}{4}$ pt. of oak varnish, and 1/16 pt. of American turpentine. This will make about 5 lb. of paint. Adding the varnish gives the paint a good gloss, and also makes it durable for outside work. For a deeper green, add Brunswick blue paint until the desired shade is obtained. A better effect may be obtained by giving the work thus painted a coat of hard outside oak varnish.

FLAT SLATE-COLOR PAINT

Get 7 lb. of genuine whitelead, $\frac{1}{4}$ lb. of best driers, 1 lb. of best black paint, 1 oz. of best Brunswick blue, 2 oz. of beeswax, and $\frac{1}{4}$ pt. of gold-size. Mix the

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white-lead, driers, and black and blue paint with the gold-size. In another vessel dissolve the beeswax in its own weight of turpentine, then add to the paint and stir well together. Thin down to the required consistency with turpentine. The addition of beeswax gives the paint an eggshell finish, whilst the gold-size binds the colors mixed with the turp.

BROWN PAINT FOR OUTSIDE USE

Get 4 lb. of raw Turkey umber paint in paste, $\frac{1}{2}$ lb. of patent driers, $\frac{1}{2}$ pt. of boiled linseed oil, $\frac{1}{16}$ pt. of American turpentine, and $\frac{1}{8}$ pt. of pale oak varnish. This will make about 5 lb. of paint. Mix the umber and driers together, then add the boiled oil and varnish, and finally thin down with turpentine. By adding white-lead in various proportions, much lighter shades can be obtained. This paint dries hard with a good gloss.

CHOCOLATE-COLOR PAINT

Take 8 lb. of Indian red, 1 lb. of ivory black, 1 lb. of patent driers, 1 pt. of boiled oil, and $\frac{1}{4}$ pt. of American turpentine. If a glossy finish is required, prime the work with the paint, and for the finishing coat omit $\frac{1}{4}$ lb. of boiled oil and replace with best oak varnish. By varying the proportions of black paint any desired shade of chocolate may be obtained.

HEAT RESISTING PAINTS

The pigments required should be in the following proportions made up into a paste with boiled oil and turpentine. For ivory white: 90 parts of zinc oxide, 10 parts of light chrome yellow. For plum color: white-lead, ultramarine, and indian red in equal proportions. For olive green: 12 parts of white lead, 4 parts of yellow ochre, and 1 part of ivory black. The usual proportions are: for 7 lb. of paste paint, $\frac{1}{2}$ lb. of powdered litharge, 1 pt. of japan gold size, $\frac{1}{4}$ lb. of turp, and $\frac{1}{2}$ pt. of boiled oil. The work should first be given two coats of boiled oil, followed by two coats of the paint. For heat-resisting brown paint mix 1 lb. of drop black ground in turpentine with $\frac{1}{2}$ lb. of Indian red paste paint. Thin down to working consistency with 2 parts of turpentine and 1 part of japan gold-size. This paint will dry with a dull surface.

DULL BLACK PAINT FOR STOVES

Take 7 lb. of bone pitch, $3\frac{1}{2}$ lb. of resin, $\frac{1}{2}$ lb. of lampblack, $\frac{1}{2}$ gal. of boiled oil, $\frac{1}{2}$ gal. of turpentine, $\frac{1}{2}$ lb. of beeswax, and 1 lb. of litharge. Melt the pitch and resin in any suitable vessel, then add the lampblack, and stir well. The litharge should then be added very steadily, following with the oil, which should first be warmed. Allow the mixture to remain on the fire for about ten minutes, constantly stirring all the time. The pan should then be removed from the fire and allowed to cool somewhat, and the turp stirred in. The beeswax should then be dissolved in its own weight of turpentine and well stirred in, when the paint will be ready for use. The above dries hard in about six hours with an egg-shell gloss.

REMOVING PAINT

(a) To remove paint from old wood, apply freshly slaked, hot limewash, to each bucketful of which from 2 lb. to 4 lb. of common washing soda has been added; use a common fibre—not bristle—brush. As the paint softens, scrape off with a painter's scraping or chisel-shaped putty knife. Repeat as often as necessary, using a thinner solution as the paint is removed. The above pickle will also darken the wood. Swill off with plenty of clean water, and when the surface of the wood is dry and perfectly clean brush over with common malt vinegar, to kill any trace of lime soda, before applying varnish or staining medium. Woodwork that is required still darker in tone should be brushed over with one or more coats of bicarbonate of potash, 2 oz. to each pint of water. In order that the latter may be effective, the work must be perfectly free from oil, varnish, polish, or wax; otherwise a stained varnish will be necessary to bring all the work to an equal tone of color. (b) Dissolve 3 lb. of caustic soda in $\frac{1}{2}$ gal. of water, then stir into it 2 lb. of quicklime. Sufficient quantities of soda or waterglass should now be

added to form a paste. Use as before. (c) Dissolve in an earthenware jar equal parts of soda crystals and quicklime in water, then add sufficient flour to form a paste. Use as before.

TREATING DAMP WALLS

Often it is found very difficult to cure a damp wall, and many persons have been compelled to arrive at the conclusion that the only cure would be structural alteration. There are often, however, several less drastic ways of effecting a cure. (a) The following preparation may be used with advantage on the interior of buildings which are to be afterwards papered or painted, and may also be used on the walls of stables, cellars, and outhouses, or where the painters find any difficulty in making ordinary paint adhere. It is quite easy to prepare. Procure 11 lb. of zinc-white paste paint, 23 lb. of pale resin, $\frac{1}{2}$ gal. of oak varnish, 3 gal. of coal-tar naphtha, and 1 gal. boiled linseed oil. Melt the resin in an old iron vessel over the fire, then add the boiled oil and varnish, and stir well together. Take the preparation well away from the fire, and allow it to cool to somewhere about 100 F.; then add the coal-tar naphtha steadily while constantly stirring. In another vessel break up the sine paint with $\frac{1}{2}$ gal. of coal-tar naphtha; then thin down with the above preparation. The above makes an excellent white, but may be prepared of any color by thinning down good quality paste paints and using the above preparation as a medium for mixing. If a brick-red color is required, add venetian red or red oxide; and a good stone color may be made by using Italian ochre and zinc-white. White-lead should not be used, as it does not chemically mix with the ingredients. Should the proportions be too large, reduce accordingly. Care should always be exercised in mixing the naphtha well away from any fire or light, as it gives off an inflammable vapor. This preparation dries with a hard enamel-like surface in about six hours, or, if applied warm, in three hours. The above is sufficient to cover 500 sq. yd., one coat, at a less cost than boiled oil. (b) Another simple preparation may be produced by dissolving 4 oz. of pure rubber in 1 gal. of boiled oil over a fire, allowing it to cool; then add sufficient solvent naphtha to thin down ready for use. This preparation is suitable for applying in interior and exterior work, and may be used with advantage when the plaster falls or cracks. When using, it should be well rubbed into the walls until all suction is stopped, two coats being generally sufficient. It forms a tough, elastic, and binding coat. It may be colored as desired by adding paste paints. Dampness in newly plastered walls may be remedied by applying two coats of solution made by dissolving 2 $\frac{1}{2}$ lb. of orange shellac and $\frac{1}{2}$ lb. of common resin in 1 gal. of methylated spirit, and after this is quite dry the plaster may be papered upon in the usual manner.

CHEAP BLACK PAINT FOR ROUGH OUTSIDE WORK

Melt together equal parts of pitch and coal-tar, and thin to a working consistency with coal-tar naphtha. The naphtha may be dispensed with if the melted material is applied hot.

WILD ONION TAINTS MILK

Wild onion or wild garlic is probably the worst weed known for tainting milk. Its effects are not so bad if the cows pasture on it immediately after milking and taken off at least three or four hours before milking again. Its eradication in a pasture that cannot be plowed is not an easy matter. It usually grows in patches and some have got around the trouble by fencing these off. One farmer who had this same trouble plowed up the patches, exposing the roots, and got rid of the weed. Still others where a summer-fallow can be practised break up the sod, cultivate it and seed down to perennial pasture 8 lbs. of rye grass and 8 pounds of bromo grass per acre.

EFFECTIVE CURE FOR CATTLE LICE

The following is a standard grease dip for lice on cattle. Kerosene and lard mixed in the proportion of $\frac{1}{2}$ pint of kerosene to 1 pound of lard. Melt the lard, add the kerosene, mix, apply with a brush or cloth. Any of the dips sold for the purpose are effective against lice if used according to directions.

SHAMPOO

First put oil of sweet almonds, 4 oss., into alcohol, 1 pt., and put in oil of bergamot, 2 drs., or 1 dr. with oil citronella, 1 dr., when it can be had; then add aqua ammonia, 4 oss.; rye whiskey, 8 oss.; gum camphor, $\frac{1}{2}$ oz.; mix. Shake before applying, and rub well in.

WASH FOR LADIES' HANDS

Put powdered borax, 5 oss., into a bottle with water, 1 pt. If this all dissolves, put in enough to always keep some borax, undissolved, at the bottom. When the work is done for the day, put enough loto the water in which the hands are to be washed to make soft as slippery as suds. It is very cleansing and by this use of it the hands will be kept in excellent condition, smooth and soft and white. Of course, a little of this in water to wash the head will cleanse the scalp as nicely as the hands.

WASH FOR ROUGHENED HANDS

Wash the hands in vinegar in which a handful of Indian meal is put, rubbing thoroughly, then wash off and apply some hair dressing, made of equal parts of glycerine and rose water, which will soften and heal them, and be found very grateful to their irritated, or even chapped condition, in the cold wintry winds.

Wheat bran, in the water, is also considered excellent, so is oatmeal also good for the same purpose.

TO TEMPER VERY HARD STEEL

Take water, 2 measures—no matter what size—wheat flour, $\frac{1}{2}$ measure, and 1 of common salt. Mix into a paste; heat the steel to be hardened enough to coat with the paste—by immersing it in the composition—after which heat it to a cherry red and plunge it in cold, soft water. If properly done, the steel will come out with a beautiful white surface, and very hard.

