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MONTEREAL PROVINCIAL EXHIBITION.

The 11th Annual Exhibition, under the management of the Montreal Exposition Co, will be held from the 11th to the 19th of next September.

All the exhibitors of previous years have been notified, and from the numerous enquiries received the Directors confidently hope that the forthcoming fair of 1896 will be a worthy successor to the previous exhibitions.

The chief desire of the Company has been to promote the development of manufactures and industries, to stimulate the progress of Agriculture, and to make the exhibition a valuable medium of education by providing a display of the most recent improvements in Industrial and Mechanical Art.

The great interest felt in the Montreal Exhibition by Farmers, Stock-breeders, Fruit growers, and others was shown last year by the magnificent display of Live Stock and the splendid collections of Horses, Sheep and Swine, while the Poultry Show was a perfect gem.

Many well known American experts and prominent Canadian Breeders expressed the opinion that a finer display of Ayrshire Cattle had never been seen on the continent.

It has been a source of great satisfaction to the management to know that since the inception of the Annual Exhibitions in 1891, the standard of excellence in all exhibits has been perceptibly raised and a great impetus given to the development and extension of the various branches of Agriculture.

The syndicate competition of the important Dairy centres of the Province of Quebec proved a valuable adjunct in stimulating the skill and energy of each individual engaged in the manufacture of Butter and Cheese, while the results as shown in the extensive display at last year's exhibition, were most gratifying.

The prospects for the next fall Exhibition are most assuring. A greater number of special prizes have already been voluntarily offered, and there is reason to believe that many more will shortly be received.

A prominent feature in the Horse Department next fall will be an exhibit of valuable animals from the famous Stock farm at Burlington Vt., owned by Dr. W. Leward Webb, President of the Wagner Car Co.

The classes in the Cattle Department have been altered from having a large number of sections, and greater prominence is given to the Exhibitors' Herds and young herds, thus giving breeders more encouragement in the displaying of their stock.

Many new and interesting features are proposed to be introduced which will doubtless be appreciated by the visitors.

The greatest care and attention will be paid to provide for the accommodation and comfort of exhibitors and every facility will be afforded them.

The Railway and Steamboat Companies will supply the means of transportation at the usual low rates and the

regular concessions and privileges will be readily granted.

Exhibitors and others wishing for information connected with the exhibition can obtain the same by applying to S. C. Stevenson, the manager and secretary.

EFFECT OF FOOD UPON THE COMPOSITION OF MILK.

Though much has already been written upon this subject, it will still be of interest to note the results obtained by the veteran experimenters, Lawes and Gilbert, of Rothamsted; nor is the interest lessened from the fact that their results seem to be somewhat in opposition to those of American stations. Sir J. H. Gilbert is quoted as follows:

"Exercising such care and reservation in regard to the numerous results of ourselves and others which are at command, it may be taken as clearly indicated that, within certain limits, high feeding, and especially high nitrogenous feeding, does increase both the yield and the richness of the milk. But it is evident that when high feeding is pushed beyond a comparatively limited range, the tendency is to increase the weight of the animal; that is, to favor the development of the individual, rather than to enhance the activity of the functions connected with the reproductive system.

"It may be observed that direct experiments at Rothamsted confirm the view arrived at by common experience, that roots, and especially mangels have a favorable effect on the flow of milk. Further, the Rothamsted experiments have shown that a higher percentage of butter-fat, of other solids, and of total solids, was obtained with mangels than with silage as the succulent food. The yield of milk was, however, in a much greater degree increased by grazing than by any other change in the food, and with us, at any rate, the influence of roots comes next in order to that of grass, though far behind it in this respect. But with grazing, as has been shown, the percentage composition of the milk is considerably reduced, though, owing to the greatly increased quantity yielded, the amount of constituents removed in the milk while grazing may, nevertheless be greater per head per day than under any other conditions."

RAISING AND FATTENING OF SWINE.

Breed only of relative importance—Medium breed—Selection of stock—Deaf pigs—Protection for the suckers—Raising and fattening—Feeding pigs for market—Experiment on feeding—Boiled roots—rations.

FIRST PRIZE, EX. 1895

Centre, Ontario, 1895.

In considering the first division of our topic we find that it is rather broad to discuss without further dividing as many important points are to be considered as breed-selection, cross-breeding etc.

The breed is an important point indirectly, but unimportant directly. What I mean is that one man may take

a superior strain of pigs and another may take an inferior strain, and the latter, through care in selection, will excel the former in a short time. The wide variation of individuals in breed does not allow the breed to be taken as a standard. It is said that individuals in breeds vary more than breeds, and there is no doubt but this is the case, that the difference between the worst and the best in any breed is at greater variance than the difference in the average of different breeds, therefore, indirectly, breed is unimportant.

In no business should a person be more particular in selecting well bred animals than in selecting them for feeding.

In raising stock entirely for the market, the aim should be to obtain stock which will produce the most in the least time on the least feed.

The fact that the better bred an animal is, the easier it is fed, is an accepted fact.

The reason of this is that every point is paid particular attention to, in breeding well bred stock where they have to enter into competition one with the other.

An instance of this. Two pigs of equally the same size and shape came into competition. The one being a little deficient in his hams was awarded 2nd, also less in weight, because it had not the capacity for laying on pork that the one had which was perfectly formed.

Then, again, when a record is kept of the breeding of stock for generation no intercrossing occurs or reoccurs as often: proves disastrous to grade stock. Therefore, breeding is an important factor to consider but the breed is no guide in selection.

Whatever breed a person selects, let him think it is the best, and stick to it as long as he wants stock.

Attention should be paid not to go to extreme in selection; a long lean animal indicates a hard feeder; or yet the reverse of this; that is, a compact short stubby one will not prove satisfactory.

The medium breed by selection, the point we shall next consider, will give better satisfaction, and more pleasure than a short stubby one, or the model of a fence rail.

As we have touched on the selection of the breed we shall now consider the selection of the animal.

"Selection" has done more for the improvement of live stock than all other methods combined. Some think cross-breeding is a rapid road to the improvement of stock. If live stock had been combined in the place of selected during the past century, we should not have had the magnificent breeds we have to day. In selecting breed, the disposition should not be overlooked. Pigs that are wild, seldom produce and rear as good and as easily fed litters, as those which are tractable.

A sluggish disposition is not desirable; they are apt to be careless mothers and subjects to crippling more or less. A pig that is always moving about is the one that knows where the holes are in the farmyard fence.

A pig should have good action, not necessarily full action, nor yet be a racer; but it should move freely, easily, and gracefully.

Sows of this character make better mothers, as they are not so liable to injure their pigs by their wildness. Pigs of this strain feed better and easier, and stand confinement well although this may seem an unimportant point to some

breeders; but some breeders assert that advancement depends more or less on the disposition of their swine.

In selecting the size, particular attention should be paid to the back and hams as these parts are more or less liable to be weak.

The pen should 1st be dry well ventilated but not subject to draughts.

2. They should be roomy.

3. Situated so as to have easy access to yards and fields for pasture and exercise.

All classes of pigs require pens of this kind but sows require larger and warmer pens than other pigs.

The south side of the pen should be reserved for the sow and small pigs. If the wall is made of window sash with double glass so much the better, as it allows the light and heat to enter and keeps out the cold.

A pig that is intended for a breeder should not be fed with those that are being fed for the market. Stock for the market should be fed all that they will digest from the time they are weaned until sold as fat animals. Pigs for breeders and cattle for milking should be fed more moderately, also the food should be that which will produce muscle and bone in place of fat and flesh as is desired in the former instance.

Then, show-stock should be rejected for breeders as they generally are hard to keep in fair condition after having once been fattened to excess, they never make as prolific breeders nor yet do they last so long.

The age to commence breeding, for sires, should be at 6 months and sows from 6-12.

Better results will be obtained by commencing at these ages than by commencing either before or after.

The most favorable condition for breeders is a medium condition, neither lean nor fat.

A sow in fair condition will produce a heavier litter in lbs at 6 to 8 weeks old, than a sow that is fat or one that is too lean. A lean sow may produce a larger litter, but they are often irregular and some times weak.

A fat sow will produce a smaller litter, also weak, and she will give more or less trouble in raising the little ones.

A fat sow's milk is often too rich for the little pigs and causes diarrhoea. We found that by feeding wheat-bran about two weeks previous to farrowing and continuing the same for about two weeks after, it obviated the difficulty. Large, fat sows give more or less trouble in raising their litters, often lying on the pigs and killing sometime the whole litter.

Deafness is sometimes the cause of this, which fat stock is more or less subject to.

A large sow, after she has become deaf, is very poor property to own, the sooner she becomes the property of the pork-packer the better.

In raising litters from large sows we have arranged a protection in the pen for the pigs while small, by taking a scantling 3 feet long and beveling each end so as to form the hypotenuse of a right angle with the floor and wall and nailing it fast; then, nailing a plank or board horizontal to this about 8 inches from the floor afford a splendid protection for little pigs. Indeed we have not lost a single pig since it was adopted; also a little trough can be arranged behind this so the little pigs may be fed.

Raising and fattening pigs is not altogether a trade, but, like the occupa-

tion of which it forms a part, it combines both trade and profession. Not only should a person know how to feed, but he should know what to feed, and how to sell.

He should not only know that the old sow is going to have little pigs sometime, but he should know the very day, as pigs vary very little in the period of gestation, and he should be there when they come. We have found it best to attend the sow when farrowing, after she commences farrowing and get the piglings to suck; then move away until she has done. Then, clean out the pen and bed the sow with short, dry straw or chaff and return the pigs to the mother.

They will need no special attention for a few weeks, if pen is right and the feed for the sow is suitable except cleaning out and bedding each day.

When about four weeks old they will require a little feed in addition to sow's milk, especially if the litter is large and the sow thin. They can be fed by the method before described. The feed most suitable is $\frac{1}{2}$ oats the remainder wheat, pease, and shorts, mixed. The whole should be ground very fine. If they are fed in this way at 8 weeks old they will depend very little on the sow for support.

We have had them to weigh 80 lbs at 8 weeks fed in this way. After the pigs are two weeks old exercise should be given the sow each day. At 8 weeks old they will be ready to turn out on clover if farrowed at the proper time in spring, which should be about the first part of April or last of March. By having them farrowed then they can be grown outside on clover, grass, rye, or rape. For the next 2 months they may be turned out to pasture, with the aid of skim milk and whey. They may be made to weigh from 120 to 150 lbs without feeding to them any wheat or the grain. The amount and kind of grain required will depend on the drink, pasture, and the feeding abilities of the pigs. We have found it best not to mix the chop before feeding.

We once tried an experiment, in which we divided a litter of pigs and fed one part by putting the chop in the trough and then pouring the drink in the trough on the chop. The other half had their feed mixed 12 hours before feeding and the results were as follows:

Aug 24 pen No 1 fed with dry chop weighed.....	330
Sept. 24 pen No 1.....	495
Gain.....	165
Pen No 1 ate 552 lbs chop	
Aug. 24 Pen No 2 fed with soaked chop weighed.....	365
Sept. 24.....	385
Gain.....	20 lbs

Pen No 2 ate 590 lbs in 1 month
Pen No 1 made..... \$115

For wheat fed.....
Pen No 2..... \$74

We cannot say that it would always give results like these, but as far as we know, the trial was accurate.

The last month or 6 weeks they will require more chop. Any one who has studied agricultural chemistry can quickly work out a feeding ration for stock of that age, 1 bushel of oats to 3 of wheat should give good results and finish pigs very quickly. (1)

Pease or corn chop may be substituted for the wheat, but at the present

(1) And make soft pork, we fear. A bushel of pease added would be advantageous.—Ed.

time oats and wheat would be the cheapest only costing \$16 per ton. Fall pigs of September and October farrow should receive the same attention, while with the mothers, as spring pigs. In the place of clover or pasture, boiled turnips, potatoes, pumpkins, or roots may be substituted for the pasture. Boiled roots are excellent for pigs. They will grow faster, eat less chop and make better and more desirable pigs for the market than those fed on clear chop.

We do not favor boiling the chop with the roots as it makes the feed sticky and in cold weather, when they huddle together, they make each other in a bad state. We tried several experiments in feeding boiled roots; an average one we give below:

Devised on the 3 of Jan., Pen No 1 weighed.....	1484
Weighted them on 22 Jan.....	1710
Fed 800 lbs of wheat with turnips. Gain.....	226
Pen No 2 weighed.....	1700
Pen No 2 weighed Jan 13.....	1900
Fed 900 lbs of wheat chop.	
Pen No 2 required $4\frac{1}{2}$ chop.	
1 lb of pork.	
Pen No 1 required 3 4-10 to produce.	
1 lb of pork.	

Pen No 1 were in better condition for the pork packer at end of experiment than No 2, as they were not so fat, and were in a better condition to lay on fat afterwards.

When strong feed is the ration, the other part should be part soft feed, such as pasture or roots, especially is this true in winter-feeding, when the pigs have to be confined to their pens. Pigs at 5 $\frac{1}{2}$ (1) fed and cared for in this way selected and bred in the way described will furnish as much pleasure in attending, and as much profit in rearing, as any branch of agriculture. As there are many ways of feeding, and many different feeds, we have to give the simplest, and what we have found to give the best results in our own pens.

W. E. BUTLER.

One or two passages in the above, we regret to say, were undecipherable.—Ed.

PLOUGHING AND SUBSOIL PLOUGHING.

(By J. W. Knight)

Benefits of ploughing—Effects—Formation of nitrates—Width of ridges—The skim—Ploughing sandy soils—Autumn-cleaning—Deep ploughing—Subsoiling.

SECOND PRIZE, EX. 1895.

Before entering upon the subject of how the operation should be performed let us consider the necessity and beneficial effects of plowing. In the autumn, the farmer turns over his soil, leaving it exposed to the winter's frost. (2) The excessive rainfall during the late fall saturates the upturned soil and when the cold weather comes on, it is frozen solid, and, in the spring, when these lumps of earth thaw out they crumble into a finely pulverised mass. The soil-water, on freezing, has expanded and thus burst asunder the particles of soil, and, as a result, when the harrow is used these lumps of soil are brought into a fine state of division and

(1) Does this mean 5 $\frac{1}{2}$ months old or what?—Ed.

(2) Yes; but, too often he "does not believe in fall-ploughing."—Ed.

are readily converted into a seed bed for the reception of the grain. This however is not the only object in fall plowing. It brings the undersoil into relation with the atmosphere, and the oxygen of the air is a powerful disintegrator acting upon any compounds of iron which may be present; the rains also bring to the ground large quantities of carbonic acid gas, which has a very powerful action on soils containing lime, forming compounds which are available as plant-food. Much ammonia is also brought by rains to the soil, and a bare, loose surface will absorb a considerable quantity of it; it has a special action forming nitrates in the soil which are held in reserve for the production of vegetation when it is required.

It is impossible to lay down any set of rules for plowing either sod or stubble, as soil of a sandy nature requires somewhat different treatment from stiffer soils. When plowing clay land in the fall the furrows should be so turned over as to lap on the preceding and lie at an angle of 45° and to accomplish this the depth of the furrow should be two thirds of its width. Thus, a furrow six inches deep should be about nine inches wide; and if eight inches deep, it should be twelve inches wide but the six by nine inches furrow is preferable. (1) This will allow of the furrows lying regularly and evenly, and in the proper position for the drainage of the soil, the free circulation of air, and the most efficient action of the frosts, which in this way have access to every side of them. The width of the ridges should depend upon the lay of the land, the condition of the subsoil and the provision made for drainage. If flat and retentive, the lands or ridges should not be wider than one rod; (2) there should be a gradual and even slope from the centre of the ridge to the furrow, to allow the easy escape of surface water. Where the land has a fair fall, and is less retentive in character, the lands may be made wider, even up to twenty five yards. While the foregoing is particularly applicable to fall plowing, the same general rules may govern spring plowing, at this season it is good practice to attach a skimmer. This skimmer fastened to the beam just behind the coulter is set to pare off a sod a couple of inches (3) in thickness and invert it in the bottom of the previous furrow. The plow then throws up the lower soil completely, burying the inverted sod, and gives a loose, mellow surface to the field. This with one or two harrowings forms an excellent preparation for any grain crop.

Sandy or dry soils require flat plowing. (4) To ensure this on an old sod the depth should be about half the width and the lands as wide as can conveniently be made, so as to preserve as much uniformity of surface on the whole field as possible. It has become a rule with the best farmers of the present day to skim their stubble land as soon as possible after harvest is taken off with a gang of plows. (5) This plow-

(1) We prefer 7x10.—Ed.
(2) In England, on heavy land, half a rod; so that the horses, harrowing, drilling, &c., may walk in the open furrows, thus avoiding "poaching" the land.—Ed.
(3) One inch is enough.—Ed.
(4) With this we disagree.—Ed.
(5) The surface should never be turned under but kept atop. No plough, but a grubber. As for the addition of fertility, that is infinitesimal.—Ed.

ing turns all grain and weed seeds under, causing them to germinate and when plowed again before winter, sets in, this growth is turned under, adding to some extent to the fertility of the soil. As this plowing which is as deep as the depth of the soil and the custom of former years will admit, the land is usually put in ridges from two to eight rods wide according to the drainage of the land.

When sod which has been plowed in the early fall is desired to be used as planting ground the next season, it is good practice to work it up "one and just before winter ridge it up by throwing two furrows up from opposite directions, and not plowing it in the form of lands. This surface is a good one to spread manure upon and when plowed again in the spring, will cover the manure completely.

It is not good practice to plow any land so as to bring the sub-soil to the surface unless it is desired to increase the amount of surface soil, then a slight depth, say an inch may be brought up each season until the desired object is attained. But it is well to have the sub-soil stirred once in four or five years, especially if it is of a very stiff and retentive nature. This operation is called sub-soiling and is done with a sub-soil plow which is very simple in construction and strong. It loosens the sub-soil without bringing it to the surface following in each furrow after the common plow has preceded, therefore the work must be accomplished while the regular plowing is in progress. This operation is especially beneficial on soil intended for root crops, mangels in particular having long roots, it gives them an opportunity of penetrating in lower soil and feeding therefrom to some extent. Sub-soiling should always be performed in the spring or else the late fall rains and spring floods will pack the soil nearly as firm as before. (1)

In conclusion a word may be not out of place as regard the kind of plow to use. We have a great variety of plows made in Canada but perhaps for fancy work on sod there is no plow which can compete with the old iron Scotch plow as has been proved at all plowing matches of any significance in Quebec or Ontario during the last twenty five years. But since so many different appliances have come into use for working the soil it does not make very much difference how the plowing is accomplished so long as it is done fairly straight and laid up at the proper angle to give the best results. (2)

A QUEER DOG.—A friend of ours, who lives in Lincoln Avenue, has a magnificent black spaniel, with a perfect curly coat, which, strange as it may seem, is very desirous of keeping free from spot or blemish. To this end, Jack, as the spaniel is unequally called, refuses to eat his meals until his ears are carefully fastened behind his head by means of a clothes-pin! A fact, parole d'honneur, foi de gentil-homme.

AGRICULTURE IN THE SCHOOLS.—The Rev. Brother Théon, of the order of the Brothers of Christian doctrine, whose provincial house is at Laprairie,

(1) True only on un-drained land.—Ed.
(2) No work so perfect as that done by the two-wheeled ploughs of Ransome, Howard, and others. Any boy of 15 years old can hold them, if once properly set.—Ed.

has sent us an admirable book, intended especially for the schools of his order. We know that the Rev. Brother Abel, of Ploërmel, France, submitted this book to the "Society of the Farmers of France," which, after having carefully examined it, greatly approved of it. Since that time, the book has been entirely remodelled to adopt it to Canadian usage, and the illustrations are suited to this country. In short, the book seems to us to be a model of what such a work should be, and absolutely unique of its kind.

Messrs. Beauchemin, Bros., of Montreal are the publishers: price, 15 cents. From "L'Journal d'Agriculture."

At the request of the Department, we revised the above work, and can honestly say that it is likely to prove of great utility to any school into which it is introduced.—Ed.

The annual meeting of the American Southdown Breeders' Association was held in Springfield, Ill., May 27th, Mr. J. H. Pickrell, presiding as president pro-tem in the absence of president John Hobart Warren of New-York.

The financial and other reports of the Treasurer and Secretary show the Association in good condition, and that Southdown breeders have reason to expect that this breed will be in great demand because of their superiority of mutton, and of their ability to impress their good qualities upon other breeds thus making the sort of sheep that our mutton markets now require.

The report of the Committee awarding Mr. Geo. McKerrow, Sussex, Wis., the fifty dollar Gold Medal for making the largest score in exhibition at Fairs in 1895 was approved.

A committee was appointed to formulate the offering of a Gold Medal for exhibitions in 1896, and for Special Premiums at the Tennessee Centennial in 1897.

The selection of two rams from the flock of Mr. Geo. McKerrow, Sussex Wis., for use in a test between Southdowns and Dorsets as to earliness and quick maturing of lambs for market, to be made by Mr. G. M. Wilber, Marysville, Ohio, was approved.

Mr. C. H. Nimson, Cranberry, N. C., presented a valuable paper on the Characteristics of Southdown Sheep.

The following officers were elected: President, L. S. Rupert, Bloomington, Ill.

Secretary, Jno. G. Springer, Springfield, Ill.

Treasurer, D. W. Smith, Springfield, Ill.

Directors, Geo. McKerrow, Sussex Wis.

L. M. Crothers, Crothers, Penn. F. W. Barrett, Wadsworth, N. Y.

J. G. S.

ENEMIES.

Weeds—Fungi—Insects—Means to destroy—Necessity of prompt action &c.

"A man's worst enemy is often himself."

At this season of the year the farmer has many foes to contend with, and if he does not fight manfully against them, they will get the upper hand and he will have himself to blame.

It will be opportune at this time to consider what these foes are and how they may be conquered or rendered comparatively harmless. First, noxious

weeds; we must not wait until these have marshalled all their forces and are in battle array, but attack them while they are yet weaklings. Finely, earnest, thorough, careful and complete eradication of the growing crop is our best resource as to the embryo weeds which will grow up and choke it if neglected.

But some weeds require more patient and laborious effort to eradicate them. For instance the field thistle "*Carduus arvensis*," called here, and by our neighbours across the line, the "Canada thistle," why, I am at a loss to know, for many a hard day have I spent when a youth in old England "spudding" thistle, and many an acre of them have I seen in New-England, or why poor Canada should have such a troublesome child mothered upon her I cannot conceive.

In our pastures, meadows, and grain crops, where they abound, no more effective means can be used for their complete annihilation than the spudding I mentioned. If we take an instrument called a "soud" which is a chisel about 1½ inches wide fixed on to a hoe handle, and with this cut the plant just below the crown of the root we shall have no more trouble, because the root deprived of its top will perish.

This may be considered in these fast times a slow and tedious operation, but it is the best means of utterly and completely destroying the pest. The root-stalks will not grow without the top but if any part of it is left it will; hence the necessity of cutting them below the crown which the scythe will not, therefore mowing them to prevent their seeding is not nearly so effective as "spudding"—Docks, burdock, Bull thistles, and the like, can be destroyed in the same manner. Charlock, or wild mustard, "*Sinapis arvensis*," can be got rid of by preventing its going to seed, and it is unpardonable to allow this to take place, for soon a whole neighbourhood will be over run by it. Couch, grass, or sometimes, it might seem, appropriately, called devil's grass (*Agropyron repens*)—is perhaps one of the most tiresome and persistent weed-foes we have to fight. Every particle of the root left in the soil will grow and develop into a perfect plant with amazing rapidity, and if not checked, will soon take the place of any other crop. Alternate cropping with cereals, legumes, or roots, thorough summer cultivation, and planting a smothering crop are the best agent, for its eradication.

Fortunately, it cannot grow without sun light, and if we plant a crop that will entirely overshadow the land we can destroy it completely. I have entirely succeeded in doing so, in one case by a crop of "corn" and in another case with a crop of tobacco, I had a good crop of each, by keeping a little space round each plant quite clean until their leaves overshadowed the soil and although the piece was a complete mass of grass, and rendered quite useless until that was removed, when the crops were taken off in the fall not one particle of the couch was alive. Ox-eye daisy, "*Chrysanthemum leucanthemum*," a terrible pest in some localities, is often supposed to be bought mixed with grass or clover seed.

Hence the necessity of dealing with a conscientious, trustworthy seeds-man, and not buying an article because it is cheap: dirty seed is dear at any price. This daisy is a perennial, propagated by root-stocks and seed, and it is difficult to exterminate, but this may be accomplished by cutting before the seed is ripe; thorough cultivation and ex-

posing the roots to the action of frost will destroy it. The annual weeds such as Lambs quarters, "*Chenopodium album*," purslane. "*Portulaca oleracea*," Groundsel, and the like are all easily killed, by close and persevering cultivation. Sorrel, sheep sorrel, or sour weed, "*Rumex acetosella*," soon makes its appearance on light sandy soil, and pastures where it abounds can only be cleared of it by good cultivation and planting a smothering crop. But, after all it is doubtful whether these enemies which can be seen and described are any more dangerous than the vegetable organisms which are so minute as only to be visible with the aid of a powerful microscope. Our worst foes are those which are insidious in their attacks and work in the dark.

Thanks to scientific research and observation, these too are now, to a great extent, defined and understood, and with a knowledge of their habits comes also a knowledge of the means by which they may be rendered comparatively harmless. We know that mildew, rust, blight etc., are caused by the action of microscopic fungi, and we know too that these may be killed by the application of certain caustic poisons to the growing plant. Of these the most effectual is the formula called Bordeaux mixture which, if properly prepared and faithfully used will prevent injury to all crops affected by fungi. The experiment Station of Vermont has paid great attention to the prevention of plant diseases, and the results of their experiments for several years have been most instructive and interesting. The last Bulletin is full of most useful information on these subjects, especially as regards the potato rots, about which several new discoveries have been made, amongst them the fact that two distinct species of fungi injure the potato crop, namely the "*Macrospermum solani*," causing the early blight, damaging the leaves but not the tubers, and the old potato blight "*Phytopthera infestans*," which destroys leaves, stems, and tubers. These diseases, which have caused the loss of millions of dollars, have been prevented by the use of Bordeaux mixture. But it is now proved that to be perfectly effective it must be used quite fresh and the formula changed a little: thus—6 pounds copper sulphate and 4 pounds fresh lime to 40 gallons of water. This is now adopted as the standard article. The most important experiment I copy from the Vermont Bulletin.

EXPERIMENT WITH POTATO DISEASES AT BURLINGTON VERMONT 1895.

Every third row were left untreated as a check row.

11 rows treated with Standard Bordeaux Mixture.

4 rows treated with test Bordeaux Mixture.

2 rows treated with Stock do. made sometime previous.

3 rows treated with Bordeaux powder.

2 rows treated with a new mixture called fungroid.

RESULT

	Yield per acre in bushels	Large sound tubers	Large rotten tubers
Standard B. Mixture	365	57	
Test B. Mixture	332	74	
Stock B. Mixture	307	100	
Bordeaux powder M.	235	177	
Fungroid	210	151	
Check row not treated	170	159	

Some of the farmers I had the pleasure to address last spring, adopted my advice as to the use of this fungicide, and, they report, with most satisfactory results. If a man neglects to use remedies which are proved beyond all doubt to be efficient, he is his own enemy. Then, the insect world furnishes another lot of foes to battle with, such as the potato-bug, flea and other beetles, caterpillars, and worms and for all these which eat or chew, we have an unfailing specific in arsenical poisons. Paris green, London purple, hellebore powder and tobacco; while for those which only suck the juice from our plants we have petroleum, but this has to be made into an emulsion as follows:

$\frac{1}{2}$ lb hard soap—1 qts Boiling water
4 qts coal oil, churn together for 5 to 10 minutes until like cream, then add 10 to 20 gallons of water, according to strength required; spray with this, and it will kill all the "suckers" it comes into contact with. The same mixture, with the addition of 2 oz. of carbolic acid, sprayed over the cattle is said to prevent the annoyance caused to them by the "horse-fly". With these facts before us, we shall be guilty of neglect if we do not adopt the means suggested and proved to be successful. It seems preposterous that a farmer should do all he can, up to a certain point, to secure a good crop, and at last to refuse to take precautions to protect it from its enemies; and yet there are such. I am told: "I have no time". It will not pay" It is a new fangled experiment. "I don't understand it." To such I would say: why plant the crop if you have not time to attend to it? Will it pay to lose the crop after all the trouble and expense it has already cost? It is not a new fangled experiment but a fact proved and demonstrated all over the world. If you don't understand it, learn; you have ample opportunities at this day of doing so through the press. Agricultural experiment stations etc. Where there is a will there is a way. The man who despises advice is a fool and he who neglects to fight against the common enemies of the farmer is unpatriotic, because he is not a good neighbor, and, is a worse enemy to himself than all the weeds, fungi or insects, that he has to encounter.

GEO. MOORE.

The Poultry-Yard.

The months of hot weather—Treatment of the older and younger chicks—Safeguards against the lodgement of lice—The laying stock and how to bring on an early moult.

(A. G. GILBERT)

The month of July is one of the hottest months of the year and at this time the farmer's hens are generally to be found running at large. It is well that they should have extended runs, for the fowl house, in most cases, is in a filthy condition and reeking with a pestilential odor. It is unnecessary to say, that in such cases his poultry do not pay the farmer. Dirt and success seldom go together. If the farmer cares so little for his poultry that he will not take the trouble to keep his fowl house clean, it is evident that he does not wish to make them revenue producers.

But, all farmers are not indifferent as to the money making value of the fowls, and for such there is work to be done in the present month. What is that work? It may be stated as the care of the young and the older stock. Where chickens have been hatched out late, and are yet tender, they require, in this hot month, to be given shade and to be kept free from lice. The May hatched chicks are by this time of goodly size and making rapid growth, or ought to be so doing. If they appear stunted in anyway, or seem to suffer from diarrhoea, look out for lice. If the little ones go peeping about, with wings inclined to droop, and are generally emaciated looking, ten to one their ailment is lice. On looking over a flock of chickens, the expert poultry man can at once tell; from their appearance, how they are fed and cared for. Lice infected, or infested, chickens present the appearance of suffering from all the ailments known in poultrydom. A good dusting of Carbolic acid disinfecting powder, well rubbed into the feathers and fluff of the older chicks, will soon give them relief. The little ones require to be more tenderly treated, for what kills the lice, in their case, very often kills the chick too. It must be remembered that it is easier to prevent the lodgement of vermin, than to rid the chicks of their presence. The work of prevention should commence with the sitting-hen, and every effort should be made to have her body free of insect life when her brood is hatched, and is entrusted to her motherly wings, under which they will brood for so many hours of their first few days of life. A good plan whereby to prevent the lodgement of lice on the chicks is to rub the body of the mother hen with a cloth or sponge dampened, not wet, with coal oil. Rub well under the wings and into the soft fluff feathers, and among the neck feathers of the fowl. Lice cannot stand coal oil, or the fumes of it. The little chicks nestle in the feathers of the mother hen, and their bodies are kept free from the pests. It must be remembered that care should be taken to only moisten the cloth or sponge, and not to wet the feathers of the hen with the oil, or it might affect the chicks. In the April and May numbers of the "Journal of Agriculture" full instructions are given as to the proper care, management and feeding of the young chicks and the sitting hen. The early chicks do not seem to be affected so much by lice, but June and July chicks require special care to guard against their insidious enemy. Hence, we have always urged farmers to get our their chicks early, not only for the reason given, but also that his cokedreds may make early market fowls, so bringing high prices, and his pullets make early layers.

CARE OF THE OLDER BIRDS

What care do the older stock require? Well, it should be the aim of the progressive farmer to look carefully over his laying stock. His object should be to have his hens over their moult as soon as possible, and go into winter quarters in such fine feather and condition, as to begin egg production at once.

In looking over his laying stock, care should be taken to weed out all hens over two years of age. The old hens moult late and do not begin to lay until late in the season. If possible, let the future winter layer have a run of the fields where they can have free access to the different clovers and grasses. If they cannot have such

freedom, supply them with such food three times a week, at least. At the close of the breeding season, separate the male birds from the hens. About the beginning of the moulting period egg production will slacken off. At the beginning of August, give the hens a soft morning ration mixed to a crumbly condition, three times a week. Give a night feed of cut bone, at noon, three days in the week, and, on other days, at that time, a light feed of outs. For last ration, give grain of any sort, but avoid the feeding of Indian Corn to Plymouth Rocks, Brahmas, Dorkings, and Javas. With such treatment, the yearling and other hens will shed the old and get their new feathers at an early period. The aim should be to get the laying stock into winter quarters in proper condition. While the feeding is generous, care should be taken not to get the layers overfat. At this season, the mistake is often made, even by those who ought to know better, of getting their prospective layers out of condition by overfeeding. It is better that the laying stock should go into winter quarters on the thin, rather than on the fat side. With a good strain of the ordinary farm-yard fowls, that is, a strain with a dash of thoroughbred in them and of the proper age, the farmer should have no trouble in getting them into winter quarters in proper condition, and laying when eggs are worth from 35 to 45 cents per dozen in Montreal.

Again, I hear the plaint "Oh! all that requires experience and expenditure of time and money". Again, I reply, that the different departments of modern, progressive farming can only be successfully prosecuted by a thorough knowledge of details. Experience must be gained, sooner or later, and it can only be had in time, and time, we are told, is money. Brains, energy skill, experience are all required to make mixed farming a success.

PRACTICAL AGRICULTURE.

(By James Dickson)

Hay making—Saving grass seed—"Dont's" in brief.

(In last issue please read ten dollar-note in place of two dollar-note.)

HAY-MAKING

It is generally conceded that the nearer the consistency of Hay to that of grass, the more perfect the quality of the Hay; that a great proportion of ripe hay cannot be digested by an animal, and consequently cannot be assimilated by the system; and that hay that has been wetted to the loss of its beautiful green, has lost much of its nutritive and digestive qualities.

Those who can look back 40 or 50 years can remember that the quality of hay as generally made, was much inferior to that of the present day. They can also remember that the hand labour necessary made it a tedious and wearying time of excessive labour. Nearly 50 years ago, I went to the U. S. One of the purposes being to learn something of more advanced Agriculture. In the one haying season I changed places three times, as I could not believe they were all alike in their system of work. The regular time to commence mowing was just before the largest stars had disappeared, stopping as few minutes as possible at 6 for breakfast,

at 11.30 for dinner and again at 5 for tea, every man being at the utmost tension of his system throughout the whole course of the day, and even at the eating table.

The farmers of the present day cannot estimate the difference in the severe labour of hay making by hand, and that of the present day. Over 30 years ago I bought one of the first three mowing machines sold in the Township that season, (1) and since that time, although machines are a great deal better now, and for half the price, hay-making has had all the pleasure, with less hard labour. I am certain that if some of our spruce young farmers had a few days in a gang of mowers; if they would industriously work at the stumps and stones of the buck field, getting it ready for the machine; they would have more sympathy with the humilities of the "old folks," and respect for the memory of those who did pioneer work from the first click of the

ave
"Make hay while the sun shines" is often quoted. But this is not a surprisingly wise injunction, the great difficulty being to make it when it does not shine. (1) In old times of hand mowing there was little stop to the work of cutting, even in dull weather. But in modern haymaking, the closer the rake can be kept to the mower, and the waggon to the rake, the better for the hay, and the more economy in labour and time. Another great difference between the old and the new systems of haymaking is, that now it is cut in better time, and it is not handled so much, and then does not appear to be so much necessity for, nor benefit from, cocking hay, and although hay in hand-mowing seemed drier, even to crackle, it did not keep so well as it does at the present day. The reason is obvious, and applies to handmowing of swales etc., at the present time. In cutting with the machine, it is spread evenly on the ground, and is at once drying, the sun and wind surrounding and extracting the moisture from each separated stem. And, contrasting that with the fact that the swaths were rarely begun to be shaken out before 10 o'clock, and then were not spread in the even manner the machine leaves it, it was thus imperfectly and unevenly dried, the top being sometimes too dry, before that underneath was even wilted. This made cocking hay a necessity, to allow the dry hay to absorb a part of the moisture from the damp portion, making further curing an easier matter, and an even quality of hay.