TO REMOVE RUST ON STEEL

Cover the steel for a couple of days with sweet oil; then with finely powdered unslacked lime (known as "quick" lime), rub the steel until all the rust is removed; re-oil to prevent further rust.

Another plan, is, to place the rusty article in a bowl of kerosene, else to wrap the steel in a cloth well wet with kerosene, and let it remain 24 hours or more; then scour the rusty spots with brick dust.

TO CLEAN GLASS GLOBES

If the globes are much stained by smoke, soak them in tolerably hot water with a little washing soda dissolved in it, then put a teaspoonful of powdered carbonate of ammonia into a pan of lukewarm water, and with a tolerably hard brush wash the globes till the smoke stain disappears; rinse in clear, cold water, and let them drain till dry. They will be quite white and clear. Aqua ammonia, which is more likely to be in the house, will do as well, but a teaspoonful of either is not enough for a "pan of water," but only for a pint of water or one quart at most.

TO CLEAN WHITE PAINT

Take a small quantity of fine whiting on a damp piece of flannel; rub gently over the soiled surface and the effect will almost equal the original purity.

TO CLEAN OIL PAINTED SURFACES

Take a piece of soft flannel, put it in warm water and squeeze it till it feels dry; next dip gently in to some very finely pulverized French chalk, and rub the painted surface with the flannel; the effect will be the removal of all dust, greasy matter and dirt; the surface is next washed with a clean sponge and water, and dried with a piece of wash leather. This method does not injure the paint like soap, and produces a very good result. Wash leather is split sheepskin, prepared as chamois, and used for the same purposes, very properly, too, because much cheaper.

CHEAP PAINT

Crude petroleum, 3 parts—qts. or gals.—boiled linseed oil, 1 part, with "macer paint" for body.

FIRE-PROOF WASH FOR SHINGLE ROOFS

Freshly slacked lime, salt and fine sand, or wood ashes, equal parts, made into a wash and put on shingles as an ordinary whitewash is done, is said to render shingles fifty-fold more safe against taking fire from falling cinders or otherwise, in case of a fire nearby.

ANTI-FREEZING MIXTURES

A census of the opinion of motor-car manufacturers as to the value of various anti-freeze solutions for use in winter driving reveals a universal recommendation of alcohol and glycerine. Calcium chloride—in fact, all soluble salts, are tabooed, because of their harmful action on the metal. In a few instances warning is given against the over-liberal use of glycerine because of its disintegrating action on the rubber-hose connections.

Alcohol recommendations include the wood, grain and denatured varieties with advocates for each. Because of its purity, grain alcohol is undoubtedly the best to use, but its worth, in the writer's opinion, is not enough greater to pay for the cost of it which is universally much greater than the wood and denatured varieties. Alcohol has one undesirable feature and that is its evaporating proclivities. The glycerine addition is primarily intended to hold the anti-freezing solution in the water longer and there is no doubt but what it accomplishes that end.

The following data shows how anti-freezing solutions may be made up:

Water	Alcohol	Freezes at
95%	5%	25 above
90	10	18 "
85	15	11 "
80	20	5 "
75	25	2 below
70	30	9 "
65	35	15 "
60	40	23 "

If the radiator should become frozen on account of not containing the proper solution, do not run the motor until full circulation has been started. It is not possible to thaw a frozen radiator by running the motor, whereas, by doing so the current of air caused by the fan may cause it to freeze even more solidly. Here is another table showing the proportions in which the two ingredients should be mixed with water. These combinations have a lot of merit:

Alcohol	Glycerine	Water	Freezes at deg. Fah.
3	2	95	28
8	4	90	25
9	6	85	20
12	8	80	15
18	12	70	-5
21	14	65	-10
24	16	60	-15

As previously stated, alcohol evaporates rapidly, while glycerine remains in the cooling system. As the contents of the radiator have to be added to, pay no attention to the glycerine, but add according to the following proportion: alcohol, 25 per cent.; water, 75 per cent.

Summary of all expert opinion in this matter seems to show a preference for denatured alcohol, which, fortunately, is cheaper in most localities than wood or grain alcohol, and an addition of a small amount of glycerine to reduce the evaporation rate of alcohol. Regarding the glycerine, the unbleached variety which may be procured at practically any drug store is cheapest and best.

FLOOR STAIN

Boiled linseed oil, 1 gal.; 5 ets. worth, or 2 heaping tablespoonfuls of burnt umber; heat the oil hot in an iron kettle—soap will clean it easily—then stir in the finely powdered umber, and with an old paint brush apply it as hot as you can. A mop, wrung out of warm water will clean it nicely.

CEMENT FOR GENERAL PURPOSES

Hard water, 3 qts.; white glue, 3 lbs.; dry white lead, $\frac{1}{2}$ lb.; aqua ammonia, 1 oz.; spirits of camphor, 2 oss.; salt, 1 heaping tablespoonful; alcohol, 1 qt.; gum shellac, $\frac{1}{2}$ lb. Put the shellac into the alcohol until dissolved. Dissolve the glue in the water by putting into a tin dish and setting into a pan of hot water to prevent burning the glue, till dissolved; then put the glue water and shellac, dissolved in the alcohol, together in a pan or kettle, to allow all to be brought to a boiling heat, stir in the powdered white lead; then the ammonia and spirits of camphor, and lastly the salt; stir and boil a few minutes and bottle while hot.

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FACTS ABOUT THE EARTH

The Earth's equatorial semi-diameter is 3963.1307 miles, and the polar semi-diameter is 3940.871 miles. One degree of latitude at the pole equals 69.407 miles. One degree of latitude at the equator equals 68.704 miles.

The area and cubic contents of the earth are: Surface, 196,971,984 square miles; cubic contents, 259,944,035,515 cubic miles.

THE VELOCITY OF RIVERS

The velocity of rivers does not depend wholly on their slope; much is owing to their depth and volume; while bends in the course, jutting peaks of rock or other obstacles, whether at the sides or bottom, and even the friction of the aqueous particles, which, though slight, is productive of perceptible effect, are retarding agencies. In consequence, the water of a river flows with different velocities at different parts of its bed; it moves slower at the bottom than at the surface, and at the sides than the middle. The line of quickest velocity is a line drawn along the center of the current.

FACTS ABOUT THE LENGTH OF SEASONS

Spring lasts from March 21 to June 21, or 92 days; summer from June 21 to September 21, or 92 days; autumn from September 21 to December 21, or 91 days, and winter from December 21 to March 21, or 90 days, or 91 days in the case of leap year, that is, the interval from the autumnal to the vernal equinox is about three days shorter (neglecting the odd hours and minutes) than the interval from the vernal to the autumnal equinox. This discrepancy is due to the form of the earth's orbit, the earth describing during the autumn and winter months that portion of its orbit nearest the sun, and therefore with the greatest velocity. We are nearest to the sun about the 1st of January and farthest about the 1st of July.

HOW TO WRITE INSCRIPTIONS ON METALS

Take $\frac{1}{2}$ lb. of nitric acid and 1 oz. of muriatic acid. Mix, shake well together and it is ready for use. Cover the place you wish to mark with melted beeswax; when cold, write your inscription plainly in the wax, clear to the metal with a sharp instrument; then apply the mixed acids with a feather, carefully filling each letter. Let it remain from 1 to 20 minutes, according to appearance desired; then throw on water, which stops the process and removes the wax.

THE AMOUNT OF ALCOHOL IN WINES AND LIQUORS

Beer, 4.0; porter, 4.5; ale, 7.4; cider, 8.6; perry, 8.8; elder, 9.3; Moselle, 0.6; Tokay, 10.2; Rhine, 11.0; Orange, 11.2; Bordeaux, 11.5; hock, 11.6; gooseberry, 11.8; champagne, 12.2; claret, 13.3; Burgundy, 13.6; Malaga, 17.3; Lisbon, 18.5; Canary, 18.8; cherry, 19.0; Vermouth, 19.0; Cape, 19.2; Malmsey, 19.7; Marsala, 20.2; Madeira, 21.0; port, 23.2; curacao, 27.0; aniseed, 33.0; Maraschino, 34.0; Chartreuse, 43.0; gin, 51.6; brandy, 53.4; rum, 53.7; Irish whisky, 53.9; Scotch, 54.3. Spirits are said to be "proof" when they contain 57 per cent.

INTEREST

Interest is an allowance made for the use of money that is borrowed; or, in other words it is the sum paid for the use of money by the borrower to the lender. It is reckoned at a certain per cent per annum; that is, a certain number of dollars are paid for the use of \$100 for one year. Thus, when \$5 is paid for the use of \$100 for one year, the interest is said to be 5 per cent; and when \$6 is paid for the use of \$100 for one year the interest is said to be 6 per cent, and so on.

The principal is the money lent, on which interest is computed.

The amount is the interest and principal added together.

Legal interest is the rate per cent established by law. Usury is a higher rate per cent, than is allowed by law. Per cent means by the hundred. Per annum means by the year.

WHAT A MAN DRINKS

The amount of liquid refreshment taken by a man of 70 years would equal 76,700 pints, and to hold this a pail twelve feet high and more than 2,500 times as large as an ordinary pail would be required. The

weight of the liquid would be over forty-two tons. If it had been used in the torture of a criminal by allowing one drop to fall on his outstretched hand every minute day and night the supply would have lasted from the days of Nero up to the present time and would not now be exhausted.

CEMENT FOR IRON WORKS

It is sometimes advisable to fix two pieces of iron, as pipes for water or steam, firmly together as a permanency. A rust cement is frequently used, and the materials are sal-ammoniac, sulphur and iron borings. If the cement is desired to set quickly, the proportions should be: Sal-ammoniac, 1 part by weight; sulphur, 2 parts; iron borings, 200 parts. The sal-ammoniac and sulphur should be pulverized, and the borings of iron tolerably fine and free from oil. The mixture should be made with water to a conveniently handled paste. The theory of its action is union by oxidation.

CEMENT FOR LEATHER

Sulphide of carbon, 10 parts; spirits of turpentine, 1 part; into which, in a suitable bottle, put fine yeast of pure gutta serena, to make a thickly-flowing liquid. To remove grease from the belts or leather to be joined, put a cloth upon it and apply a hot iron for a while; then apply the cement to both surfaces, put together and apply pressure until dry.