The time for cutting each farmer must decide for himself, the object before us being, to finish before the last is too ripe. In this he has to consider the amount of help and hay, and, what is more difficult, to allow something for dull weather. Clovers, coarse grasses, and swales come in for first attention, after that old meadows, and then timothy for the horses, which can generally stand until about the first of August, sometimes longer. I well remember the old Irishman's rule, at the time of the St-Lawrence and Atlantic R. R. building. He was uneducated; knew nothing of science; but my experience has satisfied me that he was right. He wanted what he called "strong hay", hay that was raised on well fed clay

(1) In 1851, the Editor bought the first "McCormick" mower brought to England.

(2) Little sun and a fair breeze makes better hay than too much sun and still weather.—Ed.

loam, timothy well saved, and from which the seed could be rubbed off with a little difficulty. He claimed that in this state there was "more work in a horse" (i. e. bone and muscle forming food) with fewer oats. He knew something about it, for I never saw six better horses on a public work, more especially owned by one man. This rule also applies to growing colts. And as cattle prefer earlier cut hay, and eat other kinds well, and as sheep would actually starve on such hay, the advantage of keeping the different qualities of hay separate cannot be too forcibly impressed. To attain this end in the same barn, it will be found that partitions as high as the beams are a great advantage. A timber across the sills, and one over the beams or plates, and boards or poles, nailed perpendicularly to them, will fully answer the purpose; will save use of hay-knife in winter, and will also furnish a vent for overfermentation. It will be found that when the boards are separate more than a foot or so, the hay will often bind and trouble more than the extra cost of putting them closer. If the hay is not perfectly cured, sometimes where the pitcher stands (he should not stand in any particular place) the hay will threaten to mowburn. In this case a smooth pole with a long sharpened point can be driven down to make a vent, replaced and drawn up as the filling proceeds.

The ladders at the ends of the hay-rack, which has been used in the French country since my first remembrance, very generally supersedes all other styles, and the use of them cannot be too highly commended. With this, if a hay fork is used to unload, a third hand can load quite well with a little suggestion and placing by the pitcher. In such case I have used a third ladder midway of the rack, to avoid the bad work of the loader, and prevent the extra straining of the horse in pulling apart. With the old style rack and hand work, the best hand ought to be on the waggon, as two pitchers can be used to supply him, one of whom can be left on the field while the other mows away the hay. One of the pitchers ought to be ready to sometimes lead the horses forward by grasping the reins underneath the neck of the horse nearest him. (I am not now referring to where it is necessary to go over an acre for a load of hay.)

There is a great art in laying the load to allow of easy unloading. This however commences at the making of the tumbles, any one can make a bunch of hay, but to make a tumble, some science is required. Roll up part of a forkful, step forward, break the windrow, and taking sufficient to finish the forkful, with an artful toss, using the back of the fork, it is tumbled atop of the other. In doing this, keep the tangle ends up, and if you have not made a perfect tumble, give it another tumble with the back of the fork. The windrow ought to be heavy enough to allow of making two tumbles near each other, thus making fewer stops with the team necessary. If properly made, and the pitcher turns his fork when placing it on the load, and the loader understands placing them without pulling them apart, no more than one in a place at a time, and in regular order, he will pitch them off almost as easily as tied bundles.

I have omitted in the proper place to say that, for unloading with a horse fork, the loading must be done quite differently to that which I have just described. The loader must build the load in 2 parts, each perfectly separate, by keeping one always higher than the

other, unless a midway ladder is used. Also, the hay must be spread about over the whole half, so that it can be held by the fork, and completely unloaded. In regard to the economy of using a horse fork, with two good men the advantage of one in saving time is not of much account, until the mow is above the hay-rack. With young hands however, where the labour is considered, it is of great service, and for packing in the roof of the barn it almost indispensable.

SAVING GRASS SEED

There is much inferior grass seed put upon the market, and as long as it is bought by farmers, even at a low price, it will be produced for their use. And a farmer cannot make a worse investment, than in sowing dirty seed of any kind, and more especially grass seed. At the usual price of grass seed, and the price of other produce that the farmer must sell to buy it with, it pays every farmer to save his own grass seed. For those who require only a small quantity, it will be more perfect if cut with the sickle, tied with old binder strings, set firmly on end, and allowed to become weather beaten sufficiently to allow the seed to be beaten out. The most economical way of doing this, is to draw a drag from stook to stook, upon which is a tight box 3 to 4 feet square. Upon this place a half box, round side up, and with a stick in one hand, and the bundle in the other the seed can be readily separated from the straw, which ought to be scattered on the ground, as it is not worth barn room and unless carefully rotted, ought not to be used as bedding. The stubble ought to be immediately cut and housed.

Our difficulty in saving grass seed, is the separating the seed from the chaff. With a proper machine this is easy, but few small farmers own one.

In olden times, much of the grain of all kinds was cleaned with the wind, and with a steady, constant breeze it is a simple matter, the hand being held higher or lower according to the strength of the wind. It will fall upon the sheet in three undefined grades, nearest the wind will be the heavier, and clean seed which ought to be immediately bagged. The lighter chaff can then be carefully separated from the lighter seeds, amongst which are some heavy seeds, but not separated from the chaff enclosing it, this again goes through the same process, and again if necessary, observing that, if it is for hand sowing it is not necessary that it be particularly free from chaff which contains seed, and for machine sowing, it can be put through a fine sieve: a flour sieve answers very well.

DON'TS IN BRIEF FOR HAYING

Don't sit on the ground while warm or stop working while in damp sweaty clothing, and then complain of feeling "kinds' stiff."

Don't overwork. It is the even gaited steady horse that covers the most ground in a week, or month, and it is the little extra beyond his endurance that breaks him down.

Don't forget that it is just the same with a man.

Don't forget after the dew is off to pull off the 4 lbs boots and put on a light pair of anything that will keep your feet off the ground "Light footed quick footed."

Don't forget that sunstroke, so called, is caused by an overheating of the system. Put on a felt hat, closely woven clothing, a big pair of boots

outside your trousers to prevent the air from ascending, go to work, and especially if you are unwell, or in an exhausted state, you are in a fair way for a sunstroke.

Don't work all day in woollen clothing, and at night sleep in cotton sheets, else, in time you may feel rheumatism creeping through the marrow of your bones. And

Don't begrudge the trouble of changing your clothing to suit the weather.

FARMERS' SYNDICATE

OF THE PROVINCE OF QUEBEC, Office: 23 St. Louis Street, Quebec.

President: His Grace Mgr. L. N. Beign.

General Secretary: Ferd. Audet, N.P.

Treasurer: P. G. Lafrance, Cashier of the National Bank.

Farmers, Agricultural Clubs and Societies can be supplied with every thing they want, viz:

Pigs: Chester, Berkshire, Yorkshire, &c., &c.

Cattle: Canadian, Ayrshire, Jersey, Durham, &c., &c.

Sheep: Shropshire, Lincoln, Oxford, Cotswold, South-down, &c., &c.

Fertilizers and agricultural implements of every kind. Send in your order at once for feed-cutters. Farm products of all kind sold for our members. Informations of all kind given to members.

LONDON MARKETS.

Mark lane: Prices current; June 8th	
Wheat, per 504 lbs.; British.	s. 8.
White	27 20
Red	26 28
London flour per 280 lbs.....	25 --
Grinding	13 22
Oats, English per 8 bushels....	15 26
White pease	32 38

FOREIGN

Wheat—Manitoba	27 20
Canadian white pease.....	27 --

Milch-cows, per head., £28.

BEASTS.

Scotch	4 6
Herefords per stone of 8 lbs.....	4 4
Welsh (runts) per stone of 8 lbs..	4 2
Shorthorns (runts) per tons of 8 lbs	4 2
Fat cows	3 6

SHEEP.

(Shorn.)

Small Downs per stone of 8 lbs...	5 4
Half-breds and Scotch per stone of 8 lbs	5
Lambs per stone of 8 lbs.....	6 8
Calves per stone of 8 lbs.....	4 8
Pigs per stone of 8 lbs.....	3 4

BUTTER.

Fresh, (Finest factory) per doz.	
lbs	11 12
English Dairy-butter fresh.....	10 1
Irish (creamery).....	9 0
Danish	9 2

BACON.

Irish	42 54
Canadian	40 42
American	48 50
Irish, small	84 90
Hay, per load of 2016 lbs.....	
Prime meadow	84 90
Prime clover	90 95
Straw, per load 1296 lbs.....	32 31
Best	40
Hops from 20s. to 70 per 112 lbs.	

FOREIGN OPINION of the VALUE of the WOEK of CANADIAN EXPERIMENTAL FARMS.

In a letter recently received by Dr. Wm. Saunders, Director of Experimental Farms in Canada, from the Hon. Charles Robinson, Minister of Agriculture for New South Wales, Australia he says:

"Please accept my thanks for the publications issued by your Department, which have been duly received. I have read a great deal upon the subjects dealt with, and in my judgment the treatises issued by your staff, even after making every allowance for difference in climate, are the most practically useful of any which I have seen. I should be glad if I may continue your debtor, for future Experimental Farm Reports."

Notes by the Way.

POTATOES.—As potatoes were very low-priced indeed last winter and spring, it is pretty certain that many people will avoid embarking largely in their cultivation this season; so there is a fair chance of their fetching a remunerative price next winter. It is a curious practice in this country, that of "dodging the markets". If wool is cheap, the farmer sells off his flock, to buy again when wool is dear and therefore sheep are costly. The English plan we think is a better one: keep to the rotation, and plant or sow such crops as, on the average of years, have proved the most profitable. Above all things, remember the advice of the Hon. J. J. Ross, of St. Anne de la Pêrade; that it is not wise to put all your eggs into one basket; the correctness of which, as applied to agriculture, is fully proved by the present state of the cheese-trade. We think we remember giving the same warning to the farmers of Maskinongé country when lecturing there in the spring of 1887.

SOOT.—Many people, visiting the neighbourhood of London, for the first time, are surprised by the early growth of the grass as compared with other parts of the south of England. Of course, the temperature of the vast city has something to do with this abnormal precocity, but the main factor is the quantity of "soot" in the air, the greatly preponderating fuel used in the thousands of chimneys being soft coal.

AGRICULTURAL HELP.—The aid to agricultural progress afforded by the government in England and Scotland is not ruinous. The whole sum expended for that purpose, in 1885, was only 80,000—\$388,800. In the case of Ireland, though, very much more was needed, though, at present, we have not the full returns.

SULPHATE OF AMMONIA, at Liverpool, is now selling for £8 a gross ton! That makes, at 20 p. c. of nitrogen, the price of that manurial constituent less than 9 cents a pound. Here we see, the value quoted by the Stations is 14 cents. Superphosphate, of ordinary quality, containing, that is, about 13 to 14 p. c. of phosphoric acid, is purchasable, at the same port, for £2 the gross ton \$8.50 for our ton of 2,000 lbs., say, 3½ cts a pound for the

Phosphoric acid. So an excellent dress for Sweden only costs in England 550 lbs of superphosphate. . . . \$1.30
100 lbs sulphate of ammonia. . . 1.75

\$3.05

What would the same fertilizer cost here?

LUCERNE.—As we mentioned in our list, the Lucerne on the strip of stony land by the side of Mark street, Montreal, had made a growth of 29 inches by the 15th of May, and was quite fit to cut for green-meal. It had "gathered" together wonderfully, considering its position, and there were quite 8 tons to the acre. What other plant is there in the country that will give such an early, copious yield as that?

LUCERNE IN GRASS-MIXTURES.—Many of our readers will remember the well managed farm of the late Monsieur Casavant, at St. Hyacinthe. When we were inspecting the farms of that district, in 1887, Monsieur Taché was good enough to drive us over to the place in question, and then we saw, for the first time, lucerne growing among other grasses, though its chief companion was red-clover. We made the following remarks upon the plant, in the No. of the Journal for April, 1887, p. 54:

A patch of lucerne looked as if it had done its work, and will, I suppose, be broken up for oats shortly. It will not stand out long in this country, that is evident, but, with proper precaution, should be tried on all sound, dry, deep soils. My curiosity was gratified in one respect; there was a piece of lucerne and red-clover, sown together, and a good lesson it taught to all who would take it in. The crop had been cut once, and now the clover was just starting to grow, while the lucerne was 9 inches high, and just coming into bloom. By the time the clover was fit to cut the second time, the lucerne would have formed its seed, and be of no more value than so much wheat-straw. If we are to mix our crops, we must select such plants as grow equally and mature at the same time.

LAWES ON LUCERNE.—Sir John Lawes, in the same year 1887, was good enough to give us his opinion on the subject of mixing lucerne seed with other plant-seeds for permanent pasture:

DEAR SIR,—I consider that in laying down land to permanent pasture it is advisable to sow, with the perennial seeds, a certain quantity of annual and biennial grasses. It is quite true that, if the soil is in very high condition, at the time of sowing and an abundance of manure is used during the first year or two, perennial plants may give at once a fairly good pasture, but such is not the ordinary state of land when laid down. Lucerne should always form a portion of the seed sown. Of all the plants known to me, lucerne is the one that yields the largest amount of nitrogen where none has been applied in manure; it also sends its roots deeper into the subsoil than any other plant. (1) There is a field in my neighbourhood that was sown with lucerne 20 years ago; not being clean, it almost at once became covered with couch-grass and other weeds. These, however, have not been able to drive out the lucerne of which there is still a considerable quantity on the land.

(1) Of course Sir John Lawes means grass-plants. Hops go down 20 and 24 feet.—Ed.

It will be observed that, in the above two opinions, Sir John Lawes is speaking of permanent pasture, which is of course to be kept grazed at, probably, intervals of a fortnight, while we ourselves were speaking of clover and lucerne for hay not meant to stand more than a couple of years or so, which makes all the difference.

HORSE-BEANS. The English bean—"faba vulgaris equina"—seems to be unknown in the United-States; at least, "Hoard's Dairyman" says that it was first brought to notice on this side of the water, by Prof. Roelet, in his effort to make a balanced ration from silage, composed of maize, English horse-beans, and sunflower heads. Now, we ourselves grew horse beans in the Townships at least 13 years ago, and we believe they had been grown on the Island of Montreal many years before that. As for their being "about three feet high," as "Hoard" says, we have seen them, on our low lying alluvial soils in Gloucestershire, quite seven feet in height, and have known them yield as much as 80 bushels, of 68 lbs. each, to the acre. As a rule, unless they can be got into the ground by the end of April, they will rarely do much good, as the "black-fly" plays the mischief with late sown beans. They take a long time to ripen thoroughly, and unless the autumn is dead ripe and black, they are very apt to mould in the stack or barn-bay.

Three kinds of these beans are commonly sown in England: the tick, the harrow, and the pigeon-bean; of which the last is the smallest in yield, though the best in quality. As, in England the bean is usually sown in February, and harvested in September; frequently not till October,—it will be easily determined by any one desirous of trying this most valuable crop, whether there is a probability of its arriving at maturity in his climate or not. Beans should be sown in rows about 24 to 30 inches apart, depending upon the habit of the sort chosen, and 2½ to 3 bushels an acre will not be too much seed. (1)

BUTTER vs COD-LIVER OIL.—Of all the horrid flavours extant, commend us to the flavour of cod-liver oil! Now, it seems, according to the "Nor-West Farmer," butter is prescribed by medical men as a means of "lubricating" the human machine in the case of young people, growing quickly, of nervous invalids, and of all who suffer from wasting diseases such as influenza. A quarter of a pound of good butter (we wish we could get some), spread upon very thin slices of bread, can be taken with ease in the day by a patient who cannot digest cod-liver oil, and is now ordered with the best results.

LUCERNE.—Mr. W. W. Everett, in the "Farmer's Advocate," recommends lucerne as being "green" when all other pasture was dried up. Excellent as a soiling crop, furnishing an abundance of very nutritious food. It makes the finest hay I ever fed to stock, there being no waste whatever, if properly cured. Cut when about half the bloom is out; do not let it get too dry before raking; put it into small cocks, and let it stand as long as the weather will permit. We never made lucerne into hay, as it always was needed for green meat, but Mr. Everett's advice is quite

(1) Stephens recommends 4 bushels to the imperial acre.

right as to cutting it early, even before the bloom is expanded.

RED-CLOVER.—People in the States are still recommended to sow clover every three years; they will be truly sorry before long if they follow this advice. The year 1895 was very unfavourable for getting what is called a "catch" of clover, and every reason is now assigned for its failure except the true one:—The plant too frequently repeated on the same land.

RAPE.—This plant is said by some to be an exhaustive one; but we quite agree with the editor of the "Farmer's Advocate," that a plant "that will readily appropriate what we give it in the form of manure affords us an opportunity of making the best use of the soil." Now, think a little; and you who read this will see that if rape is fed off on the land by sheep, each sheep daily receiving, say, a few pease, and oats, or a half-pound of cake, with a trifle of clover-hay and pease-straw when the cold nights begin—i. e. from Michaelmas to the end of the season—the exhaustion of the soil by rape-growing cannot be a very rapid process. And this system, that of feeding sheep on the land to consume the crop, is the real and genuinely remunerative means of utilizing this plant.

But why does our contemporary advise the sowing of 2½ lbs. of seed to the acre in drills 26 inches apart? One pound, or a trifle more, is quite enough for drills at that distance, as no one wants to have the trouble of singling rape; but, depend upon it, if the land is in good heart, and not foul with couch-grass, a broadcast sowing of 6 lbs. to the acre will prevent any other weeds from showing their heads. If a heavy rain-storm occurs when the rape is up, a couple of strokes of the harrows, along and across, after the land is quite dry, will prevent caking and send the plant along wonderfully fast.

A correspondent of "The Advocate" wishes to know if "lucerne will flavour the milk". As we passed some six months with a farmer who kept 20 cows for the milk-supply of Brighton, England, and who never had less than 20 acres of lucerne; cut green for his cows; we can answer the question pretty positively: there is not the least danger of the flavour of the milk being affected by lucerne any more than by clover. Why should there be? If Mr. Ault, the enquirer, found the milk of his cows tainted, he may depend upon it there was some deleterious weed growing in the same field as his lucerne.

BAD ADVICE.—Mr. F. D. Burtch, in "The Farmers' Review," in an article entitled "The way to grow all kinds of roots," says: "Plough under all the manure in the fall you can. Then plough deep in the spring." A most erroneous idea. All deep ploughing should be done before winter, particularly on clay soils, that the frosts and thaws may have a fair chance to pulverise the land thoroughly. And what on earth is the English of the following language? "As soon as the land is in good condition in the spring plough and drag. Then back farrow into a dead furrow. Catching your eyes in a spot on the corner, and holding it over the furrows, the horse walks in them back on the other side. Let the driver walk

in the furrow" while harrowing. "Go over it three or four times, and all the lumps are in the ditch, the ridges will be a nice oval, and the fine soil on top will be firm. What does it all mean?"

THE TRUE DOCTRINE.—But some one may remark that if the Canadians make a better and more honest cheese they deserve the trade. So they do; but let no one make the mistake of assuming that this Canadian honesty is of a perfectly spontaneous character, and that it exists in defiance of the tendencies of unrestricted competition, for such is not the case. Canadian cheese remains good and pure because, in defiance of the tenets of laissez faire, the use of adulterants has been absolutely prohibited. If, a cheese maker in Canada attempts to get the better of his competitor by doctoring his product with lard or cotton seed oil his whole stock is at once seized and he is heavily fined. Under such circumstances Canadian cheese remains pure.

If we wish to regain our lost trade and provide domestic consumers with decent cheese we must eschew the English free-trade example and imitate that of Canada. It has been conclusively demonstrated that competition cannot satisfactorily regulate trade; on the contrary, it promotes the class of evils complained of. The only efficient regulator of trade in the interest of both producer and consumer is the rigid enforcement of a system which will not permit adulteration for the sake of reducing prices.—"San Francisco Chronicle."

SPONTANEOUS COMBUSTION OF CLOVER-HAY.—A novelty in the States, it seems, is the spontaneous firing of hay carried too green! Why, in England, we farmers had a common saying that if a man did not burn a stack down once in four or five seasons, it was a certain sign that he always over-made his hay.

This was, of course, an exaggeration; but we have seen dozens of stacks—hay is never put into barns there—overheated, and that on the land of some of the best hay-makers in the neighbourhood of London. To speak frankly, all the clover-hay we see here has been allowed to stand too long before cutting and has been made too much. How often do we see, in the agricultural papers from the States, statements about mowing clover in the morning and putting it into big cocks in the evening to be carried the next day! Even with our hot sun, no clover cut in the flush of its vigour, as it should be, can be fit to carry till the afternoon of the fourth day: cut Monday after dinner, carry from the cock, without shaking the leaf off by turning, on Thursday afternoon.

They had not long ago, at the Pennsylvania Experiment Station, an experiment with the fact that a fire may be started spontaneously in a mow of clover hay. The details, as given to the press, by Prof. Armsby, have been summarized as follows:

The spontaneous combustion occurred in the bay over the college barn. The bay was 18x23 feet and 23 feet high. The floor was of two thicknesses of wide inch boards, so placed as to break joints perfectly. The sides were of matched lumber. The fire was first observed falling through into the cow barn below. The bottom of the bay had about a foot of corn fodder. On this was placed second crop clover and

timothy, mostly clover, and when harvested was thought to be in unusually fine condition. It was dropped in with a horse fork from considerable height and hence very solidly pressed. By stopping up the holes below and using plenty of water above they were able to remove the entire amount of hay without losing the barn, but the greater portion of it was so thoroughly charred that it would crumble in the hands when handled. For several days a peculiar odor had been noticed about the barn, and even at a distance of forty or fifty rods to the leeward. It was known that the hay was heating, but there was no indication or even suspicion of fire. "Hoard."

TIMOTHY-HAY.—This grass is much easier and less hazardous to make in hay than clover is; but, even timothy, if cut in proper season, takes longer to make than is usually seen in practice here. It will bear shaking out, which rakes clover, and the ease with which it is dried is probably one of the reasons why clover is so carelessly treated. A tedder may very properly be used to break out timothy from the swath, whereas the slight of one in a clover-field is enough to send a man, who knows the value of the leaf of that plant, into fits. Rattle your timothy about as much as you please, but turn your clover over carefully, with the handles of fork or rake; in fact treat it as gently as if it were a lace-fichu. "Make" it before raking together and getting it into cock, so that it may be fit for stacking without further disturbance. It is to the perfection with which this process is carried on in England that is due the superiority of price that clover-hay always fetches in the London market; from \$5.00 to \$5.50 per 20 16 lbs., our London "load" of hay; more than the best meadow-hay.

AUSTRALIAN MUTTON.—Mutton from the Australasian colonies seems to be within the reach of the leanest purses in England just now. By our last advices from that country—May 6th—Australian mutton was selling for from 4 to 4½ cents a pound, and New-Zealand mutton for 2 cents a pound more. No wonder the demand for cheese has slackened there, if meat can be bought for such a trifling sum! The great drawback to this reduced price is that the common run of English people has no idea of converting ordinary meat into palatable dishes. As a recent arrival in our kitchen remarked the other day: Oh, Sir, if our people at home only knew how to make such pease-soup as Madame has taught me how to make, what a blessing it would be to the poor!

VACCINATION.—The city of Gloucester, England, was severely tried this past winter by a violent epidemic (or endemic) of small-pox. The deaths from this fell disease, throughout England, during the 13 weeks ending March 31st, were 192, out of which Gloucester counts for 149, very nearly three-fourths of the whole.

There are many anti-vaccinationists in the good city; a strange thing so near Berkeley, the residence of Jenner, the great discoverer of vaccination, in the parish-church of which town he lies buried. Perhaps, these opponents of his marvellous conception, may see fit to change their minds, now that their friends and relations have suffered so much from their obstinate refusal to

believe in a remedy that for, now, just a century has proved itself to be an almost universal blessing.

By the bye, one very curious fact has come to light in this the centenary of Jenner's discovery. James Phipps, a boy 8 years old, was the first subject of the new treatment. He was vaccinated in the month of May, 1796, and although before he arrived at the age of 20 he was inoculated with small-pox matter twenty times, he proved to be completely fortified against that virulent disease.

TURNIP-FLY.—The "haltica nemorum," as this destructive pest is called by entomologists, is utterly opposed to the success of the turnip crop in many parts of this province; particularly on farms where turnips have been grown for many years. Near Montreal, at Chambly, in the neighbourhood of Joliette, we ourselves have often failed completely in our attempts at a crop, unless, accidentally, the sowing happened to be made at some peculiar epoch, when the fly was either asleep, or intoxicated, i. e., poisoned. The

FLAT SOWING OF TURNIPS.—As we have often remarked in this periodical, the only reason for drilling up land for the root-crop, in this country, is to economise manure. Even in the Southern counties of England, though the summer drought there is a trifle compared with our intense heat during the months of July and August, almost all the root-crop is sown on the flat in rows from 18 to 20 inches apart. We entertain rather a prejudice in favour of drills for mangels, partly only on account of their habit of growth, and because, from the earliness of the time of sowing them, there is not a sufficient opportunity of cleaning the land perfectly before that operation. Besides, we have a hankering after big mangels, as we are sure that, in spite of the superior quality of moderate-sized roots, the heaviest weight of nutriment per acre, can only be produced by large mangels. If drills must be used, care should be taken to pull them down when singling the roots, so that the whole surface of the field may be level, and the rootlets have an un-interrupted scope of finely pulverised earth to revel in after the horse-hoe has done its work.

it "crazes." Can any one tell us, as a great favour, whence this appellation is derived?

EXTRACTS FROM "L'ALMANACH DES CERCLES"

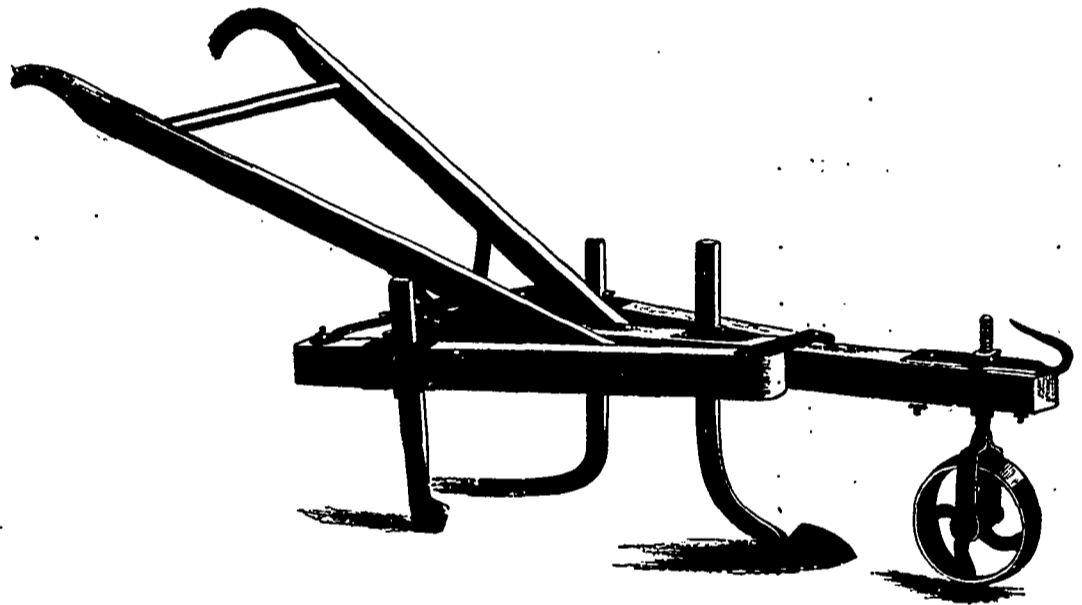
We translate some of the excellent "Advice to farmers for June and July." Do not forget to grow plenty of mangels for your stock.

Remember to harrow your grain thoroughly. Let the land be harrowed till it is like a garden.

In the light land, roll the grain after it is up. (We would add: and on heavy land, too; only, on the latter take extra care that the land is quite dry before rolling.)

Before turning cows out to grass, give them some succulent food, such as mangels, or other roots, for a few days. Do not turn them out till the grass is fit for them, i. e., not before the end of May or the beginning of June.

Spray, with a good instrument, your potatoes with the Bouillie-bordelaise: first time, at the end of June; second time, about the 15th July.



HORSEHOE.

great point in guarding against its ravages seems to be to make it as uncomfortable as possible, and, especially, to make its food as foul as powders of the most nauseous description can bring about. Sulphur, wood-ashes, &c., may be tried, and sometimes succeed; but, unfortunately, the first shower washes them off the leaf; besides, they cost money. Very finely sifted road-dust, very dry, we have known answer as well as anything; it sticks well to the leaf of the tiny plant, and costs nothing but the trouble of collecting. In England, a light bush-harrow is sometimes used; it dislodges the fly, and when it prepares to resume its dinner, it finds the leaves of the young turnip rendered repulsive in the extreme by the dust stirred up by the bush-harrow.

In growing swedes, it would not be a bad plan to show broadcast, after the swede-seed has been drilled in, a pound or so of common turnip-seed. The fly, we think, prefers the latter to the swede, and while he is feasting on the one, the other stands a fair chance of escaping. Why should the Guvremont's farms at Sorel be perfectly free from the pest? Turnips have been grown there annually for the last 12 years, and therefore the absence of their favourite food cannot be the cause of their abstention.

And, speaking of "horse-hoes," there is an engraving of one, at page 89, vol. for 1894 of the Journal, that we used as long ago as 1848. In the cut, there is a light error in the form and position of the two side-hoes. They should slightly—very slightly—overlap each other at a very oblique angle, and there is not sufficient curve given to the lower part. If this curve—outside the plane of the shaft of the hoes—is attended to, every particle of the earth between the rows of plants will be cut, and every weed eradicated. Of course, a slight pitch must be given to the front hoe to keep it in the ground. This hoe, properly constructed, will work up to within a couple of inches of the plants, and render the hand-hoeing very light work. Stones of course it does not like, and where they occur in any quantity the best implement is the Scotch "drill-grubber," or the "Planet Jr.," but none of them pare down the sides of the drills like "our own," of which, if we live, a sample shall be seen at the "International Exhibition" of 1897.

BUTTERCUPS.—This weed, called in science "ranunculus bulbosus," is known in Essex, and other S. E. counties in England, by the name of king-cobs, cobs being, of course, equivalent to cups. The Gloucestershire farmer calls

When your melons have developed the 4th leaf, pinch the end of the short. (We prefer doing this when two rough leaves have appeared. When this has been done, two side shoots will soon start, and these should be stopped when they have produced six or seven leaves each. Then, let the plant go as it pleases, till fruit is formed, when the fruiting shoots are to be stopped one eye above each melon, only one fruit being allowed to each shoot. Six or at most seven melons are as many as any one plant can bring to perfection in bulk and flavour. After this, all superfluous, non-productive shoots must be pinched off. As for cucumbers, when the plant has made three rough leaves, nip out the point, to promote a further growth of shoots from the base, and when these have made four or five leaves each, stop them to encourage a further growth of side-shoots. When the fruiting shoots appear, each should be pinched at two leaves above the fruit. In our best houses in England, the early cucumbers are never peeled. Here, hot suns and late sowings render peeling necessary, but it should be done as thinly as possible, the best flavour, as in the apple and all other fruits, lying just under the skin.)

With a view to give your cows the best food for milk-production, sow plenty of green-fodder plants, such as vetches and

outs, with an abundance of clover. (And do not forget to try a piece of lucerne, 18 lbs. to the arpent broadcast.)

Think of your sheep, and sow rape.

Cut your clover towards the end of June as soon as it is in flower. If the crop is fit to go into cock the same day that it is mown, it is a sign that it has been allowed to stand too long before mowing.

THE LONG TRACES. The main object of attaching one or two leaders to the wheelers in a single or pair-horse carriage is to help the wheelers in "against the collar" work, whether the pull is required by heavy roads on the flat, or in ordinary ascents. Therefore, except in these two cases, the traces of the leaders of tandems, unicorns, or four-in-hands, should always be slack, and the bars of the two last teams rattle. For, from the distance the leader is away from his work, it takes a great deal more out of him to pull a pound-weight than is expended in the exertion of the same amount of force by the wheeler.

HARVEST WORK FOR JULY.

A busy month—Barley-harvest—Hoed-crops—Earthing-up—Care of stock.

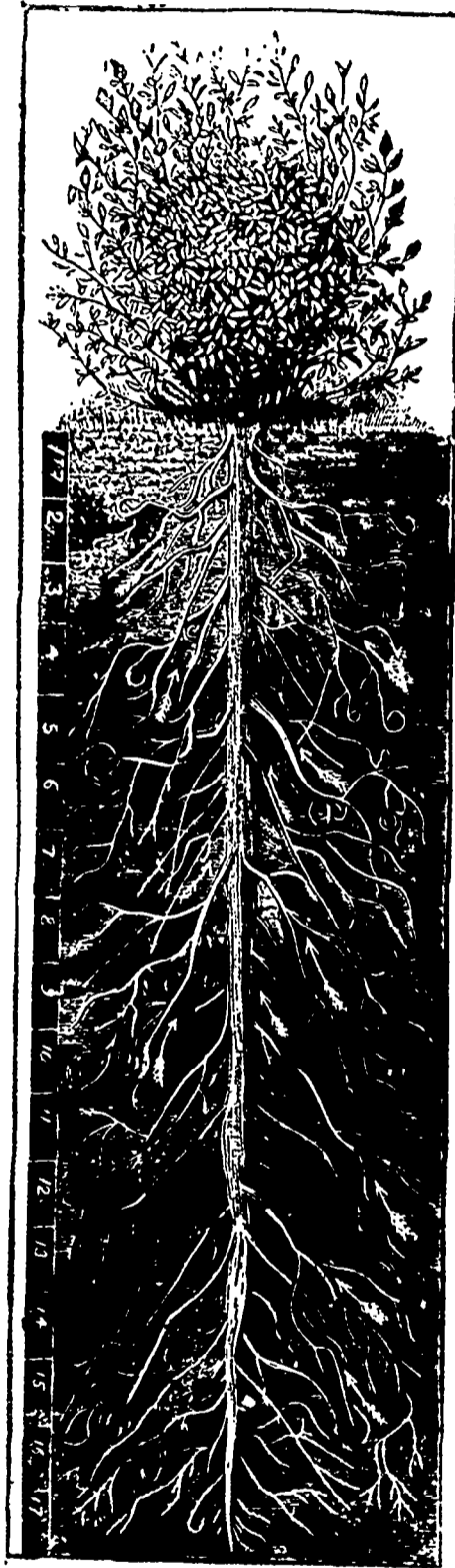
A very busy month, this of July. Hay-making in full swing; hoeing, both by horse and hand; arrangement of the barn for the reception of the grain-crops, and a heap of other things demanding foresight as well as activity. We have, in many an article, given our opinion pretty freely on the subject of turning both grass and clover into hay, so we shall not expatiate on this matter now. The whole of the first cut of clover ought, in the Eastern part of the province at least, to be safe by the 5th of the month, leaving only the timothy to be accounted for. When this is secured, go round the sides and corners of your fields, and mow all the stuff you find, to top up the hay in the barn with: the sheep will be glad of it when the first cold mornings arrive, particularly if a little salt is sprinkled over it, and the topmost layer of the real hay will be all the better for the protection afforded by it against the air, dust, &c. Besides, it is far better to get rid of this grass, weeds as it may mostly be composed of, than to allow it to stand and ripen its seed.