CEMENT FOR RUBBER

Powdered shellac is softened to ten times its weight of strong water of ammonia, whereby a transparent mass is obtained, which becomes fluid after keeping some little time, without the use of hot water. In three or four weeks the mixture is perfectly liquid, and when applied it will be found to soften the rubber. As soon as the ammonia evaporates the rubber hardens again—it is said quite firmly—and thus becomes impervious both to gases and to liquids. For cementing sheet rubber or rubber material in any shape to metal, glass or other smooth surfaces the cement is highly recommended.

DURABILITY OF A HORSE

A horse will travel 400 yards in $4\frac{1}{2}$ minutes at a walk, 400 yards in 2 minutes at a trot, and 400 yards in 1 minute at a gallop. The usual work of a horse is taken at 22,500 lbs. raised 1 foot per minute, for 8 hours per day. A horse will carry 250 lbs. 25 miles per day of 8 hours. An average draught-horse will draw 1,000 lbs. 23 miles per day on a level road, weight of wagon included. The average weight of a horse is 1,000 lbs.; his strength is equal to that of five men. In a horse mill moving at 3 feet per second, track 25 feet diameter, he exerts with the machine the power of $4\frac{1}{2}$ horses. The greatest amount a horse can pull in a horizontal line is 900 lbs.; but he can only do this momentarily, in continued exertion, probably half of this is the limit. He attains his growth in 5 years, will live 25, average 16 years. A horse will live 25 days on water, without solid food, 17 days without eating or drinking, but only 5 days on solid food, without drinking.

SIZES OF BOOKS

The name indicates the number of pages in the sheet, thus: In a folio book, 4 pages or 2 leaves equal 1 sheet; a quarto, or 4to, eight pages or 4 leaves to a sheet; an octavo, or 8vo, 16 pages or 8 leaves, to a sheet. In a 12mo, 24 pages, or 12 leaves equal 1 sheet, and so on. The following are the approximate sizes of books:

	Inches		Inches
Royal folio	19 x 12	Crown 8vo	7 $\frac{1}{2}$ x 4 $\frac{1}{2}$
Demy folio	18 x 11	Foolscap 8vo	7 x 4
Super Imp.		12mo	7 x 4
4to	16 $\frac{1}{2}$ x 13	16mo	6 $\frac{1}{2}$ x 4
Royal 4to	12 $\frac{1}{2}$ x 10	Square 16mo	4 $\frac{1}{2}$ x 3 $\frac{1}{2}$
Demy 4to	11 $\frac{1}{2}$ x 8 $\frac{1}{2}$	Royal 24mo	5 $\frac{1}{2}$ x 3 $\frac{1}{2}$
Crown 4to	11 x 8	Demy 24mo	5 x 3 $\frac{1}{2}$
Royal octavo	10 $\frac{1}{2}$ x 6 $\frac{1}{2}$	Royal 32mo	5 x 3
Medium 8vo	9 $\frac{1}{2}$ x 6	Post 32mo	4 x 2 $\frac{1}{2}$
Demy 8vo	9 x 5 $\frac{1}{2}$	Demy 48mo	3 $\frac{1}{2}$ x 2 $\frac{1}{2}$

TO KILL GREASE SPOTS BEFORE PAINTING

Wash over smoky or greasy parts with saltpetre, or very thin lime white-wash. If soap-suds are used, they must be washed off thoroughly, as they prevent the paint from drying hard.

STANDARD TABLE SHOWING VELOCITY AND FORCE OF WINDS

Description	Miles	Feet	Feet	Force in
	per Hour	per Minute	per Second	Square Foot
Perceptible	1	88	1.47	.005
Just perceptible	2	176	2.93	.020
	3	264	4.4	.044
	4	352	5.87	.079
Gentle breeze	5	440	7.33	.123
	10	880	14.67	.492
Pleasant breeze	15	1,320	22.0	1.107
	20	1,760	29.3	1.948
Brisk wind	25	2,200	36.6	3.075
	30	2,640	44.0	4.428
High wind	35	3,080	51.3	6.027
	40	3,520	58.6	7.872
Very high wind	45	3,960	66.0	9.963
Storm	50	4,400	73.3	12.300
	60	5,280	88.0	17.712
Great storm	70	6,160	102.7	24.108
	80	7,040	117.3	31.488
Hurricane	100	8,800	146.6	49.200

RULES FOR CONVERTING

Centigrade degrees to Fahrenheit—Multiply by 9, divide by 5 and add 32. Fahrenheit degrees to Centigrade—Subtract 32, multiply by 5 and divide by 9. Centigrade degrees to Reaumur—Multiply by 4 and divide by 5. Reaumur degrees to Centigrade—Multiply by 5 and divide by 4. Reaumur degrees to Fahrenheit—Multiply by 9, divide by 4 and add 32. Fahrenheit degrees to Reaumur—Subtract 32, multiply by 4 and divide by 9.

RECORDS OF RECENT GIANTS

A well known scientist, investigating the subject of giants, gives the following as a reliable list of the big people and their statures, who have lived during the last 250 years:—In the year 1632, Evans, 8 feet; Mellon, 1665-1684, 7 feet 6 inches; Miller, 1674-1734, 8 feet; Blacker, 1724, 7 feet 4 inches; Cornelius McGrath, 1734-1760, 7 feet 8 inches; O'Brien, 1760-1783, 8 feet 10 inches; Cottar, 1802, 8 feet 7 inches; Bradley, 1798-1820, 7 feet 8 inches; Elisiguc, 7 feet 10 inches; Hale, 1820-1862, 7 feet 6 inches; Louis, 7 feet 4 inches; Loushkin, 8 feet; Chang, 8 feet; Annak, 1840-1865, 7 feet 8 inches; Minnesota giant, 7 feet 4 inches; Marriam Wedbe, 8 feet 4½ inches; Austrian giant, 8 feet 4½ inches; Winkelmeier, 8 feet 6 inches.

TO MEASURE LAND

If the field be a square or parallelogram, multiply the length in rods by the width in rods, and divide by 160, the number of square rods in the acre. If the field is triangular, multiply the length of the longest side in rods by the greatest width in rods, and divide half the product by 160. If the field be of irregular shape, divide it into triangles, and find the acreage of each triangle as above. All straight sided fields can be thus measured. Where the sides are crooked and irregular, take the length of rods in a number of places at equal distances apart, add them, and divide by the number of measurements, which will give the mean length; proceed similarly with the width, multiply the mean length by the mean width, and divide by 160. Where the field is in a circle, find the diameter in rods, multiply the square of the diameter by 7.854, and divide by 160.

An acre of land contains 160 square rods, or 43,560 square feet. Hence, to lay out an acre at right angles (square corners), when one side is known, divide the units in the square content by the units of the same kind in the length of the known side. Thus: if the known side be 4 rods, divide 160 by 4, and the quotient 40 will be the depth of the acre-plot. If the length of the known side be 90 feet, divide 43,560 by 90, and the quotient 484 will be the depth of an acre-plot.

EXCESSIVE HEAT IN THE PAST

In 1803 and 1804, the Rhine, Loire and Seine ran dry. The heat in several French provinces during the summer of 1795 was equal to that of a glass furnace. Meat could be cooked by merely exposing it to the sun. Not a soul dared venture out between noon and 4 p.m. In 1718 many shops had to close. The theaters never opened their doors for three months. Not a drop of

water fell during six months. In 1773 the thermometer rose to 118 degrees. In 1778 the heat of Bologna was so great that a great number of people were stifled. There was not sufficient air for the breath, and people had to take refuge under the ground. In July, 1793, the heat again became intolerable. Vegetables were burned up, and fruit dried on the trees. The furniture and wood work in dwelling-houses cracked and split up, meat went bad in an hour.

WHAT A VESSEL'S DISPLACEMENT IS

The displacement of a vessel is the weight of water displaced by its bottom and sides below the waterline. A ship does not carry a weight greater than its displacement; the carrying capacity of a ship is measured by marine tons of forty-eight cubic feet, while the displacement is measured by tons of 2,000 pounds. If the displacement is less than the weight, the vessel will sink; if more, the vessel floats.

TO REMOVE FRUIT STAINS FROM CLOTHING, ETC.

To remove fruit stains hold them so you can pour boiling water through them; and if this fails in any case to remove the stain, then dip the table-cloth or other article into hot water, and place it over burning brick stone, as for bleaching flannels, below.

BLEACHING FLANNELS

Wet them and place upon a stick over the top of a barrel, in the bottom of which is an old pan with some burning coals, and sprinkle on the fire a little, broken bits of brimstone and cover over with a piece of carpet to retain the smoke. Particularly applicable to children's flannels which have become yellowish, and which you do not wish to wash for fear of shrinkage.

TO REMOVE INK SPOTS FROM CLOTHING

Wet the spots with milk, sour milk is best, or if you have no milk, wet with water, and rub a piece of lemon on some salt, then upon the spot, a few times will always remove it. If you have no lemon, a little oxalic acid in water, rinsed out with clear water, will do it, except the cheap school inks made with chromates of potash, even oxalic acid will not dissolve them; but the better inks, which are set with iron, the above will dissolve out.

Remember, if oxalic acid is used, to keep it away from children, as it is poisonous, or corrosive upon the flesh, so upon clothing if left without rinsing. A drachm will be enough for any ordinary spot, the size of the hand. If rinsed out as soon as the spot disappears it will hurt no clothing.

WASHING STONE, SLATE OR MAROON COLORED COTTON GOODS

Before washing black and white, stone, slate or maroon colored cotton goods; dip them in a solution of salt and water made by dissolving two cupfuls of salt in 10 quarts of cold water, and hang them in a shady place to dry. The salt sets the colors. When dry, wash in a light lye in the usual way. Calicoes and muslins do not require a hot lye; water moderately warm is best. Never allow them to soak in the water. Wash quickly, turn the wrong side out, and dry in the shade. A little salt in the rinsing water is an improvement. Another way is to mix two cupfuls of wheat bran in cold water, making a smooth paste, then stir it into 1 qt. of soft boiling water. Let it boil one hour, then strain into five or six quarts of soft warm water. No soap is necessary, for bran has cleansing properties of its own. If there is black in the dress, or any other color that is liable to "run," add a tablespoonful of salt. Rinse thoroughly in one water. For starch, use a little white glue-water, and wash clean. Always iron on the wrong side with a moderately hot iron.