As we said last year, do not cut your barley till it is quite ripe. The maltster wants it ripe, for, unless it is, the grain will not grow equally on the floors after it comes out of the steep and couch. We may also repeat that, where the soil is accustomed to yield a good sample of malting barley, if there is an abundance of clover in it, cut the barley high, so as not to get more clover in to the swathe than is absolutely necessary; but, if the barley is meant for stockfood, cut low, and do not let the grain stand too long, the barley-straw and the clover together, if carefully made will be very useful fodder. Above all things, in threshing barley intended for malting, take care not to break the grain. The broken grain turns mouldy on the maltster's floors and, when used by the brewer, causes a continuous sub-fermentation on the beers, invariably followed by cloudiness and acidity.

Every spare minute in the day, in the early mornings, and after the dew begins to fall in the afternoons, will,

if you looked ahead last month, afford you plenty of opportunities to attend to your hoed crops. Corn may be hoed as deep as you please during the first stages of its growth, but when the rootlets begin to spread in the intervals between the rows, shallow work is clearly advisable; the same treatment is best for potatoes: in fact, if you want early potatoes, they should not be hoed more than just enough to remove the weeds: the land can be worked and pulverised after their remo-

Remember that the cultivation of food-crops tells quite as much on the subsequent crops of grain and seeds, as on the root-crop itself. Were the pastures better divided here, so that they could be fed off in turn, they would stand our droughts better; but they are all gnawed down so close, and kept so short, that after the first bite is taken, they never shade the ground at all. We see, in the "Journal d'Agriculture," a description and cut of a "Moveable Fence," which we present,



Lucerne plant, traced down 17 feet below the surface.

val. We have tried the two plans here in Canada, and are convinced that, by not hoeing, the crop is made earlier fit for market by from eight to ten days. As for earthing-up potatoes, that is quite unnecessary, as the crop will undoubtedly be larger if left unearthed, and the few tubers that are "greened," by exposure to the light, can be kept for seed or given to the pigs.

Swedes, and all other vegetables, cannot be horse-hoed too deeply or too late in the season, provided that the plants are not injured by the horse or the implement.

in English, to our readers. It seems to be firm enough to resist most animals, except the wild sheep that have been accustomed to roam at will all over the country.

"A moveable fence," v. engraving (p. 11). Each panel is composed of four boards, each 12 feet long,—and 4 x 1½ inches. They are placed, respectively, 5, 8, and 9 inches apart, the spaces increasing towards the top of the fence. Three cross-bars 1 x 4 inches, serve to keep them together.

The transverse struts are formed of a board, set edge-wise (placée de champ)

on the ground. It is 6 feet long, and 1½ x feet in section. To each of its surfaces, perpendicularly to its axis, and midway in its length, a bar is nailed, these being about 3 inches apart, and kept in their places by a "contre-fiche" (whatever that may be. Our dictionary gives for it, under the head "carpenter's work," dragon-beam," which sounds absurd in the present connection.)

Fig. 3 Shows one of the panels.

Fig. 2 Shows the construction of one of the moveable struts.

Fig. 1 Shows one of the struts in its place, and the way to set the panels end to end.

We think this form of fence might be used for folding sheep on rape, &c. If too low to retain active sheep in their proper quarters, a wire drawn between the tops of the struts, say, a foot above the top bar of the fence, would, if they tried to jump, throw them on their backs, and prove such a "sell," that they would not readily forget the check.

The horned stick will take all the extra food you can afford them this month, in addition to the pasture. Where the fly is troublesome, keep in door during the day, and turn out at night.

Pasture your horses, if possible, in a handy place, so that when wanted for the mower, for carting, or other purposes, you may not have a long way to go to fetch them. But a far better plan is to have plenty of vetches and oats, or vetches, oats and pence, to cut green for them, and keep them in a cool shed where they will be always ready to harness.

Swine will eat all the clover there is to spare, and a pool, for them to wallow in, will not be unfrequented by them. Turning out on clover is an easy but extravagant plan, compared with cutting it and feeding the pigs in a yard.

Plenty of young pigeons now. If you would taste them in perfection, kill them while they still have the yellow fluff on their necks. When able to fly, a pigeon is not worth eating.

Do see to your barns before you begin hay-harvest. Nothing annoyed us more, when we were passing the summer of '94 at Beaconsfield, than to see men chiding about at work that should have been done a month before, while the weeds were kicking up their heels in the potato-field.

CLAY-BURNING.

Stifle- and clump-burning—Mechanical and chemical effects—On chalk and heavy clays—Methods of burning—paring plough.

(By the Editor)

Driving along the lovely lanes of the Weald of Kent, with the hops just coming into burr on one side, and the ripening wheat on the other, a stranger would be surprised to see vast heaps of what appear to be irregularly shaped, badly burnt bricks.

In Gloucestershire, after the last load of grain is safe in the stack, the whole of the heavy land seems covered with small heaps of smouldering earth; very little smoke escaping, and no flame at all.

Now, the object of the farmer in both these practices is the same, though the means employed are different; the system which answers in one soil would probably fail in the other, for whereas the heavy land of the Wealden formation will only burn in large masses, the

greater mixture of organic matter in the red-sandstone of Gloucestershire submits to the influence of fire in heaps of two to three bushels, with no other fuel than the stubble of the lately reaped (1) grain crops.

It is, to our mind, a very doubtful point whether the indisputably beneficial effect of the burnt clay is due to the solely to its mechanical or to its chemical action: probably, it is due to the two combined. Its mechanical action is easily understood: like slaked lime, the burnt clay falls into the finest powder under the influence of the rain, the frost, and other disintegrating agents; each little particle of dust finds its way into the interstices of the surrounding soil, and until, in process of time, the whole sinks below the ordinary plough-furrow, insects and their eggs are destroyed, as well as weeds, the land is rendered lighter in texture, the ordinary acts of husbandry are more easily and rapidly executed, the rain passes more freely through the soil, and the

Eng.—but we have seen a great deal of it done in various parts of the country, and on all sorts of soils: on the thin chalky downs of Sussex, the fens of Cambridgeshire, and the heavy Oxford clay of Berkshire. In all cases it did much good, and we never saw it do harm, though some of the landlords did not fancy it, fearing that the land would be exhausted. Of course, if a succession of grain-crops were grown after burning, the last state of the land would be worse than the first; but the almost invariable practice with us is to take a rape or root crop after the ashes are spread, and the usual rotation follows.

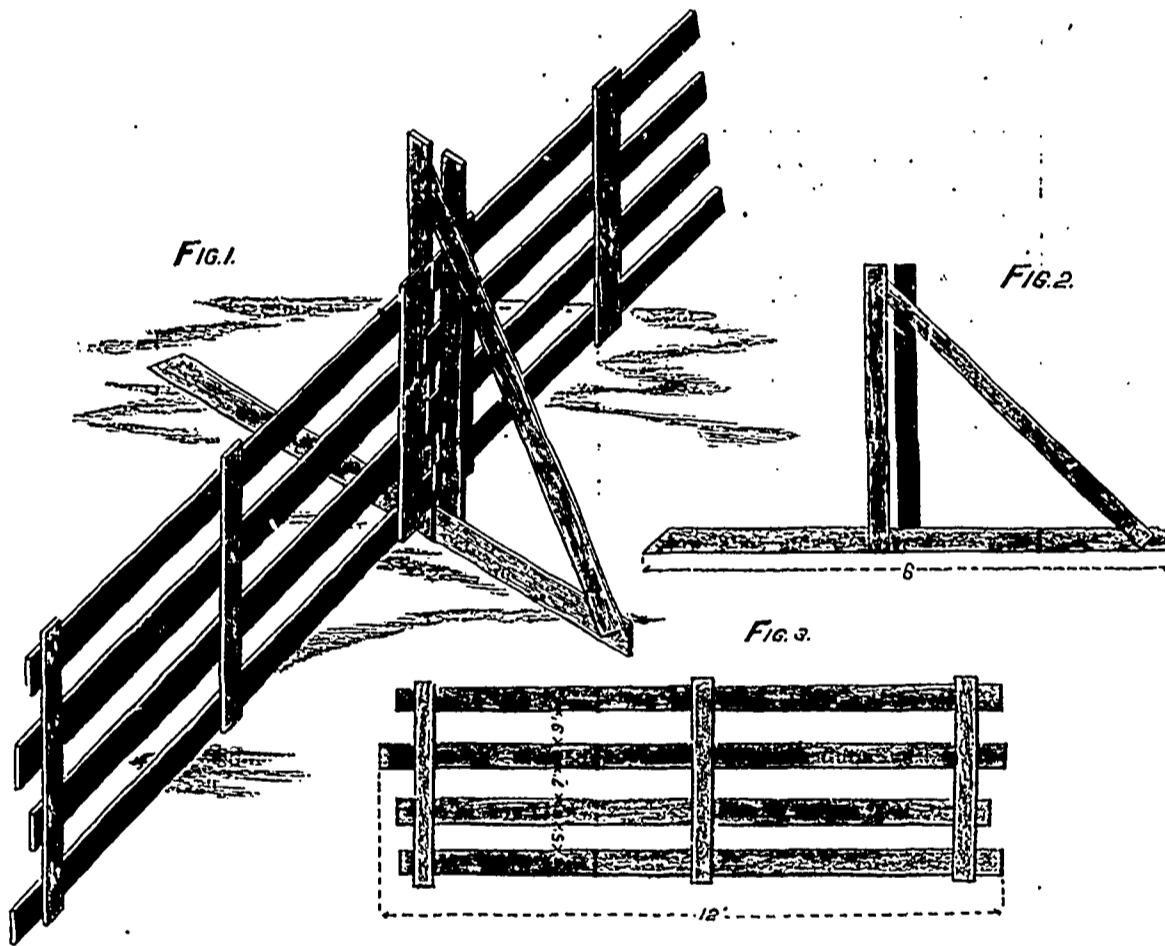
The rape and turnips are fed off on the land with sheep eating cake or corn, and the three following crops—barley, clover, wheat—are sure to be good.

As an example of what may be expected from this way of treating the land, we will give an instance of what was done on an utterly worn out farm

of the operation was, to the best of our recollection, £3.10 an acre for the burning, and putting the other expenses at £5 more, we arrive at a total expenditure of £8. 10, or \$42.00, the return from the crop being 48x2-806; a clear profit of \$54 per acre, and the land left in a clean, workable condition. The process was, we heard, continued, until the whole farm was gone over, and a miserable, poor lot of exhausted soil converted into one of the best farms in the neighbourhood.

Mr. Randell, a large Berkshire farmer gives his experience, in the Journal of the Royal Society of England for 1814. He starts with a piece of land, rent 5s. an acre, "of the very poorest description of clay, on the side of a steep hill, wholly inaccessible to the dung-cart, to which it had always been a stranger." After ploughing it once, it was worked with the grubber and harrows, and the clods of couch-grass and warty turf dragged to the surface, collected with rakes and forks, and burned in

grass round the fences, which should be dug up in spadefuls about 7 inches deep, and partially dried by the sun and air before burning; by the other, the whole surface of the field is ploughed up, with the thinnest possible furrow, and the grubber and harrow having reduced the clods to a reasonable size, they are collected into heaps of about 4 perches square, and burnt by the process about to be described, until the mass is reduced to about half its original size, when the ashes and unconsumed matter are spread as manure for the succeeding crops. I think that the best time for doing this here, would be just before haying. It is rather an idle time, just then, with our heavy land farmers, and the sun is at its hottest. The land to be burnt should be the longest in grass, as the sod would be at its toughest, and from the quantity of roots contained in it, would burn more easily: a consideration by no means to be over looked in the case of inexperienced hands.



A MOVEABLE FENCE.

roots of the cultivated plants, finding a comparatively easy path for their foraging expeditions, obtain their food with less trouble, and return a willing answer to the demands of the farmer on their renewed energies.

The chemical effects of burnt clay are not so easily described. Potash is formed from the combustion of the inert vegetable matter, and whatever chalky matter exists in the soil is converted into lime. Charcoal (carbon), as we know, attracts ammonia largely from the atmosphere; but in our Wealden clay the quantity of organic matter is so trifling, and the clay is burnt to such a degree of redness, that hardly a particle of carbon is visible in the finished clump. We really do not see what the chemical effect is, so we won't pretend that we do. All we know is that an "immense" additional yield of all crops is the invariable consequence of the process, when properly carried out.

Our own experience in clay-burning is confined to our own farm in Kent.

(1) Cut high.

in the midland counties of England.

The land in question, a clay-loam on a chalk subsoil, was one mass of couch-grass, and as the last tenant had lost all his capital on it, the neighbours looked askance when the farm was offered them, and the unfortunate proprietor began to fear he would be obliged to work it himself. A stranger, however, was at last induced to look at it, and, eventually, took it on a ten years lease, rent-free for the first two years, and 5s. an acre, for the remaining eight years.

The first season, 80 acres of the heaviest part of the farm were burned, about 100 loads of ashes spread on each acre, which, after lying exposed to the air and rain for a couple of months, were ploughed in with a shallow furrow; rape was sown, fed off by sheep, the land ploughed again, a little deeper, and sown with fall-wheat. Yield of the crop 48 bushels per acre, which, as wheat was then worth nearly 8s. a bushel, greatly exceeded the value of the fee-simple of the land. The cost

heaps of a cartload each, with wood from the neglected hedges round the field, at a cost of \$10 an acre. After a shallow ploughing, the land was sown with vetches (tares), which were fed off by sheep, the whole field, again after a deeper furrow, planted with wheat, the yield of which was 45 bushels an acre, sown down with grass-seeds, and it carried a much larger grazing stock than it ever had done before.

We could give a dozen other instances of the wonderful effect of burning land, but it is hardly necessary to do so. We can only lament that it has never been tried here (except on a very tiny scale), for we are convinced that, cheap as fuel is in the country parts, it would prove to be the best and easiest way of restoring to fertility the heavy lands in the St. Lawrence valley.

There are two ways of managing the process; in large masses, and in small heaps; and two descriptions of soil are collected for that purpose; the one consisting of the green strips of

The labourer begins by placing some large pieces, by which he frames an artificial furnace, open to the windward side; he then places some dry straw, bits of wood, rough underbrush, or chips, any worthless stuff in fact, and partially covers the fuel with the driest of the collected earth; the fire is then applied, and as it progresses, the whole is speedily covered with the earth, until by degrees the whole of the earth is applied. Great care must be taken never to allow the fire to burn through to the external surface of the heap without applying a fresh lot of earth, and at the same time avoiding laying it on too thickly, so as to press down the heap too closely at first. With attention, many of these fires are kept burning at once, night and day, until the whole field is gone over. With proper care on the part of the workman, very little escapes the fire in the first instance, but should any escape, it is collected and carried forward to the next succeeding row and there consumed. The grand point is to put

such a layer of clods on the fuel that the cover may neither be too heavy, nor light enough to let the fire burst out; for should the former be the case, the fire would be smothered, whilst in the latter event, the whole force of the combustion would be directed to the thinly covered spot, and the fire of the whole soon become extinguished. (1)

"Slide-burning," the small heap plan mentioned at the beginning of this article, is done in the following manner: The land is ploughed as thinly as possible after harvest; it is then worked with the grubber and well harrowed; and when the clods are dry, the couch, stubble, and rubbish, are raked into heaps, a small bundle of straw placed in the middle of each heap and set on fire. The hole is then closed, and as soon as the heap burns freely, the earth is shovelled upon the fire in moderate quantities; sometimes as much as eight or ten bushels are burnt in a heap, but generally not more than four or five. The slower the burning, and the less, therefore, the air is admitted, consistently with the thorough combustion of the heap, the better will the ashes be.

If we were to set about burning a worn out pasture, the cheapest plan would be to take a common one-wheel-plough, and get the blacksmith to fit it with a share, steered if possible, about 14 inches wide at the hinder end. With such an arrangement, a pair of ordinary horses would skim, roughly it is true, about 2½ acres a day. It is not necessary to cut every particle of ground-surface; what is wanted is plenty of flag to burn, as the cleaning operations may be gone through afterwards. There is a beautiful implement made in England, the Leicester paring-plough, one of which we had the pleasure to possess; but as it cost £5 at Leicester, it would probably, with the 35 p. c., duty and the freight &c., cost \$45 here, which would completely debar us from using it. The only difficulty with the wide share here recommended is that, owing to the extreme shallowness of the furrow, the plough is difficult to hold steadily. In practice, however, this does not signify two straws, for the work is so rapidly gone over that it would not be a tedious operation to cross-plough athwart the first furrow. Anyhow, it ought not to be difficult to get rubbish enough to give 100 cubic yards of ashes per acre, which is a full dressing. The base on which the burnt heaps stood should be shovelled out six inches deep, or the next grain-crop there will fall on its back before harvest.

THE AGRICULTURAL VALUE OF VARIOUS FORMS OF POTASH SALTS.