TO WASH COLORED SILK HANDKERCHIEFS

To wash colored silk handkerchiefs make a good lye in lukewarm water, in which a little bit of carbonate of ammonia has been dissolved; rub the handkerchiefs lightly in the hands till all the spots have disappeared. Then rinse them in lukewarm water, and squeeze them as dry as possible. Take hold of the two corners and shake and snap each one for a few minutes. Roll in a soft towel lightly, laying the handkerchief flat on the towel at first, squeeze tightly and iron at once.

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WASHING CARPETS WITHOUT TAKING UP

Put a tablespoonful of ammonia in 1 gal. of moderately warm water, and with sponges or soft broom go all over the carpet, and you will be astonished to see how bright it will look for the little labor and expense.

WASHING WINDOWS

Have a pail partly filled with water a little warm and dissolve in it a teaspoonful of borax (the author thinks it would be better to use a tablespoonful of powdered borax, or else the same amount of spirits of ammonia to 1 gal. of water, as above for washing carpets), have one chamois, a cloth will do nicely, dipped into the water to wash the windows with, then with a dry chamois rub the window dry and polish. (Chamois skin is best as it leaves no lint as a cloth will).

SOFTENING HARD WATER FOR WASHING CLOTHES, DISHES OR HOUSE CLEANING

Take 2 lbs. of washing soda (sal soda), and 1 lb. of common stone lime, and boil in 5 gals. of water for 2 or 3 hours; then stand away to settle, and dip off the clear water from the top and put into a jug (pouring off carefully is better). Can be used for washing dishes or cleaning, and 1 teacup in a boiler of clothes, put in after the water is hot, will whiten the clothes and soften the water, without injury to the hands or clothes. Use an old iron pot to make it in.

BEE AND WASP STINGS

A little ammonia put upon bee and wasp stings, bites of spiders and all other poisonous insect bites, will neutralize the poison, preventing soreness and swelling. But mind, it only needs a very little put on, and washed off soon, to prevent its making a sore.

TO REMOVE MILDEW FROM CLOTHING

Take common soft soap and stir in quite a bit of salt, so the soap crumbles or grains, as it were, and rub on the spot and lay out over night, and if not effaced by morning wet it occasionally during the day. Or, to put about half a cup of chloride of lime into two quarts of hot water, wetting the mildewed articles first in cold water, then put into the lime water until the mildew is bleached out, then rinse well in plenty of water to remove the lime.

TO CLEAN FLAT IRONS FROM RUST OR STARCH

Flat irons often have starch stick to them, and occasionally a spot of rust from a drop of water shows upon them. The following plan is a sensible remedy for it. Have a piece of yellow beeswax in a coarse cloth; when the iron is almost hot enough to use, but not quite, rub it quickly with the beeswax cloth and then with a coarse cloth.

TO BRIGHTEN SILVERWARE

When it is desirable to brighten silverware without a formal scouring, prepare some pieces of silver cloth as follows: Obtain hartshorn (carbonate of ammonia), 2 oz.; powdered or broken up finely, and boil it in 1 pint of soft water. Dip suitable pieces of muslin in the liquor and hang up to dry without wringing. When dry, fold closely and put away for use. Simply rubbing the silver with one of these pieces will surprise you by its improved appearance. Never put soap on silverware, if you wish to keep its original lustre.

TO REMOVE RUST FROM STOVEPIPE

Rub a very little raw linseed oil upon it, which stops its further eating; then dry it with a moderate fire, after which polish may be used if desired; but polish does not stop the deeper corrosion, or eating into the pipe; hence, after a little, it will again show through the polish, unless the oil is first used.

CLEANING BARRELS AND OTHER WOODEN VESSELS

An ordinary barrel should be filled half full of water, and a solution of about 2 lbs. of the soda in as much water as will dissolve it, poured in, and the liquids thoroughly mixed by shaking the barrel, which should then be filled to the bung with water, and allowed to remain from 12 to 14 hours; then, after withdrawing the discolored liquid, it should be well rinsed and filled with pure water, and should remain a few hours more, when it will be fit for use. Other wooden utensils may be similarly treated.

RENOVATING FEATHER BEDS

Old feather beds may be renovated or cleaned very satisfactorily by putting them out during a heavy shower, turning, to give both sides a good soaking. Dry thoroughly in the sun, beating with a stick to loosen up the feathers, as you do a carpet to get out the dust. The bed may lay upon the ground to receive the water, but should be placed upon slats or sticks across chairs, or something of this character, while drying. On boards or poles, one end on the fence sloping towards the sun, is the better way. If there are stains on the tick they can be cleaned at the same time in the following manner:

TO REMOVE STAINS FROM FEATHER BED TICK.

Pulverize some starch and stir it into sufficient soft soap to make quite a thick paste, enough to cover the spots caused by children's wetting it. When dry, brush off and wash with clean water by means of a wash-cloth or sponge. Dry again in the sun and whip to lighten up the feathers.

TO REMOVE PUTTY

It is quite difficult to remove the old putty from the sash when a glass is broken; but if you apply a hot soldering iron to the putty and pass it slowly over all that you desire to remove, it softens it quickly so it can be removed nearly as readily as if just put on. Any iron that is of such shape as to allow its close contact with the putty will do as well as a regular soldering iron, but one of these would be very convenient in every family—especially in the country—for purposes of soldering tinware, to save taking it to town to get it done, or otherwise stuffing a rag into the hole. Soft soap will do the same, but takes much longer.

FLY STICKUMFAST

Melt rosin, 6 ozs., in a tin cup, then put in lard, 1 rounding tablespoonful, as a woma taken it up for shortening, or about 2 ozs., which should make it like very thick molasses when cold. Spread upon rather stiff paper with a little flat piece of wood or a knife, and place about the shelves, rooms, etc. If a knife is used to spread it, heat the knife over the fire when it will all wipe off with a piece of newspaper or cloth. It will hold all that light upon it, and the more that light the more will come, thinking something good has been found. It holds them fast. Place a paper over the cup to keep flies out when it is set away.

HOME-MADE FILTER

Take a large flower pot, put a piece of sponge over the hole in the bottom, fill three-quarters full of equal parts of clean sand and charcoal the size of a pea; over this lay a woolen cloth large enough to hang over the sides of the pot. Pour water into the cloth and it will come out pure after the dust from the coal has been run off by a few fillings. When it works too slow take off the woolen cloth and wash it thoroughly and replace it again. This is all that will be required for a long time.

WATER PROOFING FOR BOGGS

Melt together beef tallow, 4 ozs.; rosin and beeswax, each, 1 oz., and when nearly cooled add as much neat's-foot oil as the above mixture measures (6 ozs. will be near enough). It is to be applied with a soft rag, both to the soles and the uppers. The leather should be warmed meanwhile before the fire, and the application well rubbed in. It requires two applications to make the leather thoroughly water-proof.

WALSOMING

Take four lbs. of Paris white, put it in a pail, cover it with cold water and let it stand over night. Put into a kettle 4 oz. of glue, and cover it also with cold water. In the morning set the glue on the stove, and add enough warm water to make 1 qt.; stir it until dissolved. Add the glue to the Paris white, and pour in warm water till the pail is three-quarters full. Then add bluing, a little at a time, stirring it well until the mixture is slightly bluish. Use a good brush, and go over one spot on the wall till it is thoroughly wet. If your brush dries quickly, add more warm water, as the mixture is too thick. The brush must be kept wet.

CHRONOLOGICAL HISTORY OF CANADA

- 1497—June 24, Eastern coast of North America discovered by John Cabot.
- 1498—Cabot discovers Hudson Strait.
- 1524—Verrasano explores the Coast of Nova Scotia.
- 1534—June 21, Landing of Jacques Cartier at Esquimaux Bay.
- 1535—Cartier's second voyage. He ascends the St. Lawrence to Stadacona (Quebec) (Sept. 14) and Hochelaga (Montreal) (Oct. 2.)
- 1541—Cartier's third voyage.
- 1542—3—De Roberval and his party winter at Cap Rouge, and are rescued by Cartier on his fourth voyage.
- 1557—Sept. 1, Death of Cartier at St. Malo, France.
- 1592—Straits of Juan de Fuca discovered by de Fuca.
- 1603—June 22, Champlain's first landing in Canada, at Quebec.
- 1605—Founding of Port Royal (Annapolis, N.S.)
- 1608—Champlain's second visit. July 3, Founding of Quebec.
- 1609—July, Champlain discovers Lake Champlain.
- 1610-11—Hudson explores Hudson Bay and James Bay.
- 1611—Brulé ascends the Ottawa River.
- 1612—Oct. 15, Champlain made Lieutenant-General of New France.
- 1613—June, Champlain ascends the Ottawa River.
- 1615—Champlain explores Lakes Nipissing, Huron, and Ontario. (Discovered by Brulé and Le Caron.)
- 1616—First schools opened at Three Rivers and Tadoussac.
- 1620—Population of Quebec, 60 persons.
- 1621—Code of laws issued, and register of births, deaths and marriages opened in Quebec.
- 1622—Lake Superior discovered by Brulé.
- 1623—First British settlement of Nova Scotia.
- 1627—New France and Acadia granted to the Company of 100 Associates.
- 1628—Port Royal taken by Sir David Kirke.
- 1629—April 24, Treaty of Fuca between France and England. July 20, Quebec taken by Sir David Kirke.
- 1632—March 29, Canada and Acadia restored to England. July 20, Quebec taken by Sir David Kirke.
- 1632—March 29, Canada and Acadia restored to France by the Treaty of St. Germain-en-Laye.
- 1633—May 23, Champlain made first Governor of New France.
- 1634—July 4, Foundation of Three Rivers.
- 1634-35—Exploration of the great lakes by Nicolet.
- 1635—Dec. 25, Death of Champlain at Quebec.
- 1636—March 10, De Montmagny appointed governor.
- 1638—June 11, First recorded earthquake in Canada.
- 1640—Discovery of Lake Erie by Chaumonot and Brébeuf.
- 1641—Resident population of New France, 240.
- 1642—May 17, founding of Ville-Marie (Montreal).
- 1643—Exploration of the Saguenay by Dablon.
- 1647—Lake St. John discovered by de Quen.
- 1648—March 5, Council of New France created. Aug. 20, D'Ailleboust de Coulonges, governor.
- 1649—March 16-17, Murder of Fathers Brébeuf and Lalénant by Indians.
- 1651—Jan. 17, de Lauzon governor.
- 1654—Aug., Acadia taken by an expedition from New England.
- 1556—Nov. 13, Acadia restored to France by the Treaty of Westminster.
- 1657—Jan. 20, Vicomte d'Argenson governor.
- 1659—June 16, François de Laval arrives in Canada as Vicar-Apostolic.
- 1660—May 21, Dollard des Ormeaux and sixteen companions killed at the Long Sault, Ottawa River.
- 1661—Baron d'Avaugour governor.
- 1663—Company of 100 Associates dissolved. Feb. 5, severe earthquake. April, Sovereign Council of New France established. May 1, Saffray de Mézy governor. Population of New France 2,500, of whom 800 were in Quebec.
- 1664—May, Company of the West Indies founded.
- 1665—March 23, de Camille governor. Population of New France, 3,215.
- 1667—July 21, Acadia restored to France by the Treaty of Breda. White population of New France, 3,918.
- 1668—Mission at Sault Ste. Marie founded by Marquette.
- 1670—May 13, charter of the Hudson's Bay Company.
- 1671—Population of Acadia, 441.
- 1672—Population of New France, 6,705. April 6, Comte de Frontenac governor.
- 1673—June 13, Cataract (Kingston) founded.
- 1674—Oct. 1, Laval becomes first Bishop of Quebec.
- 1675—Population of New France, 7,832.
- 1678—Niagara Falls visited by Hennepin.
- 1679—Ship *Le Griffon* built on Niagara river above the Falls by La Salle. Population of New France, 9,400; Acadia, 515.
- 1682—May 1, de la Barre governor. Frontenac recalled.
- 1683—Population of New France, 10,251.
- 1685—Jan 1, Marquis de Denonville governor. Card money issued.
- 1686—Population of New France, 12,373; of Acadia 885.
- 1687—March 18, La Salle assassinated.
- 1689—June 7, Frontenac reappointed governor. Aug. 5, Massacre of whites by Indians at Lachine.
- 1690—May 21, Sir William Phipps captures Port Royal, but is repulsed in an attack on Quebec (Oct. 16-21).
- 1691—Kelley of the Hudson's Bay Co., reaches the Rocky Mountains.
- 1692—Population of New France, 12,431. Oct. 22, Defence of Verchères against Indians by Magdeleine de Verchères.
- 1693—Population of Acadia, 1,000.
- 1697—Sept. 20, by the Treaty of Ryswick, peace taken during the war are mutually restored. D'Iberville defeats the Hudson's Bay Co.'s ships on Hudson Bay.
- 1698—Nov. 28, death of Frontenac. Population of New France, 15,355.
- 1699—April 20, de Callière governor.
- 1703—June 16, Sovereign Council of Canada becomes Superior council and membership increased from 7 to 12.
- 1705—Aug. 1, Marquis de Vaudreuil governor.
- 1706—Population of New France, 16,417.
- 1709—British invasion of Canada.
- 1710—Oct. 13, Port Royal taken by Nicholson.
- 1711—Sept. 1, Part of Sir II. Walker's fleet, proceeding against Quebec, wrecked off the Seven Islands.
- 1713—April 11, Treaty of Utrecht. Hudson Bay, Acadia and Newfoundland ceded to Great Britain. Aug., Louisbourg founded by the French. Population of New France, 18,110.
- 1720—Population of New France, 24,234, of Isle St. Jean (P.E.I.), about 100. April 25, Governor and Council of Nova Scotia appointed.
- 1721—June 19, burning of about one half of Montreal.
- 1723—Oct. 10, death of Vaudreuil.
- 1726—June 11, Marquis de Beauharnois, governor.
- 1727—Population of New France, 30,613.
- 1728—Population of Isle St. Jean (P.E.I.) 330.
- 1731—Population of the North of the Peninsula of Acadia, 6,000.
- 1734—Road opened from Quebec to Montreal. Population of New France, 37,710.
- 1737—Iron smelted at St. Maurice. French population of the North of the Acadia peninsula, 7,598.
- 1739—Population of New France, 42,701.
- 1745—June 17, taking of Louisbourg by Pepperell and Warren.
- 1747—Marquis de La Jonquière appointed governor. captured at sea by the English, took office Aug. 15, 1749.
- 1748—Oct. 18, Treaty of Aix-la-Chapelle. Louisbourg restored to France in exchange for Madras.
- 1749—June 21, Founding of Halifax. British immigrants brought to Nova Scotia by Governor Cornwallis, 2,544 persons. Fort Rouillé (Toronto) built.
- 1750—St. Paul's Church, Halifax (oldest Anglican church in Canada), built.

- 1752—March 25, Issue of the Halifax "Gazette." First paper in Canada. British and German population of Nova Scotia, 4,203. May 17, Death of La Jonquière. July, Marquis Duquesne de Menerville governor.
- 1754—Population of New France, 55,000.
- 1755—July 10, Marquis de Vaudreuil-Cavagnal governor. Sept. 10, Expulsion of the Acadians from Nova Scotia.
- 1756—War (Seven Years') between Great Britain and France.
- 1758—July 26, Final capture of Louisbourg by the British. Oct. 7, First meeting of the Legislature of Nova Scotia.
- 1759—July 25, Taking of Fort Niagara by the British. July 26, Beginning of the Siege of Quebec. July 31, French victory at Beauport Flats. Sept. 13, Defeat of the French on the Plains of Abraham. Death of Wolfe. Sept. 14, Death of Montcalm. Sept. 18, Surrender of Quebec.
- 1760—April 28, Victory of the French under Lévis at Ste. Foy. Sept. 8, Surrender of Montreal. Military rule set up in Canada. Population of New France, 70,000.
- 1762—British population of Nova Scotia, 8,104. First British settlement in New Brunswick.
- 1763—Feb. 10, Treaty of Paris by which Canada and its dependencies are ceded to the British. May, Rising of Indians under Pontiac, who take a number of forts and defeat the British at Bloody Run (July 31). Oct. 7, Civil government proclaimed. Cape Breton and Isle St. Jean annexed to Nova Scotia, Labrador, Anticosti and Madgalen Islands to Newfoundland. Nov. 21, General Jas. Murray appointed governor in chief. First Canadian post offices established at Montreal, Three Rivers and Quebec.
- 1764—June 21, First issue of the Quebec "Gazette." Aug. 13, Civil government established.
- 1765—Publication of the first book printed in Canada, *Catechisme du Diocèse de Sens*. May 18, Montreal nearly destroyed by fire. Population of Canada, 69,810.
- 1766—July 24, Peace made with Pontiac at Oswego.
- 1768—Charlottetown, P.E.I., founded. April 11, Great fire at Montreal. April 12, Sir Guy Carleton (Lord Dorchester), governor in chief.
- 1769—Isle St. Jean (Prince Edward Island) separated from Nova Scotia, with governor and council.
- 1770-72—Hearne's journey to the Coppermine and Slave Rivers and Great Slave Lake.
- 1773—Suppression of the Order of Jesuits in Canada and escheat of their estates.
- 1774—The Quebec Act passed.
- 1775—May 1, The Quebec Act comes into force. Outbreak of the American Revolution. Montgomery and Arnold invade Canada. Nov. 12, Montgomery takes Montreal; Dec. 31, is defeated and killed in an attack on Quebec.
- 1776—The Americans are defeated and driven from Canada by General Carleton.
- 1777—Sept. 18, General Frederick Haldimand governor in chief.
- 1778—Captain Jas. Cook explores Nootka Sound and claims the north-west coast of America for Great Britain. June 3, First issue of the Montreal "Gazette."
- 1783—Sept. 3, Treaty of Versailles, recognizing the independence of the United States. Organization of the Northwest Company at Montreal. Kingston, Ont., and St. John, N.B., founded by United Empire Loyalists.
- 1784—Population of Canada, 113,012. United Empire Loyalists settle in Upper Canada and found Fredericton, N.B. Aug. 16, New Brunswick and (Aug. 26) Cape Breton separated from Nova Scotia.
- 1785—May 18, Incorporation of Parrytown (St. John, N.B.).
- 1786—April 22, Lord Dorchester governor in chief. Oct. 23, Government of New Brunswick moved from St. John to Fredericton.
- 1787—C. Inglis appointed Anglican Bishop of Nova Scotia—first colonial bishopric in the British Empire.
- 1788—King's College, Windsor, N.S., opened. Sailing packet service established between Great Britain and Halifax.
- 1789—Quebec and Halifax Agricultural Societies established.
- 1790—Spain surrenders her exclusive rights on the Pacific coast. Population of Canada, 161,311. (This census does not include what becomes in the next year Upper Canada).
- 1791—The Constitutional Act divides the province of Quebec into Upper and Lower Canada, each with a Lieutenant-Governor and Legislature. The Act goes into force Dec. 26. Sept. 21, Colonel J. G. Simcoe Lieutenant-Governor of Upper Canada.
- 1792—July 8, Simcoe sworn in at Kingston. Sept. 17, First Legislature of Upper Canada opened at Newark (Niagara). Dec. 17, First Legislature of Lower Canada opened at Quebec. Vancouver Island circumnavigated by Vancouver.
- 1793—April 18, First issue of the "Upper Canada Gazette." June 28, Jacob Mountain appointed first Anglican Bishop of Quebec. July 9, Importation of slaves into Upper Canada forbidden. Rocky Mountains crossed by (Sir) Alexander Mackenzie. York (Toronto) founded by Simcoe.
- 1794—Nov. 19, Jay's Treaty between Great Britain and the United States.
- 1795—Pacific Coast of Canada finally given up by the Spaniards.
- 1796—Dec. 15, General Robert Prescott governor in chief. Government of Upper Canada moved from Niagara to York (Toronto.)
- 1798—St. John's Island (population 4,500)—re-named Prince Edward Island.
- 1799—April 10, Lieut. General Peter Hunter Lieutenant-Governor of Upper Canada.
- 1800—Foundation of New Brunswick College, Fredericton (now University of N.B.). The Rocky Mountains crossed by David Thompson.
- 1803—Settlers sent by Lord Selkirk to Prince Edward Island.
- 1806—Jan. 22, Francis Gore, Lieut.-Governor of Upper Canada. Nov. 22, Issue of "Le Canadien"—first wholly French newspaper. Population—Upper Canada, 70,718; Lower Canada, 250,000. New Brunswick, 35,000 P.E.I., 9,676.
- 1807—Aug. 29, Sir James Craig Governor in chief. Simon Fraser explores the Fraser River. Estimated population of Nova Scotia, 65,000.
- 1809—Nov. 1, First Canadian steamer runs from Montreal to Quebec.
- 1811—Lord Selkirk's Red River Settlement on land granted by the Hudson's Bay Company. Oct. 21, Sir George Prevost, Governor in Chief.
- 1812—June 18, Declaration of War by the United States. July 12, Americans under Hull cross the Detroit River. Aug. 16, Detroit surrendered by Hull to Brock. Oct. 13, Defeat of the Americans at Queenston Heights and death of Gen. Brock.
- 1813—Jan. 22, British victory at Frenchtown. April 27, York (Toronto) taken and burned by the Americans. June 5, British victory at Stoney Creek. June 24, British, warned by Laura Secord, captured an American force at Beaver Dams. Sept. 10, Commodore Perry destroys the British flotilla on Lake Erie. Oct. 5, Americans under Harrison defeat the British at Moravian town. Tecumseh killed. Oct. 26, Victory of French-Canadian troops under de Salaberry at Chateauguay. Nov. 11, Defeat of the Americans at Crysler's Farm. British storm Fort Niagara and burn Buffalo.
- 1814—March 30, Americans repulsed at La Colle. May 6, Capture of Oswego by the British. July, British from Nova Scotia invade and occupy Northern Maine. Sept. 11, British defeat at Plattsburg on Lake Champlain. Dec. 24, Treaty of Ghent ends the war. Population—Upper Canada, 95,000; Lower Canada 335,000.
- 1815—July 3, Treaty of London regulates trade with the United States. The Red River Settlement destroyed by the Northwest Company but restored by Governor Semple.
- 1816—Mar. 25, Sir John Sherbrooke, Governor in Chief. June 19, Governor Semple killed. The Red River Settlement again destroyed.
- 1817—July 18, First treaty with the Northwest Indians. Lord Selkirk restores the Red River Settlement. Opening of the Bank of Montreal; first note issued Oct. 1. Population of Nova Scotia, 81,351.