Editor, "Journal of Agriculture." I read with much interest the comments by Prof. Shutt, on my communication

(1) Mr. Tremayne, of Heligan, Cornwall, Eng., sowed 7 acres of rape, with no manure but ashes, on the 5th of May, and on the 20th of June stocked it with sheep: seventy-five sheep were kept on it for several weeks, the greater part of which were fattened, and all maintained during the summer. In September there were fifty wethers on it, and it kept them until the land was ploughed for wheat at the latter end of October. If we could afford it, we would offer a prize to that farmer who should burn and sow with rape, to be fed off with sheep, five acres of land in the most workmanlike fashion.

relating to the value of various forms of potash, which appeared in your issue of May 1st.

It was no part of my intention to deny the undoubted value of wood ashes as a fertilizer, but rather to show that the form in which the potash exists in wood ashes is not, under all circumstances, the most effective. My views on this subject are not based on chance results by ordinary farm practice, but upon the determinations of true experimentation, in which the conditions of climate, rain fall and cultural conditions are as nearly as may be under absolute control. It is only by such comparative tests that true general laws may be isolated.

As a larger proportion of the combined nitrogen in soils must be nitrified before it becomes available as plant food, the influence of the various forms of potash on the nitrification process becomes of considerable importance. The most authoritative data at my command on this subject are the experiments of Dumont and Crochetelle (Compt. Rend., 117 (1893) No. 20) on the nitrification of meadow soils. The tests were made with 1000 grams of soil, time of observation one month. The results were as follows.—

Applications.	Nitric nitrogen obtained with (Stated in Mg)		
	Carbonate.	Sulphate.	Chloride.
Nothing	80	80	80
1 gram.	98	150	75
1.5 grams	93	180	78
2 "	140	220	78
2.5 "	160	260	100
3 "	127	240	100
4 "	100	270	78
5 "	85	340	80
6 "	80	340	78
8 "	60	350	78

In order to observe the influence of carbonate of potash on nitrification in the presence of an abundance of humus, two samples of arable soils were collected from the grounds of the Experiment Station at Grignon; one contained 20 grams of humus per kilogram and the other, cultivated for a long time without manure, contained but 10.5 grams of humus. The following table shows the percentage of nitric nitrogen obtained by applications of different forms of potash salts at the rate of 2 grams per 1000 grams of soil.

Applica- tion.	Soil rich in humus.		Soil poor in humus.	
	Total Mg.	Increase Mg.	Total Mg.	Increase Mg.
Nothing.....	39	—	28	—
Carbonate of potash.....	68	29	32	4
Sulphate of potash.....	80	41	46	18
Muriate of po- tash.....	57	18	46	18

The evidence seems to be conclusive, that carbonate is the least desirable form of potash for fertilizing purposes so far as influencing nitrification is concerned. In very low applications, the evidence is less marked; it is probable that the adverse effect is due wholly to alkalinity, and as wood ashes contain a large quantity of magnesia and carbonate of lime the ill effect would be exaggerated for any given application of potash, in that form.

As Mr. Shutt truly says, it would be unnecessary to bring forward any evidence to prove the fact that potash in wood ashes is a valuable fertilizer. This is beyond question. At the same time there is nothing to show that this form of potash has an agricultural value of the highest rank, while there is much to show that it has not. My contention was not that the crude potash salts were cheaper in proportion to the crop producing power involved.

In regard to Mr. Shutt's suggestion that the insoluble potash and phosphoric acid in wood ashes would soon be rendered available by the action of the acid exudations of the root hairs; it is not necessary to refer to any authentic examples of soil analysis, in which the available potash is estimated by extraction with a one per cent. acid solution. That portion of the potash in wood ashes which is insoluble is largely in the form of a true glass which soil acids would reduce very slowly indeed. So far as the insoluble phosphate is concerned, it must be considered that it exists associated with relatively enormous quantities of free lime which would most certainly receive the first attention of soil acids. Even when not associated with free lime, the crop producing value of tricalcium phosphate is very low. This fact is not a matter of speculation, but of clearly determined fact. (1)

Personally, I cannot place confidence in "the testimony of all practical farmers" even if I were certain of having such testimony. In this country, we cannot estimate values upon such basis with the expectation of concordant summaries. Lime has its periods of use and disuse. The authorities as a rule do not consider lime a fertilizer, but rather a soil corrective. However, we do not buy wood ashes in this country for the lime, magnesia, "and other mineral constituents of plants" it contains. We buy it for potash alone. Lime can be purchased more cheaply as lime.

Mr. Shutt explains the nature of reverted phosphoric acid and states a fact well known to the average farmer—that this form has a crop producing power quite equal to that of water soluble phosphates. Mr. Shutt will hardly claim that the phosphates in wood ashes are in the reverted form. Mr. Shutt suggests the use of wood ashes for composing with muck, such manipulation would cause the loss of much of the nitrogen in the muck.

One ton of Canadian wood ashes, as sold for agricultural purposes in the United States, contains about 104 pounds of actual potash soluble in water; about the same quantity as is contained in 200 pounds of muriate or sulphate of potash. It would seem that wood ashes at five dollars per ton is something less in agricultural value than 200 pounds of high grade potash salts worth fifty dollars per ton.

S. PEACOCK,
Philadelphia, Pa.

May, 20th., 1896.

CHEMICAL LABORATORY OF THE DOMINION EXPERIMENTAL FARMS.

Wood-ashes—Aburd prices for do.—
Stassfurt potash—Nitrification—
Solubility of phos. ac. in ashes—
Muck and ashes.

Ottawa, June, 12th., 1896.

Arthur R. Jenner Fust, Esq.,

4, Lincoln Avenue,

Montreal.

Dear Sir:

In writing my reply to Mr. Peacock's letter in your issue of May 1st., it was my purpose to lay before your

(1) Sir John Lawes "would not object to use finely ground Caroline-rock or Cambridge coprolite for cereal crops." In his letter to the editor in the Journal, p. 118, Dec. 1892.—Ed.

readers in succinct form the reasons for the belief that wood ashes may be employed on the farm as an economical and effective source of certain elements of plant food, and notably, potash. It was not my intention either to criticize Mr. Peacock's statements or to make any comparison between the effectiveness of wood ashes and the crude potash salts. Neither directly nor by inference did I say or wish to say anything in disparagement of the latter fertilizers. My contention is (1) that wood ashes are an exceedingly valuable fertilizer, more especially on light and warm soils and for leguminous plants, potatoes, roots and crops, generally with abundant foliage, as well as for fruit trees, both large and small; (2) that in many parts of Canada wood ashes are the cheapest form in which the requisite potash can be supplied. Numbers of our Canadian farmers are parting with (it cannot be called selling) their wood ashes—in reality a part of the virgin fertility of the soil—for a consideration much below their value. A bushel of unleached wood ashes for a bar of inferior soap or a tin pan has not been an unusual bargain, while the same ashes have been readily bought by New England farmers at three times the reputed price of the articles given in exchange. And further in this connection it may be said that the New England farmers considered that they got good value for their money. These are the two points which I wish to emphasize; they cannot be gain-said.

Respecting the comparative value of wood ashes and the crude potash salts, Storer in his treatise on Agriculture, page 124, says:

"In one word, experience has proved that the Stassfurt fertilizers, used as such, are decidedly inferior to wood ashes. The explanation seems to be, that the sulphate and the chloride are devoid of the alkaline quality which is so marked a peculiarity of carbonate of potash, which, as is well known, is the effective agent in wood ashes. And, in point of fact, European experience has shown that the Stassfurt salts answer a better purpose when they are applied to marled land, or when they are used in conjunction with lime."

This is in accord with the well known and scientifically proved fact that nitrification can only proceed satisfactorily when a salifiable base is present. Indeed, it appears from recent investigation that one of the chief agricultural functions of lime is to furnish a material suitable to the growth and development of the nitrifying organisms. Practical testimony is unanimous as to the value of lime, and more especially wood ashes, upon muck soils and soils rich in humus. The acidity of such is corrected, nitrogen liberated in available form, and the mineral food supplied in which such soils are particularly deficient.

In Mr. Peacock's letter contained in this issue he brings forward certain experimental data to prove that nitrification progresses more favourably in a soil under the influence of the sulphate and chloride of potash than when the carbonate of potash (the form in which it chiefly exists in wood ashes) is present. In the first place I would state that a part of the potash in wood ashes is in the form of the soluble silicate of potash, and secondly, that by far the larger amount of potash sold to farmers (excepting wood ashes) is in the form of chloride. The potash in the chloride (commonly known as muriate) and in kainit (which is largely composed of chloride) is cheaper than in the form

of sulphate: a fact that explains the above statement. After a statement in tabular form of the results of these experiments, Mr. Peacock says:—"The evidence seems to be conclusive, that carbonate is the least desirable form of potash for fertilizing purposes so far as influencing nitrification is concerned." It seems to me at least strange that Mr. Peacock should publish evidence that tells so strongly against his argument. A cursory examination of the first table in his letter plainly shows that in eight out of nine experiments more nitric nitrogen was obtained when the soils was treated with carbonate of potash than when chloride was applied. This chloride, it must be remembered is the well known and widely used muriate, and is to a large extent the form in which the potash exists in kainit. Mr. Peacock should have restricted his comparison to the sulphate, as all the other testimony is directly against his contention. In the second table there is only one instance in which the muriate produced more nitric-nitrogen than the carbonate.

One word with regard to the relative solubility of phosphoric acid in wood ashes. Two samples of ashes were recently analysed by us:

	Total phosphoric acid.	Phosphoric acid soluble in 1 p. c. citric acid.
A.....	2.54	.63
B.....	1.60	.69

These results would go to show that a considerable percentage of the phosphoric acid in wood ashes is more or less available for plant use (see note in my former letter regarding the solvent action of sap exudation from rootlets).

Though "we do not buy wood ashes in this country for the lime, magnesia, and other mineral constituents of plants they contain," this fact does not in the slightest degree lessen the agricultural value of such elements when present. On this point Storer, page III, says.

"But it is not fair to class wood ash as an exclusively potassic manure. Besides potash, wood ashes contain one or two per cent. of phosphoric acid, and various other ingredients which are of value to plants; notably a little magnesia and a great deal of carbonate of lime. The importance of these incidental constituents is made plain by the esteem in which leached ashes are held by our farmers, although from the leached ashes all but a very small proportion of the original potash has been washed out."

The assertion is made by Mr. Peacock that composting muck with wood ashes would result in loss of nitrogen. Muck is a substance rich in nitrogen, present in a form peculiarly inert and valueless as plant food until converted into a nitric compound. For this purpose potash, lime or some other salifiable base is necessary, as already stated, and provided that wood ashes are not present in large excess and the compost heap is kept moist, the loss of nitrogen, if any, must be exceedingly small, while the resulting compost is rich both in available nitrogen and potash. This, of course, is an entirely different case to that of mixing barnyard manure and wood ashes, a mixture well known to suffer great loss of nitrogen. The explanation of this, however, I need not now enter upon, as it is foreign to the subject under discussion.

Yours faithfully,

FRANK T. SHUTT,
Chemist, Exptl. Farm.

THE NINTH ANNUAL REPORT OF THE CHEMIST TO THE DOMINION EXPERIMENTAL FARMS,

Mr. Frank T. Shutt, M. A., F. I. C., F. C. S.

The first chapter of this report is devoted to a consideration of certain virgin soils from the province of British Columbia. The analytical data, presented in tabular form, are very complete, showing not only the "total" amounts of plant food constituents in the soils, but also the proportions of these which may be regarded as more or less "immediately available" for crop use. These latter determinations were made according to the method of Dr. Bernard Dyer, an eminent English Agricultural Chemist, and in soil investigations mark a distinct step in advance of previous work. We infer that it is not only possible by chemical means to ascertain approximately the relative richness as regards the total amounts of the essential elements of fertility in a soil, but that the relative amounts of these that can be at once acted upon by exudations of plant rootlets may be determined. Such information must prove valuable in suggesting economic and effective methods of soil fertilization.

The details regarding the soils here reported upon cannot now be discussed, but will be found of interest to readers who are wishful to learn somewhat of the character of the untouched soils of our far-west province. This chapter besides diagnosing and suggesting lines of treatment for the soils under consideration, gives a general account of the factors, chemical and physical, that conduce to a soil's fertility.

Under the caption "Naturally-occurring Fertilizers" the composition of a large number of swamp mucks, marsh, river and mussel muds is given. The samples are from very widely distant points in Canada, and the results show that farmers may easily and cheaply in many parts of the Dominion supplement their supply of home-produced barnyard manure, enhancing the fertility of their fields. The composition of the Bracken Fern (*Pteris aquilina*) has also been ascertained. It appears to possess in a marked degree the ability to exhaust the soil of certain mineral ingredients, and hence should not be allowed to spread through pastures, as often noticed.

An interesting chapter appears on the "Nitrogen in the Clover Crop". The analytical figures show in the experiment recorded there were 1723 lbs. of nitrogen stored in the leaves, stems and roots of this plant per acre. In this way the value of clover as a green manure is brought before our agriculturists. The data of this investigation are particularly interesting.

A short report on Moss litter from New Brunswick follows, giving the amounts of fertilizing constituents in contains and its absorptive capacity. Evidently in this dried sphagnum Canada possesses a most valuable bedding material and which come more and more into use in cities, replacing the more bulky straw now employed.

Industrial Fertilizers:—These include: "Waste from a Shoddy Factory," Bone and Meat Meal or Tankage," Slaughter-house Offal, etc., etc., the analytical data being accompanied by directions for their use.

The investigation commenced some years ago into the value of finely ground

mineral phosphate has been continued, and some interesting results are here brought forward on this important question.

The chemistry of Arsenate of Lead, a new insecticide recommended as a substitute for Paris green, is explained and directions for the preparation of the spraying fluid furnished.

Sixty-five samples of well waters from farmers' homesteads have been examined during 1895 and are here reported upon. The results show a most unsatisfactory condition of affairs, a very large proportion of the wells receiving drainage of a pernicious character.

This report concludes with a detailed account of the composition of Canadian cereals examined at the World's Columbian Exposition, at which Mr. Shutt acted as a professional juror in chemical investigations. This investigation marks the first systematic and scientific enquiry into the composition of Canadian grown grains. The excellent qualities of the wheat grown in Manitoba and the North West Territories are depicted; the percentage of albuminoids being very high, coupled with good milling properties. Data regarding Canadian oats, barley and buckwheat are also given.

We learn that copies of this report may be obtained by applying to Mr. Shutt at the Experimental Farm, Ottawa.

The ROTHAMSTED EXPERIMENTS
By Lawes and Gilbert.

THE FEEDING OF ANIMALS.
(Continued from May.)

Fat pork—Chemical composition of animals—Sources in the food of the fat in the animal body—Authorities; Liebig, Dumas, &c.—Carbohydrates the main source—Comparative fattening quantities of different animals.

Referring to pigs, the increase of those liberally and suitably fed for fresh pork will probably on the average contain an immaterial amount of mineral matter, only from 6½ to 7½ per cent of nitrogenous substance, from 65 to 70 per cent of fat, and from 70 to 75 per cent of total dry substance. The increase over the last few months of high feeding of pigs fed for curing will, however, probably contain lower percentages of nitrogenous substance, but higher and sometimes considerably higher percentages of both fat and total dry substance. The tendency of the demand in recent years has, however, been for less excessively fat bacon than formerly.

Thus far, then, it has been shown that the amounts of food, or of its various constituents consumed, both for a given live weight of animal within a given time and to produce a given amount of increase, were very much more dependent on the quantities of the nonnitrogenous than on those of the nitrogenous constituents which the food supplied. It has been said that when the large requirement for nonnitrogenous constituents of food to meet the expenditure by respiration is borne in mind, it need not excite surprise that consumption in relation to a given live weight within a given time should be so largely measurable by the amount of

digestible and available nonnitrogenous substance which the food supplies; but that, at first sight, it was less intelligible that the quantities consumed to produce a given amount of increase in live weight should also be much more dependent on the supplies of the nonnitrogenous than on those of the nitrogenous constituents of the food.

The results relating to the chemical composition of the different animals, in different conditions as to age and maturity, have shown, however, that even store animals may contain as much or even more, of the nonnitrogenous substance (fat) than of nitrogenous substance, while the bodies of fattened animals may contain two, three, four, or even more times as much dry fat as dry nitrogenous matter. It has further been shown that the proportion of fat to nitrogenous substance in the increase in live weight of the fattening animal is much higher than in the entire bodies of the fattened animals. If, therefore, the nonnitrogenous substance of the increase (the fat) is derived from the nonnitrogenous constituents of the food, the relatively large demand for such constituents for the production of fattening increase would seem to be amply accounted for.

The important question arises, therefore, what are the sources in the food of the fat of the fattening animal? In other words, from what constituent or constituents in the food is the fat produced?

SOURCES IN THE FOOD OF THE FAT PRODUCED IN THE ANIMAL BODY

Prior to the publication of Liebig's work on "Organic Chemistry in its Application to Physiology and Pathology," in 1842, it seems to have been assumed that the Herbivora derived their fat from ready formed fatty matters in their food, and that the Carnivora derived theirs from the ready-formed fat of the animals they consumed. Liebig argued that, as a rule, the food consumed by the Herbivora did not contain sufficient fatty matter for the purpose, and he maintained "that although fat might be formed from the nitrogenous substance of the food, its main source was the starch, sugar, and other carbohydrates, which the food supplied.

Dumas and Boussingault (1) at first (1) Balance of Organic Nature, 1844, p. 116 et seq.

called in question the view that fat was produced in the animal body, and assumed that the food of the Herbivora supplied sufficient fatty matter to account for the whole of the fat stored up. Subsequently, however, Dumas and Milne-Edwards, (2) from the results of experiments with bees; Per-

soz, (3) from experiments with geese,

(3) Ann. Chim. Phys., Vol. XIV, p. 408 et seq.

and Boussingault (4) from those with (4) Ibid., Vol. XIV, p. 419 et seq.; Vol. XVIII, p. 44 et seq.

pigs, geese, and ducks, concluded that fat was formed from the carbohydrates of the food. At the same time Boussingault considered that, in normal feeding, the amount of albuminoids consumed would generally supply sufficient carbon for the production of the fat formed by the animal.