- 1818—Jan. 6, Major-General Sir Peregrine Maitland Lieutenant-Governor of Upper Canada. May 8, the Duke of Richmond Governor in Chief. Oct. 20, Convention of London regulating North American fisheries. Dalhousie College, Halifax, founded. Bank of Quebec founded.
- 1819—Aug. 28, Death of the Duke of Richmond.
- 1819-22—Franklin's overland Arctic expedition.
- 1820—April 13, The Earl of Dalhousie Governor in Chief. Oct. 16, Cape Breton re-annexed to Nova Scotia.
- 1821—March 26, The Northwest Company absorbed by the Hudson's Bay Company. Charter given to McGill College.
- 1822—Population of Lower Canada, 427,465.
- 1824—Population of Upper Canada, 150,066; of New Brunswick, 74,176.
- 1825—Oct. 6, Great fire in the Miramichi district, N.B. Opening of the Lachine Canal. Population of Lower Canada, 479,268.
- 1826—Founding of Bytown (Ottawa).
- 1827—Sept. 20, Convention of London relating to the territory west of the Rocky mountains. Population of Nova Scotia, including Cape Breton, 123,630.
- 1828—Aug. 23, Major-General Sir John Colborne Lieutenant Governor of Upper Canada. The Methodist Church of Upper Canada separated from that of the United States.
- 1829—Nov. 27, First Welland Canal opened. Upper Canada College founded.
- 1830—Nov. 24, Lord Aylmer Governor in Chief.
- 1831—June 1, The North Magnetic Pole discovered by (Sir) James Ross. Population—Upper Canada 236,702; Lower Canada, 553,131; Assiniboia, 2,390.
- 1832—Outbreak of Cholera in Canada. Incorporation of Quebec and Montreal. Bank of Nova Scotia founded. May 30, Opening of the Rideau Canal.
- 1833—Aug. 18, The Steamer *Royal William* built at Quebec, leaves Plouffe for England.
- 1834—Feb. 21, The Ninety-two Resolutions on Public grievances passed by the Assembly of Lower Canada. Mar. 6, Incorporation of Toronto. Population of Upper Canada, 321,145; of New Brunswick, 119,457; of Assiniboia, 3,356.
- 1835—July 1, Lord Gosford Governor in Chief. Nov. 30, Sir Francis Bond Head, Lieutenant-Governor of Upper Canada.
- 1836—July 21, Opening of the first railway in Canada from Laprairie to St. John's, Que. Victoria University, opened at Cobourg (afterwards moved to Toronto).
- 1837—Report of the Canada Commissioners. Rebellions in Lower Canada (Papineau) and Upper Canada (W. L. MacKensie). Nov. 23, Gas lighting first used in Montreal. Dec. 22, Major-General Sir G. Arthur, Lieutenant-Governor of Upper Canada.
- 1838—Feb. 10, Constitution of Lower Canada suspended, and Special Council created. March 30, The Earl of Durham, Governor in Chief. April 27, Martial Law revoked. June 28, Amnesty to political prisoners proclaimed. Nov. 1, Lord Durham, censured by British parliament, resigns. Dec. 13, Sir John Colborne, Governor in Chief. Population Upper Canada, 399,422; Assiniboia, 3,966; Nova Scotia, 202,575.
- 1839—Feb. 11, Lord Durham's report submitted to parliament. Sept. 8, C. Poulett Thompson (Lord Sydenham) Governor in Chief. John Strachan made first Anglican Bishop of Toronto.
- 1840—July 23, Passing of the Act of Union. First ship of the Cunard line to arrive at Halifax. July 28, death of Lord Durham.
- 1841—Feb. 10, Union of the two provinces as the provinces of Canada, with Kingston as capitol. Feb. 13, Draper-Ogden Administration. April 10, Halifax incorporated. June 18, meeting of first united Parliament. Sept. 19, Death of Lord Sydenham. Oct. 7, Sir Charles Bagot, Governor in Chief. Population of Upper Canada, 455,688; of P.R.I., 47,042.
- 1842—March 10, Opening of Queen's University, Kingston. Aug. 9, The Ashburton Treaty. Sept. 16, Baldwin-La Fontaine Administration.
- 1843—Feb. 24, Sir Charles Metcalfe, Governor in Chief. June 4, Victoria, B.C., founded. Dec. 12, Draper-Viger Administration. King's (now University) College, Toronto, opened.
- 1844—May 10, Capitol moved from Kingston to Montreal. Knox College, Toronto, founded. Population of Lower Canada, 697,084.
- 1845—May 28 and June 26, Great fire at Quebec. Franklin starts on his last Arctic expedition.
- 1846—March 16, Earl Cathcart, Governor in Chief. May 18, Kingston incorporated. June 18, Oregon Boundary Treaty. June 18, Draper-Papineau Administration. Oct. 1, The Earl of Elgin, Governor in Chief.
- 1847—May 29, Sherwood-Papineau Administration. Electric telegraph opened. Aug. 3, Montreal to Toronto; Oct. 2, Montreal to Quebec. Nov. 25, Montreal Lachine railway opened.
- 1848—March 11, La Fontaine-Baldwin Administration. May 30, Fredericton incorporated. Responsible Government granted to Nova Scotia and New Brunswick.
- 1849—April 25, Signing of the Rebellion Losses Act, rioting in Montreal and burning of the Parliament buildings. Nov. 14, Toronto made the Capitol. Vancouver Island granted to the Hudson's Bay Company. Population of Assiniboia, 5,391.
- 1851—April 6, Transfer of the postal system from the British to the Provincial Government; uniform rate of postage introduced. April 23, Postage stamps issued. Aug. 2, Incorporation of Trinity College, Toronto. Sept. 22, Quebec becomes the Capitol. Oct. 23, Hincks-Morin Administration. Responsible Government granted in Prince Edward Island. Population—Upper Canada, 952,004; Lower Canada, 890,261; New Brunswick, 193,800; Nova Scotia, 276,854.
- 1852—July 8, Great fire at Montreal. Dec. 8, Laval University, Quebec, opened. The Grand Trunk Railway chartered.
- 1854—June 5, Reciprocity Treaty with the United States. (Sept. 11, Macdonald-Morin ministry. Sept. 20, Sir Edmund W. Head, Governor in Chief. Seigneurial tenure in Lower Canada abolished. Secularisation of the Clergy Reserves.
- 1855—Jan. 1 Incorporation of Ottawa. Jan. 27, Macdonald-Taché Administration. March 9, Opening of the Niagara Suspension Bridge. April 17, Incorporation of Charlottetown. Oct. 20, Government moved to Toronto.
- 1856—The Legislative Council of Canada is made elective. First meeting of the Legislature of Vancouver Island. May 24, Taché-J. A. Macdonald Administration. Oct. 27, Opening of the Grand Trunk Railway from Montreal to Toronto. Population of Assiniboia, 6,691.
- 1857—Nov. 26, J. A. Macdonald-Cartier Administration. Dec. 31, Ottawa chosen by Queen Victoria as future Capitol of Canada.
- 1858—Feb., Discovery of gold in Fraser River valley. July 1, Introduction of Canadian decimal currency. Aug. 2, Brown-Dorin Administration. Aug. 5, Completion of the Atlantic cable; first message sent. Aug. 6, Cartier-J. A. Macdonald Administration. Aug. 20, Colony of British Columbia established. Control of Vancouver Island surrendered by the Hudson's Bay Company.
- 1859—Jan., Canadian silver coinage issued. Sept. 24, Government moved to Quebec.
- 1860—Aug. 8, The Prince of Wales (King Edward VII) arrives at Quebec. Sept. 1, Laying of the corner stone at the Parliament building at Ottawa by the Prince of Wales. Prince of Wales College, Charlottetown, founded.
- 1861—Aug. 14, Great flood at Montreal. Sept. 10, Meeting of the first Anglican Provincial Synod. Nov. 2, Viscount Monk, Governor in Chief. Population, Upper Canada, 1,396,091; Lower Canada, 1,111,560; New Brunswick, 252,047; Nova Scotia, 330,857; Prince Edward Island, 80,857.
- 1862—May 24, Sandfield Macdonald-Sieotte Administration. Conference on Confederation of British North America: Sept. 1, at Charlottetown; Oct. 10-29, at Quebec. Oct. 19, Raid of American Confederates from Canada on St. Albans, Vermont.

- 1865—Feb. 3, The Canadian Legislature resolves on an address to the Queen praying for Union of the provinces of British North America. Aug. 7, Belau-J. A. Macdonald Administration. Oct. 20, Proclamation fixing the seat of Government at Ottawa.
- 1866—Mar. 17, Termination of the Reciprocity Treaty by the United States. May 31, Raid of Fenians from the United States into Canada; they are defeated at Ridgeway (June 2) and retreat across the border (June 3). June 8, First meeting at Ottawa of the Canadian Legislature. Nov. 17, Proclamation of the Union of Vancouver Island to British Columbia.
- 1867—March 20, Royal assent given to the British North America Act. July 1, The Act comes into force; Union of the provinces of Canada, Nova Scotia and New Brunswick as the Dominion of Canada; Upper and Lower Canada made separate provinces as Ontario and Quebec. Viscount Monck, first Governor General, Sir John A. Macdonald premier. Nov. 6, Meeting of the first Dominion Parliament.
- 1868—April 7, Murder of D'Arcy McGee at Ottawa. July 31, The Rupert's Land Act authorizes the acquisition by the Dominion of the Northwest Territories. Dec. 29, Sir John Young (Lord Lisgar) Governor General.
- 1869—Act providing for the government of the Northwest Territories. Nov. 19, Deed of surrender to the Crown of the Hudson's Bay Company's territorial rights in the Northwest. Outbreak of the Red River Rebellion under Riel.
- 1870—May 12, Act to establish the province of Manitoba. July 15, Northwest territories transferred to the Dominion and Manitoba admitted into Confederation. Sept. 24, Wolseley's expedition reaches Fort Garry (Winnipeg); end of the rebellion.
- 1871—April 2, First Dominion census. April 14, Act establishing uniform currency in the Dominion. May 8, Treaty of Washington, dealing with questions outstanding between the United Kingdom and United States. July 20, British Columbia enters Confederation.
- 1872—May 22, The Earl of Dufferin, Governor General.
- 1873—March 5, Opening of the Second Dominion Parliament. May 23, Act establishing the Northwest Mounted Police. July 1, Prince Edward Island enters Confederation. Nov. 7, Alexander Mackenzie premier. Nov. 8, Incorporation of Winnipeg.
- 1874—March 26, Opening of the third Dominion Parliament. May, Ontario Agricultural College, Guelph, opened.
- 1875—April 8, The Northwest Territories Act establishes a Lieutenant-Governor and Council of the Northwest Territories. June 15, Formation of the Presbyterian Church of Canada.
- 1876—June 1, Opening of the Royal Military College Kingston. June 5, First sitting of the Supreme Court of Canada. July 3, Opening of the Intercolonial Railway from Quebec to Halifax.
- 1877—June 20, Great fire at St. John, N.B. Oct., First exportation of wheat from Manitoba to the United Kingdom. Founding of the University of Manitoba.
- 1878—July 1, Canada joins the International Postal Union. Oct. 5, The Marquis of Lorne, Governor-General. Oct. 17, Sir J. A. Macdonald premier.
- 1879—Feb. 13, Opening of the fourth Dominion Parliament. May 15, Adoption of a protective tariff ("The National Policy").
- 1880—Royal Canadian Academy of Arts founded, first meeting and exhibition. March 6. May 11, Sir A. T. Galt appointed first Canadian High Commissioner in London. Sept. 1, All British possessions in North America and adjacent islands, except Newfoundland and its dependencies, annexed to Canada by Imperial Order in Council of July 31. Oct. 21, Signing of the contract for the construction of the Canadian Pacific Railway.
- 1881—April 4, Second Dominion census. May 2, First and tunnel of the Canadian Pacific Railway.
- 1882—May 8, Provisional Districts of Assiniboia, Saskatchewan, Athabasca and Alberta formed. May 26, First meeting of the Royal Society of Canada. Aug. 23, Regina established as seat of Government of Northwest Territories.
- 1883—Feb. 1, Opening of the fifth Dominion Parliament. Aug. 18, The Marquis of Lansdowne, Governor General. Sept. 5, Formation of the Methodist Church in Canada; United Conference.
- 1884—May 24, Sir Charles Tupper, High Commissioner in London. Aug. 11, Order-in-Council settling the boundary of Ontario and Manitoba.
- 1885—March 26, Outbreak of Riel's second rebellion in the Northwest. April 24, engagement at Fish Creek. May 2, Engagement at Ouelka. May 12, Taking of Battleford. May 15, Surrender of Riel. Aug. 24, First census of the Northwest Territories. Nov. 15, Execution of Riel.
- 1886—April 6, Incorporation of Vancouver. June 7, Archbishop Taschereau of Quebec made first Canadian Cardinal. June 13, Vancouver destroyed by fire. June 28, Fire through train on the Canadian Pacific Railway from Montreal to Vancouver. July 31, First quinquennial census of Manitoba.
- 1887—Interprovincial Conference at Quebec. April 4, First Intercolonial Conference in London. April 13, Opening of the sixth Dominion Parliament.
- 1888—Feb. 15, Signing of Fishery Treaty between United Kingdom and United States at Washington. May 1, Lord Stanley, Governor General. Aug., Rejection of Fishery Treaty by United States Senate.
- 1890—March 31, The Manitoba School Act abolishes separate schools.
- 1891—April 5, Third Dominion census. April 29, Opening of the seventh Dominion Parliament. June 6, Death of Sir J. A. Macdonald. June 15, Sir John Abbott, premier.
- 1892—Feb. 20, Washington Treaty, providing for arbitration of the Behring Sea Seal Fisheries question. July 22, Boundary convention between Canada and the United States. Nov. 23, Sir John Thompson, premier.
- 1893—April 4, First sitting of the Behring Sea Arbitration Court. May 22, The Earl of Aberdeen, Governor General. Dec. 18, Archbishop Machray, of Rupert's Land, elected first Anglican Primate of all Canada.
- 1894—June 28, Colonial Conference at Ottawa. Dec. 12, Death of Sir John Thompson at Windsor Castle. Dec. 21 (Sir) Mackenzie Bowell, premier.
- 1895—Sept. 10, Opening of new Sault Ste. Marie Canal. Oct. 2, Proclamation naming the Ungava, Franklin, Mackenzie and Yukon Districts of Northwest Territories.
- 1896—April 24, Sir Donald Smith (Lord Strathcona) High Commissioner in London. April 27, Sir Charles Tupper, premier. July 11, (Sir) Wilfred Laurier, premier. Aug., Gold discovered in the Klondyke. Aug. 10, Opening of the eighth Dominion Parliament.
- 1897—July, Third Colonial Conference in London. Dec. 17, Award of the Behring Sea Arbitration.
- 1898—June 13, The Yukon district established as a separate Territory by Act of Parliament. July 30, The Earl of Minto, Governor-General. Aug. 23, Meeting at Quebec of the Joint High Commission for the settlement of questions between Canada and the United States. Dec. 25, British Imperial Penny (2 cents) Postage introduced.
- 1899—Oct. 11, Beginning of the South African War. Oct. 14, Canadian Government decides to send troops to South Africa. Oct. 29, First Canadian Contingent leaves Quebec for South Africa.
- 1900—Feb. 27, Battle of Paardeberg. April 26, Great fire at Ottawa and Hull.
- 1901—Jan. 22, Death of Queen Victoria and accession of King Edward VII. Feb. 6, Opening of the ninth Dominion Parliament. April 1, Census of the British Empire, total population, 397,659,315; Canada (Fourth Dominion Census), 5,371,315. Sept. 16-Oct. 21, Visit to Canada of the Duke and Duchess of Cornwall and York (King George V and Queen Mary).
- 1902—May 31, End of South African War, peace signed at Vereeniging. June 30, Meeting of fourth Colonial Conference in London.