Next came the evidence of the Rothamsted experiments, the majority of which were conducted within the years 1858-1863, inclusive; and they involved feeding experiments on between 400 and 500 animals, with feeds of known

composition; the slaughter, determination of the weights of the parts, and notes on the character as to fatness, etc., of more than 300 animals, and finally, the chemical analysis of 10 animals.

In the first place, it was clearly demonstrated that much more fat was stored up in the bodies of the fattening animals than could be derived from the ready-formed fatty matter in their food. Secondly, from a careful study of the enormous amount of experimental data obtained, as well as of the known facts of practical experience in feeding, it was considered that no doubt whatever could be entertained that much, if not the whole, of the fat formed in the bodies of the Herbivora fed for the production of meat was derived from the carbohydrates of the food.

In fact, the experimentally determined relation of the nonnitrogenous and of the nitrogenous constituents of the food, respectively, to the amount of increase produced, the composition of fattening increase generally; the relatively greater tendency to grow in frame and to form flesh with highly nitrogenous food, the greater tendency to form fat with food comparatively rich in nonnitrogenous substances, and especially in carbohydrates, and common experience in feeding all pointed in the same direction.

For some years there was little or no discussion on the subject, and it seemed to be tacitly admitted, both on the Continent and in this country, that the view of Liebig as to the formation of, at any rate, much of the fat of the Herbivora from carbohydrates were correct.

In 1865, however, at a meeting of a congress of agricultural chemists, held at Munich in August of that year, Professor Voit, from the results of experiments made in Pettenkofer's respiration apparatus, with dogs, fed chiefly on flesh, maintained that fat must have been produced from nitrogenous substance; and that this was probably the chief, if not the only, source of the fat even of Herbivora. Pettenkofer and Voit further maintained that to establish the formation of fat from the carbohydrates, experiments must be brought forward in which the fat deposited was in excess of that supplied by the food, plus that which could be derived from the transformation of albumin.

Of course, the mere fact that the food consumed contained enough nitrogenous substance for the formation of all the fat that had been produced would of itself be no proof that that substance had been its exclusive source. On the other hand, if the amount of fat stored up in the animal was in excess of that which could be derived from the ready-formed fatty matter of the food, and from the transformation of the nitrogenous substance, it would be proved that at any rate some of the stored-up fat must have had another source, and this could only be the carbohydrates.

Accordingly, the results of many of the Rothamsted feeding experiments were calculated, to ascertain whether or not ready-formed fat and the nitrogenous substance of the food were sufficient to account for the whole of the fat estimated to have been stored up. None of the experiments had been specially arranged with a view to the elucidation of this question. In some of them, however, what may be called minimum amounts, and in others excessive quantities, of nitrogenous substance had been consumed. Some of the results seemed to us to afford clear

evidence on the point, and we gave a paper on the subject in the physiological section, at the meeting of the British Association for the Advancement of Science, at Nottingham, in 1866, and it was published, in abstract, in the report of the British association for 1866, and in full in the Philosophical Magazine for December of that year. And, as it is upon the results as then given that any subsequent discussion of our conclusion has been founded, I propose in the first place to consider the evidence afforded by those results, but afterwards to adduce certain modifications of some of them, in order to bring them more into accord with recent knowledge on some points, and to meet more effectively objections that have been raised against the conclusion drawn from them.

The first point to consider was: What description of animal is likely to yield the most direct and conclusive results on the subject? Obviously, the one which is fed more especially with the view to the production of fat; which consumes in its most appropriate fattening food a comparatively low proportion of nitrogenous substance, and a comparatively high proportion of carbohydrates; and which yields a large proportion of fat, both in relation to the weight of its body within a given time, and to the amount of food consumed. The following table (69) briefly summarizes the results of very numerous experiments with oxen, sheep, and pigs, so far as they illustrate the comparative characters of the different descriptions of animal in regard to the points above enumerated:

TABLE 69—Showing the comparative fattening quantities of different animals.

	Oxen.	Sheep.	Pigs.
Average of relation of parts in 100 live weight.....	16	24.9	59
Stomach and contents.....	11.5	7.4	1.3
Intestines and contents.....	2.8	3.5	6.2
Internal loose fat.....	14.3	10.9	7.5
Heart, aorta, lungs, windpipe, liver, gall bladder and contents, pancreas, spleen, and blood.....	4.6	7	1.6
Other ossal parts.....	7	7.3	6.6
Total ossal parts.....	13	15	1.1
Total.....	38.9	40.2	16.8
Carcass.....	59.3	59.7	82.6
Loss by evaporation, etc.....	1.8	.1	.6
Total.....	100	100	100
Per 100 live weight:			
Dry substance consumed in food per week.....	12.5	16	27
Increase yielded per week.....	1.13	1.76	6.43
Per 100 dry substance of food:			
Fat in increase.....	5.2	7	15.7
Total dry substance in increase.....	6.2	8	17.6
Total dry substance in excretions.....	36.5	31.9	16.7
Average fat per cent:			
In lean condition.....	16	18	22
In fat condition.....	30	33	44
In increase while fattening.....	60	65	70

In the first place, it is to be observed that although the proportion of intestines and contents is greater, that of the stomach and contents is very much less in the pig than in either of the ruminants, as also is that of the stomachs and contents, and intestines and contents taken together, the percentage of these collectively being in oxen 14.2, in sheep 10.9, and in pigs only 7.5 of the weight of the body. The fact is, that the appropriate fattening food of the pig consists of ripened seeds and highly starchy roots, containing but little indigestible fibre, whilst that of the ruminants contains a considerable amount of slowly digestible or indigestible

cellulose, and often a much greater amount of indigestible or unassimilable nitrogenous substance. The result is, that a less proportion of the live weight of the pig consists of more or less effete matter retained in the alimentary organs.

Then, the second division of the table shows, that with the much higher character of its food and the much less proportion of it indigestible and effete, the pig both consumes very much more and yields very much more increase for a given live weight within a given time.

Lastly, as is shown in the third division of the table, for 100 of dry substance of food consumed the pig yields very much more, both of fat and of dry substance in increase, and, on the other hand, voids very much less of dry substance in urine and in faeces.

(To be continued)

Correspondence.

Ste-Thérèse, June, 14th 1896.

Dear Jenner Fust,

Sunday is my letter writing day in the country and I intend inflicting a long one upon you to-day. I began cutting my lucerne on 12th of May, and finished first cutting on 10th of June. During that time, as I was short of hay, I have fed fourteen horses on it, cut three times a day. It was badly eaten by grasshoppers last autumn. They ate some of it down to the roots. I re-

you could pay me a short-visit? I have attended several times going out to No. 4 Lincoln Avenue, to consult you about various matters agricultural, but have not managed to do so yet. I have a good many things to ask you about sowing crops, meadows, and permanent pastures, and the best means for keeping them in good heart.

You have a translation of an article, on crossing, by M. Auzias-Turenne, which must be Greek indeed to the average habitant. The figures and proportions, in numerals, he makes use of would be to him, generally speaking, absolutely unintelligible. What he wants to be taught, and about which hardly any of them know anything at all is to be able to carry out the very good advice given in the last two lines. Be therefore prudent, and judge, of the relationships (devinez les affinités.) Exactly, that is a very easy thing for the practical breeder, who has an eye for the points of a horse, carriage-horse, hunter, or heavy draught, it does not matter which, and who, for years, has been putting the right sort of mare, to the right sort of stallion. But when instead of doing this as farmers and breeders, of any reputation, have always done for generations past, with cattle, sheep, and pigs, as well as horses, in England, the only methods of breeding indulged in by the average habitant, may be summed up as follows:

1. The service of a stallion at the lowest possible price.
2. The selection of a mare, that cannot very well be used for any other purpose.
3. And the rearing of a foal, on what will cost as near nothing as possible, you will understand that the habitant has not cultivated much of an eye for judging of the relationships, as recommended by Mr. Auzias Turenne.

I do not think, that, individually, at the present day, the farmers of France, are good breeders of horses or cattle, although there are good breeds of both in France, but, these have not been owing to individual efforts of French farmers. If they had done as well with their breeds as the English have done, they could have improved them, by this time, to a much greater degree of average excellence.

French coach-horses are very good indeed, the Anglo-Norman coacher, is a fine horse, and I much prefer good specimens to the Cleveland Bays. (1)

The Normandy and Contentin breeds of cattle are also not to be despised, but the system of judging of dairy cows at shows is peculiar. See Mr. Peer's article, on his experience in French show yards, in "Country Gentleman."

Could you not get somebody, or could you not yourself, favour us, some day, with an article, on the beauty of hedges, as line fences, their wonderful attractiveness to the aspect of a farm, the efficient use in that respect to which several kinds of plants could be put in this country, their durability and economy after the first expense of setting out?

What would farming land in England be without hedges. Half the attractiveness of rural scenery in England is quite due to the hedges. (2) Of course the beautiful turf, and its continuance in verdure, is due to the climate, but parts of Ireland, where there are no

seeded a bare patch this spring, which has taken well, although there are some weeds. I cannot account for these bare patches in any other way, than as caused by bad seed. I am glad to see you write in the "Journal of Agriculture" that lucerne is the plant for green-fodder for this country. I think so too, there is one thing about which, I have no doubt whatever, viz: that it is well worth experimenting with extensively and perseveringly and in a general way taking a good deal of trouble about, in order to find out its possibilities. I am going to specially prepare another patch of about two acres this autumn. When do you think

(1) Not used in London except for the heavy, old-fashioned "coach" for state-purposes.—Ed.

(2) Oh! how true!—Ed.

hedges, nothing but banks, although green enough are not nearly so pretty as the land where hedges flourish.

Yours truly,

C. F. BOUTHILLIER. (1)

The Flock.

PRACTICAL QUERIES IN SHEEP FARMING.

Rape—Time of sowing—Mustard—Clipping Sheep—Roots.

The Editor recommends the following article to all progressive farmers. He has expressed the same ideas a score of times in this Journal beginning with the first number, 1879.—

Editor "Farmer's Advocate."

Sir,—Allow me space to reply through your columns to the enclosed letter:—

Dear Sir,—Knowing you to be one of the best-posted men on sheep-husbandry, I venture to ask a few questions, and should you favor me with a reply, you will greatly oblige, as I am devoting 100 acres of land to this work. I see that you grew some early rape last year. What is the earliest date that it would be advisable to sow it? Would the turnip-lice not destroy the leaves of that sown early? I sowed 12½ acres last year, on June 25th, and all that came up soon after sowing was literally covered with lice, while that which came up six or eight weeks later escaped. Would not the stalks of those large plants of yours be too large and woody for lamb feed? Which is the more valuable, the leaves or the stalks for lamb feed? I sowed 1¼ pounds to the acre in drills 28 inches apart, and found that much too thick. About ¾ pound I should think would be better. My lambs were confined on it, and without grain averaged \$4.40 each some two or three weeks before Christmas. I have 25 acres that I want to devote to rape this year, and I have just been wondering if it would be wise to sow it about May 1st. (2) All the seedmen seem to think that the hot weather affects the early sown adversely. Have you ever known sheep to be pastured on white mustard, and if so what do you think of it? Is fall rye good for sheep pasture during spring months? Which do you prefer for sheep in winter, turnips or mangels? What is the best time of the year to dip sheep? Some advise dipping the lambs two or three days after shearing. Will this do, or should "both" be dipped at shearing time and again in the fall? Would it pay to dip the lambs that I buy to fatten on rape? Did you see an article in the "Farmer's Advocate" telling how Prof. Shaw succeeded in feeding sixteen sheep off one acre of land by growing a series of green crops, and if so, do you think it practicable on a larger scale?

Huron Co., Ont.

JOHN H. MALLOWH.

Reply.—In the first place, I want to express keen sympathy with our correspondent in his venture. I have urged such enterprise again and again, and I

(1) More, again, if you please. We will pay you a visit shortly—with pleasure.—Ed.

(2) Quite wise.—Ed.

feel sure there are thousands of acres now totally unprofitable that can be made to bear their share of governmental tribute and Provincial taxation, as well as yielding a handsome revenue to the enterprising shepherd. To be carried out successfully, brain work, enterprise, patience, and observation will be necessary. As a chain is only as strong as its weakest link, so this system will be successful or not according as the connecting links are maintained in steady progression by close observation and natural aptitude for the business.

I don't wish it to be understood that I have been advocating any profound scheme, but simply point out what has been accomplished in England, and ask whether a modified system, as there adopted, might not be successfully carried on here. With the knowledge firmly impressed upon my mind that without sheep husbandry many of their now most prosperous and the best farmed district must go out of cultivation—that our climate is suitable, that even our thin, rocky soils, resembling those alluded to, are naturally quite the equal in fertility to the Norfolk sands (1)—I do hope to see this industry so established in our midst that our mutton may attain the same popularity and good name in Europe that it bears in the neighboring Republic; and that the same skill and intelligence may be brought to bear as has been done in other branches of agriculture.

Replying to the questions as in order asked:—First: As to date of sowing rape.—My experience with early rape has not been satisfactory, except last year, when it came so opportunely. I shall try about four acres this year, early enough so that if it looks like a failure I can plow and re-sow. I would advise our correspondent to do the same.

Large rape.—The stalks are the most valuable part of the plant, and these thick ones were scooped out below the surface of the soil. I like sowing plenty of seed; it can be harrowed out; but I am satisfied we all leave our plants too thick. I hope to get some seed in by 1st May, and earlier if possible. If I were feeding for market I don't think I should care to have it so early, but where one is doing a ram-trade it answers a great purpose.

White mustard (2) was grown largely in Lincolnshire when I was a boy, as sheep feed, and especially as a preparation for wheat: it followed oats and vetches, or some other green crop; about 10 to 12 pounds of seed per acre was used. It was thought to have the peculiar property of causing ewes to come in season, (3) hence it was often used by ram breeders or those wanting early lambs. The ewes were turned upon it about ten days or two weeks before the ram was put with them.

I place but little value upon rye; it will blow out a lamb; it will put the ewes off their appetite for dry food, and just about when it gets to be sound feed it at once becomes woody. A few extra bushels of mangels at that season are worth so much more there is no comparison. As between turnips (swedes) and

(1) Than which nothing could be poorer in their original state.—Ed.

(2) Very poor food. We grow it in England, and again Sorrel—1884, and never found it good for much.—Ed.

(3) Quite new to us of mustard. We always used rape for that purpose, as did all the Webbs, and other large breeders.—Ed.

mangels I prefer the former, except for ewes after lambing. (good.)

The best time to dip is "whenever you find ticks." But if both lambs and ewes are dipped a week after shearing, there will be but little need to dip in the fall, still, I would do so if necessary. I dipped my show lambs in December on coming from Guelph, and then concluded to put the whole flock through. We did so with no bad results, so I would advise dipping at any season rather than feed ticks. I would certainly dip every lamb I bought to put on rape.

I don't remember Prof. Shaw's article to which you refer, but I do believe that it is not only possible, but in the near future "a system of sheep husbandry will be established that may be carried out on the same (though modified) lines as in England, and with equal success." And I am sanguine enough to hope that Mr. Mallowh may be one of the pioneers. He is on the right scent; work it out foot by foot, as a hound on the trail. If one year you overrun the scent, "hark back" and work the ground over again. You will meet with "checks," but regard them as breathing spells, wherein one may cogitate upon the mistakes and thoroughly learn to avoid them in the future; they are often of more value to the student than even success.

Allow me to continue the simile a little further, and hope our friend may at last run from scent to view, and pull him down in the open, with the glorious "whoop-whoop" ringing in his ears. In other words, may he be as successful as I hope and wish he may, and not be dismayed at first with small discouragements, but persevere, and the result is certain.

RICHARD GIBSON.

SHEEP.

It has been suggested that a profitable business might be done by persons taking up some of the abandoned New England farms, and starting sheep-breeding on them. These farms can be bought very cheaply, and on many of them there are good houses and outbuildings. The experiment is worth trying.—Farming.

The lamb crop in Australia has been very short owing to the great drought. One station reports that from 50,000 ewes only 10 per cent. of lambs have been reared, and they are poor ones. On the same station the output of wool is 800 bales less than it was the previous year. Do.

What is known in Great Britain as pure lustre wool is the growth of Lincolnshire, Nottinghamshire, and the East Riding of Yorkshire, and there is no wool precisely like it anywhere else in the world. It moves in price with alpaca and mohair. It can be mixed with or used in place of the latter, or it can be made into beautiful, bright goods without any admixture. The Demi-lustre, a straight, silky-haired wool, not so bright as Lincoln, but a little finer, and which is known as Leicester, is grown in the midland and in some of the western counties. Do.

SUMMER FOOD FOR SHEEP.

Don't forget to provide some. It will pay well to do it if the pastures are not ample. The food should be

sown. It will be a great help to the sheep. And when of the right sort it will furnish them with a nice bite during much of the summer. Various kinds of food may be sown, but there is probably no single plant that will furnish more summer food than rape. Rape may be sown early. If eaten down, it will come up again, more especially if not eaten too closely. If it is harrowed after the first, and even after the second, time of pasturing, so much the better. The harrowing will be good for the rape. It will help to retain the moisture. It will break the crust formed by the treading of the sheep, and it will start weeds, which the sheep will mow down subsequently when they are eating off the rape. Two pastures will, of course, be much better than one, so that the sheep may be made to alternate on them.—Farming.

THE SHEEP INDUSTRY IN AMERICA.

The sheep industry in the United States, at the present time, is not in a flourishing condition. Since the Democratic party came into power the number of sheep in the country has been reduced by nearly 9,000,000 head. This is owing, probably, to the change in the tariffs, and to the effects of the contemplated change before it came. The flocks have been reduced by about one-fifth. This is a serious reduction, and one that cannot be made up even in several years. The influence which this large reduction should have upon the sheep industry in this country should be favorable, for it should lessen the competition in the export trade from this country to England. The trade between Canada and England in sheep has been much on the increase, of late, and, if it should still further increase, so much the better for our flockmasters. It is not improbable that the protective tariffs in the United States will be made higher, and the people may again give more attention to the sheep industry; but, even so, as already stated, some time must elapse before the shepherds can restore the numbers even that they have lost. Do.