- 1903—Jan. 24, Signing of the Alaska Boundary Convention. June 19, Incorporation of Regina. Oct. 20, Award of the Alaska Boundary Commission.
- 1904—Feb. 1, Dominion Railway Commission established under the Railway Act of 1903. April 19, Great fire in Toronto. Sept. 26, Earl Gray, Governor General. Oct. 8, Incorporation of Edmonton.
- 1905—Jan. 11, Opening of the tenth Dominion Parliament. Sept. 1, Creation of the provinces of Alberta and Saskatchewan.
- 1906—University of Alberta founded. Oct. 8, Inter-provincial Conference at Ottawa.
- 1907—March 22, Industrial Disputes Investigation Act passed. April 15-May 14, Fifth Colonial Conference in London. Adjustment of Parliamentary representation in Saskatchewan and Alberta. New Customs Tariff, including introduction of Intermediate Tariff. Aug. 20, Collapse of Quebec Bridge. Sept. 19, new Commercial Convention with France signed at Paris. Oct. 17, First message by wireless telegraphy between Canada and the United Kingdom. University of Saskatchewan founded.
- 1908—Jan. 2, Establishment of Ottawa Branch of Royal Mint. April 11, Arbitration treaty between United Kingdom and United States. May 4, Ratification of Treaty for demarcation of boundary between Canada and United States. June 21-23, Bicentenary of Bishop Laval celebrated at Quebec. July 20-21, Quebec Tercentenary Celebrations: visit to Quebec of the Prince of Wales, representing the King. Aug. 2, Great fire in Kootenay Valley, B.C. University of British Columbia founded.
- 1909—Jan. 11, Signing of International Boundary Waters Convention between Canada and United States. Jan. 20, opening of 11th Dominion Parliament. Jan. 27, Agreement between United Kingdom and United States to submit North Atlantic Coast Fisheries Question to the Hague Tribunal. May 19, Appointment of Canadian Commission of Conservation. July 28, Conference on Imperial Defence in London.
- 1910—Feb. 1, Ratification of Commercial Treaty with France. Feb. 1, International Opium Commission met at Shanghai. May 4, Passing of Naval Service Bill. May 6, Death of King Edward VII and accession of King George V. June 7, Death of Goldwin Smith. Sept. 7, North Atlantic Coast Fisheries Arbitration award of the Hague Tribunal. New trade agreement made with Germany, Belgium, Holland and Italy.
- 1911—Jan. 21, Proposals for reciprocity with United States submitted to the Canadian Parliament. Mar. 21, Duke of Connaught appointed Governor-General of Canada. May 23-June 20, Imperial Conference in London. June 1, Fifth Dominion census. July 11, Disastrous forest fires in Porcupine mining districts. Sept. 21, General election of Dominion Parliament. Oct. 10 (Sir) R. L. Borden, premier. Oct. 11, Inauguration at Kitchener, of Ontario, Hydro Electric Power Transmission System. Oct. 13, The Duke and Duchess of Connaught land at Quebec. Nov. 15, Opening of 12th Dominion Parliament.
- 1912—April 15, Loss of the steamship *Titanic*. April 15, Appointment of Dominions Royal Commission. May 15, Extension of the boundaries of Quebec, Ontario and Manitoba. June 17, Judgement delivered by the Imperial Privy Council on the marriage question raised by the Ne Tamere Decree.
- 1913—April 10, Japanese Treaty Act assented to. June 2, Trade agreement with West Indies came into force. July 26, King's Prize at Bialay won by Canada. September 1-3, Visit to Montreal of British Lord Chancellor (Viscount Haldane). Oct. 4, New Customs tariff of United States goes into force.
- 1914—Jan. 21, Death of Lord Strathearn and Mount Royal, aged 94. May 20, Loss of the Steamship *Empress of Ireland*. Aug. 3, Acquisition by Canada of two submarines on the Pacific Coast. War with Germany, Aug. 4, with Austria-Hungary, Aug. 12, and with Turkey, Nov. 5, Aug. 18-22, special war session of Canadian Parliament. Oct. 16, First Canadian Contingent of over 33,000 troops land at Plymouth, England. Nov. 1, Loss of four Canadian midshipmen by sinking of H.M.S. Cape of Good Hope in action off the coast of Chile.
- 1915—Feb., Canadian First Contingent land in France and proceed to Flanders. April 22, Second battle of Ypres; April 24, Battle of St. Julien. May 20-26, Battle of Festubert. June 15, Battle of Givenchy; gallantry of Canadian troops highly eulogized by F.M. Sir John French. July 14, Robert Borden attends meeting of the British Cabinet. Oct. 30, Death of Sir Charles Tupper, Rt. Nov. 22, Issue of Canadian War Loan of \$50,000,000. Nov. 30, War Loan increased to \$100,000,000.
- 1916—Jan. 12, Order-in-Council authorizing increase in number of Canadian troops to 500,000. Feb. 3, Destruction of the Houses of Parliament at Ottawa by fire. April 3-20, Battle of St. Eloi. June 1, Census of Prairie Provinces. June 1-3, Battle of Sanctuary Wood. June 3, Order-in-Council establishing Board of Pension Commissioners. Sept. 1, Cornerstone of new Houses of Parliament laid by Duke of Connaught. Sept., Issue of Second War Loan, \$100,000,000. Oct. 16, Duke of Connaught left Canada on completion of term of office as Governor General. Nov. 11, Duke of Devonshire (appointed Aug. 19) sworn in at Halifax, N.S., as Governor General.
- 1917—Feb. 12-May 15, Visit to England of Prime Minister and colleagues for Imperial Conferences. Feb. 21, Final Report of Dominions Royal Commission. March, Third War Loan, \$150,000,000. March 14, Death of Duchess of Connaught. March 20-May 2, Meetings in London of Imperial War Cabinet. March 21-April 27, Imperial War Conference. March 31, Canadian patriotic contributions amount to \$49,271,012. April 6, Declaration of war against Germany by United States. April 9, Capture of Vimy Ridge. April 16, Wheat placed on free list. June 11, Appointment of Board of Grain Supervisors with power to fix grain prices. June 21, Appointment of Food Controller under Order-in-Council of June 16, July 1, Jubilee of Confederation, 1867. Aug. 15, Battle of Loos, capture of Hill 70. Aug. 29, Passing of Military Service Act. Sept. 20, Completion of structure of Quebec bridge. Sept. 20, Parliamentary franchise extended to women; Dominion Government authorized to purchase 600,000 shares of C.N.R. Oct. 6, Battle of Passchendaele. Oct. 6, Dissolution of 12th Parliament. Nov. 12, Fourth War Loan (Victory Bonds). Dec. 6, Disastrous explosion at Halifax, N.S., caused by collision between the *Imo* and the *Mont Blanc*, laden with powerful explosives. Dec. 17, General Election and Union Government sustained.
- 1918—Feb. 23, Appointment of Canada Registration Board. Mar. 18, Opening of first session of 13th Parliament. Mar. 21, Germans launch critical offensive on West Front. Mar. 30, Gen. Foch appointed Generalissimo. Mar.-April, Second battle of the Somme. April 17, Secret session of Parliament. May 23, Parliament prorogued. June-July, Prime Minister and colleagues attend Imperial War Conferences in London. July 18, Allies assume successful offensive on West Front. Aug. 12, Battle of Amiens. Aug. 26-28, Capture of Monchy le Preux. Sept. 2-4, Breaking of Drocourt-Queant line. Sept. 16, Austrian Peace note. Sept. 19, Establishment of Khaki University of Canada. Sept. 27-29, Crossing of Canal du Nord and capture of Bourlon Wood. Sept. 30, Bulgaria surrenders and signs armistice. Oct. 1-9, Capture of Cambrai. Oct. 3, Epidemic of Spanish Influenza causes closing of churches and abandonment of public meetings. Oct. 6, First German Peace Note. Oct. 20, Capture of Denain. Oct. 21, Appointment of Siberian Economic Commission. Oct. 25-Nov. 2, Capture of Valenciennes. Oct. 28, Issue of Fifth War Loan for \$300,000,000 in the form of Victory Bonds. Oct. 31, Turkey surrenders and signs armistice. Nov. 10, Flight into Holland of German Emperor. Capture of Mons. Nov. 11, Germany surrenders and signs armistice. Spontaneous rejoicings throughout the

Empire at the prospect of victorious peace. Dec. 1, National Thanksgiving Services for victory and peace.
 1919—Feb. 17, Death of Sir Wilfred Laurier. Feb. 20-July 7, Second Session of 13th Parliament of Canada. Mar. 7, Appointment of Government Receiver of the Grand Trunk Railway. May 1-June 15, Great strike at Winnipeg and strikes in other Western cities. May 26, Return to Canada of Prime Minister from Peace Conference. June 23, General Election in Quebec, resulting in retention of Liberal Administration. June 25, Signature at Versailles of Peace Treaty and Protocol; Canadian Plenipotentiaries: the Hon. Charles J. D. Doherty and the Hon. Arthur L. Sifton. July 24, General Election in Prince Edward Island, resulting in defeat of Conservative Administration. Aug. 5-7, Meeting at Ottawa of Liberal convention and election of the

Hon. W. L. Mackenzie King as leader of Liberal party. Aug. 15, Arrival at St. John, N.S., of H.R.H. the Prince of Wales for official tour in Canada. Aug. 22, Formal opening of Quebec Bridge by H.R.H. the Prince of Wales. Sept. 1, H.R.H. the Prince of Wales lays foundation stone of tower of new Parliament Buildings at Ottawa. Sept. 1-Nov. 10, Third or Special Peace Session of 13th Parliament of Canada. Sept. 13, Opening at Ottawa of the National Industrial Conference. Oct. 20, Provincial Election in Ontario, resulting in defeat of Conservative Administration and formation of Ministry by E. C. Drury, United Farmer's Organisation. Issue of Ninth War Loan for \$300,000,000 in the form of Victory Bonds. Nov. 25, H.R.H. the Prince of Wales sails from Halifax, N.S., on completion of visit to Canada. Dec. 20, Organisation of "Canadian National Railways" by Order-in-Council.

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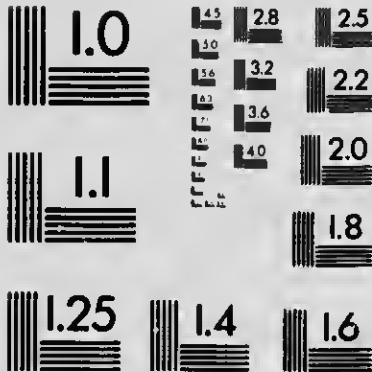
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THE IDEA The hack of this paper is to serve the people who read it, not merely to print and send the subscriber twenty-four copies of the paper each year for the one dollar paid, but to serve him or any member of his family in any way it can. The idea is that The Nor'-West Farmer shall be a Service Station for every Western Canada Farm. This has been our only purpose for nearly forty years. We intend making it the only purpose of the paper so long as it appears. Let us make ourselves perfectly clear. The dollar you pay for one year's subscription to The Nor'-West Farmer entitles you or any member of your family, to the free use of every service maintained for readers' convenience. There is nothing more to pay. No charge is made for anything we can do to help you personally.

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