THE NEW SHEEP BARN

At the Minnesota University Experiment-Farm.

The building of which the accompanying sketches give a very correct idea was erected in the summer of 1895. It is 120 feet long, 36 feet wide, and 14 feet high at the posts. As shown in Fig. 2, a passage 5 feet wide runs from end to end, but it will be observed that this passage is not in the centre, for the reason that the pens or divisions on the south side are intended for feeding flocks. One hundred sheep or lambs can be fed in the pens on the north side at one time, and small flocks of nine different breeds can be kept simultaneously on the south side.

As will be noticed, the building is plentifully supplied with windows. A door also opens into each division from without, and it is cut in twain, and a yard is attached to each pen. The divisions between the pens are moveable; hence they can be taken out at will, and large doors are so arranged that a wagon can be run through the various divisions when the manure is

being removed. The racks extend along the sides of the passage, so that all the food given may be easily put into them from the passage into each pen. The lambing pens are shown in the sketch, as also the silo, the cellar, the wool room, and the feed room. The silo is 24 feet high and is made of 2½ inch matched staves. It rests upon a floor of bricks laid in cement, a double tier of bricks being laid under the part on which the staves rest.

The plan of the loft is shown in Fig. 4. It is amply capacious to hold food supplies for a whole winter, and also bedding, even where experimental feeding is carried on. The water is brought in pipes, and is drawn from hydrants in the passage. From these it will be conveyed by means of hose into small tubs in the various divisions.

This barn, which some good authorities have pronounced the best sheep barn in all the west, is located in a field which contains between ten and eleven acres, and it is the intention to keep all the sheep on the farm, about one hundred head, in this field through the summer season on the food which it produces. Some of the crops grown will be devoted to sowing uses, but the larger portion thereof will be pastured.

One hundred lambs were fed in the barn the past winter. They made from eleven to twelve pounds of gain each month on dry food. The bright sunshine of the winter season in the North-west is eminently favorable to the fattening of sheep. The dryness of the air and the steady character of the weather enables them to follow their natural inclination to spend most of their time out of doors.

THOMAS SHAW.

Minnesota University Experiment Farm

HUNDRED POINTS OF AYRESHIRE COW (SCOTCH);

Adopted 19th Feb. 1884.

Points.

- 1st. Head short, forehead wide, nose fine between the muzzle and eyes, muzzle large, eyes full and lively, horns wide set on, inclining upwards 10
- 2nd. Neck moderately long and straight from head to top of shoulder, free from loose skin on under side, fine at its junction with the head, and enlarging symmetrically towards the shoulder 5
- 3rd. Forequarters, shoulders sloping, withers fine, chest sufficiently broad and deep to ensure constitution; brisket and whole forequarters light, the cow gradually increasing in depth and width backwards 5
- 4th. Back short and straight, spine well defined, especially at the shoulders, short ribs arched, the body deep at the flank 10
- 5th. Hind quarters long, broad and straight, hook boxes wide apart, and not overlaid with fat thighs deep and broad. Tail long and slender, and set on level with the back 8
- 6th. Udder conspicuous and not fleshy, hinder part broad and firmly attached to the body, the sole nearly level and extending well forward, milk veins about udder and abdomen well developed; the teats from 2 to 2½ inches in length, equal in thickness being in proportion to the length, hanging perpendicularly their distan-

- ce apart at the sides should be equal to about (1-3) one third of the length of the vessel and across about one half of the breadth.... 33
- 7th. Legs short in proportion to size. bones fine, joints firm..... 3
- 8th. Skin soft and elastic and covered with soft close woolly hair. 5
- 9th. Colour red of any shade, brown or white, or a little mixture of these, each colour being distinctly defined, brindle or black and white not in favor..... 3
- 10th. Average live weight in full milk, 1176 lbs..... 8
- 11th. General appearance including style and movement..... 10

Perfection..... 100

DAIRY EXPERIMENTS AT THE ONTARIO AGRICULTURAL COLLEGE.

We made some extracts last week, in regard to the relative efficiency of the three methods of creaming, from the excellent report of the Professor of Dairying at the Ontario Agricultural College, for 1895, and give below some further extracts from the same report, which treat of other subjects:

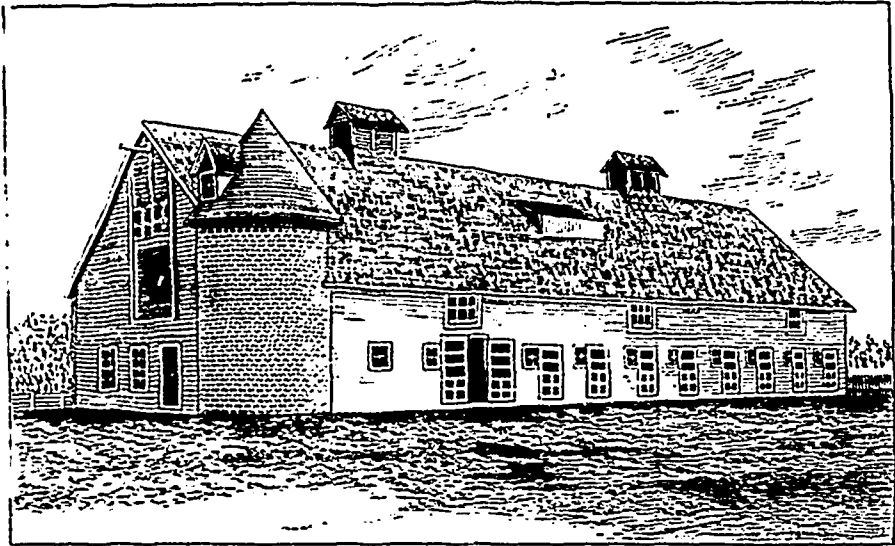
SWEET CREAM BUTTER

For some four years we have been making experiments with churning sweet cream. Our results have been practically the same throughout, viz: that butter can be made from sweet

During 1895 eighteen trials were made, in which 1,919 lbs. of cream were churned at an average temperature of 45.80 at the beginning, and 55.40 at the end. The time required for churning ranged from half an hour to one hour and fifty-five minutes, with an average time of one hour. The average percentage of fat in the buttermilk was 6.223.

RIPENING CREAM

The most difficult part of the butter-maker's task, and the one requiring the most skill and good judgment, is the proper ripening of the cream. A number of different "starters" were used in our dairy during the past season. Of



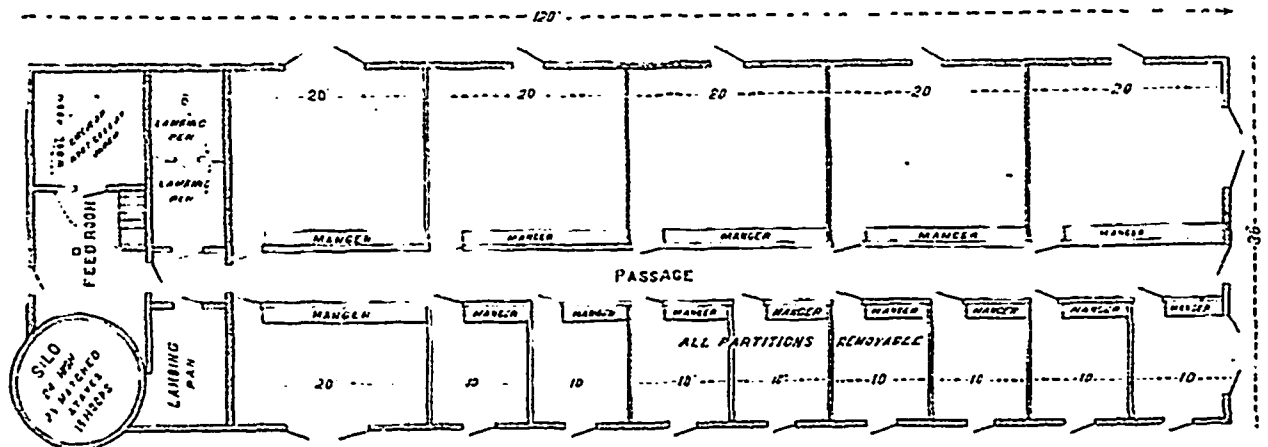
New Sheep Barn, Minnesota Experiment Farm.

There is no scale of points for a bull but when judging them, I am very particular that they have a good head, good long neck, with no loosed skin under jaw. Fine shoulder, the back bone being an inch or two higher than the shoulder blades.—No hole behind the shoulders. The ribs should join in quite level; flat and strong made across the kidneys. Short from the shoulder to the kidneys and "long quarters."

cream which will suit a certain class of customers, who like mild, fresh, creamy flavored butter; but by the majority of persons of Canada, ripened cream butter is liked better. Other points we have learned, are:

1. We must churn sweet cream at a very low temperature (45 or below) in order to obtain all the butter. Churning at ordinary temperatures means a great loss of fat in the buttermilk.

all the "pure cultures" which we have tried, there appears to be none that produced so marked an effect on the flavor of cream and butter as Conn's Bacillus No. 41. Between August 6th and the 10th, a similar flavor to that produced by B. 41 was produced in the cream and butter by using a starter made in the ordinary way, viz: by heating some skim milk to 90o and allowing it to sour. In cream-gather-



Ground Plan of Sheep Barn, Minnesota University Experiment Farm.

When viewed sideways, I am "very particular" that they should be "deeper" behind than in front and the belly should be "deep at the flank" and properly joined and would, especially looking to "deep milking qualities," always prefer a deep flank, supposing the animal was flat on the ribs, to a round ribbed light flanked animal. The teats well pronounced and wide apart.

Cream rich in butter fat (25 to 30 p. c.) gives best results.

2. Sweet cream butter does not possess "keeping quality" the same as ripened cream butter. We have found that it quickly goes off in flavor and does not improve or take on the flavor of ripened cream butter as claimed by some.

3. The temperature of the cream usually rises about 10o in the process of churning, indicating that the low temperature is not suitable for bringing the butter (yet necessary to start with) in order to gather all the particles of fat.

ing creameries, where it is difficult sometimes to get a good flavor in the or in fact at any creamery or dairy where the flavor of the butter is not first-class, we would recommend a trial of Dr. Conn's B. 41.

As a "starter" for ordinary creamery work, we would recommend pasteurizing the skim milk (heating to 170o for 20 minutes) cooling it to 85o, and then adding about 5 p. c., of good flavored buttermilk, or any "starter" of good flavor, in order to obtain a uniformly good flavored cream and butter from day to day. Add from 5 to 10 p. c., of this starter to the cream, and it will re-

sult in a more even flavored butter during the year.

SHOULD WE WASH OUR BUTTER ?

During the past year, we have made one experiment each week, by taking out about one-third of each churning and salting, working and packing this in a tub without washing. The remaining two-thirds we washed once; and then salted, worked and packed one-half of it. The other half (or remaining third of the original churning) we washed twice and then salted, worked and packed it. We have found that by adding about 25 p. c. of water to the contents of the churn before drawing off the butter milk, we thin the buttermilk and so allow a better separation of the butter, whereas, if this is not done, it is difficult to get the buttermilk from the butter. We would recommend adding in winter about 10 p. c., of water at churning temperature, when the butter "breaks," and the remaining 15 p. c., of colder water after the granules are full size. After this, revolve the churn a few times to mix the water with the milk, and then draw off the buttermilk and water.

As a result of the season's experiments on this point, we would recommend little or no washing where the butter is made into pound prints for customers who like highly flavored butter, and who will consume it in from eight to ten days after it is made. While we have found the unwashed butter to keep fully as well as the washed in some cases, yet the general results indicate that the former has not quite so good keeping quality as the washed butter. For packing in tubs, butter may be washed once or twice, but we feel satisfied that many makers are spoiling the flavor of their butter by too much washing. To-day (Dec. 28th) I have just examined three prints of butter, from the same churning, made at the dairy on the 18th instant, and the print of unwashed would score three or four points higher in flavor than the others which were washed. Winter butter especially should not be washed too much.

THE OIL TEST CHURN COMPARED WITH ACTUAL RESULTS IN CHURNING

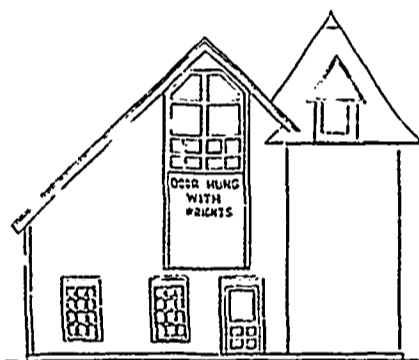
The oil test churn has been the subject of a number of attacks from patrons of cream-gathering creameries and others. To compare this test with the actual yields of butter from the churn, twenty-seven trials were made during the months of July, August and September. Altogether, there were churned 2,385 1/4 pounds of cream, which made 592 pounds 5 ounces of butter. Tested by the oil test churn method, there were 530.6 inches of cream, which varied in the test from 75 p. c., to 140 p. c. The total amount of butter credited in these churnings by the oil-test churn was 575.94 pounds, compared with 592.34 pounds as the actual yield, a difference of 16.4 lbs. Half of this difference was made in one day, June 30th, when the oil test credited the churning with 20.43 pounds of butter, whereas the actual butter churned was 38.42 lbs. Why there was so much difference on this particular day, it is difficult to say.

Only three times out of the twenty-seven trials did the oil test credit more than the actual yield from the churn.

EXPERIMENTS IN FEEDING

"Value of milk for calves"—Beginning May 6th, an experiment was commenced to find the relative value of skim milk and whole milk for calves. Two grade calves, as nearly alike in age and weight as we could get, were selected. Number one, fed on skim milk only, was dropped May 3rd and weighed 61 pounds on May 6th. At the end of six weeks it weighed 141 pounds, a gain of eighty pounds, or nearly two pounds per day. During this time the calf drank 714 pounds of skim milk. Calf number two fed on whole milk (dropped April 10th) weighed 75 pounds at the beginning, and 201 pounds at the end of six weeks, a gain of 126 lbs., or three pounds per day.

These calves were both sold to a local butcher, who pronounced the calf fed on whole milk worth one cent a pound more than the other. The calf fed on skim milk sold for \$3.50, (1) and the one on whole milk sold for \$7.50. Allowing \$1.50 as the value of No. 1 calf, and \$1.00 as the value of No. 2 at the beginning of the experiment, we have \$2.00 as the value of 714 pounds of skim milk, or 28 cents per 100 pounds and \$5.50 as the value of 714 pounds of whole milk or 77 cents per 100 pounds. To produce one pound of gain required 8.9 pounds of skim milk. The whole milk gave one pound of gain for 5.6 lbs. fed.



End Elevation of Sheep Barn, Minnesota University Experiment Farm.

GIVE SEPARATOR CREAM AGE, AND IT IS ALL RIGHT.

Ed. Hoard's Dairyman:—H. E. B., on page 288, wants to know why the separator cream he furnishes fails to give good satisfaction for ice-cream making.

There was once a time when we thought we knew lots about separators, milk, cream, cows, butter, and the whole dairy business in general and particular. Well, we are still reading the "Dairyman" and keeping in sight of the procession. Though we have not had the harness on for a year or two, still we know where the old rig is, and will just pause in our regular daily course to suggest to H. E. B. that the trouble comes from the newness of the cream, probably. We went through this mill with the first Hand Separator ever run in New Hampshire, in 1886-7, and were accused of furnishing "thin cream", when, as a matter of fact, we were giving our customers a cream with 4 to 6 p. c., more butter fat in it than we had been doing with the old feed setting. Still it did seem thin and it wouldn't whip, as we know from

(1) And, probably, was a bony beast, from too much phosphate in the skim-milk.—Ed.

bitter experience, at least not when just taken from the milk, so we investigated a little and found that age was all that was needed, and our separator cream, when 24 to 36 hours old, would whip without churning, it would also make good ice-cream or anything else, and we were happy; so were our customers.

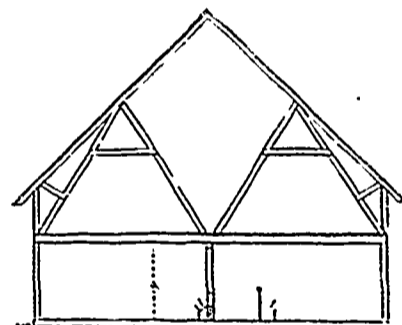
If our friends in the west will apply this suggestion, as seems best in their own case, it may be of use, anyway it is free.

G. H. WHITCHER.
Durham, N. Y.

We are very glad that Prof. Whitcher keeps the "old harness" within reach, but regret that he so seldom puts it on. We suppose he might have gone into various and sundry suppositions in regard to the effect of age upon cream, and attributed the changes which take place to the activity of the bacteria. Probably bacteria may have some influence, but we cannot help but believe that there is a mellowing or ripening that comes solely from age and without the intervention of microbes of any kind (So do we. Ed. J. of Ag.)

POINTS IN COW KEEPING.

Referring to the performance of the three Holstein cows at the Michigan Experiment Station, Rosa Bonheur, Houwtje D., and Belle Sarcasie, which we published in full some months ago,



Sectional View of Sheep Barn, Minnesota University Experiment Farm.

with photogravure illustrations of the animals, we find in an exchange the following deductions as summarized by Prof. Smith:

1. The similarity between the forms of these cows and the ideal dairy type as exemplified in the score card goes far to confirm the value of the latter.
2. The size of the udders and bellies requisite to the production of extraordinary yields seems to indicate that the cows must be relatively large if a phenomenal record is desired.
3. Perfect health, a glossy coat, thrifty appearance and a good coat of flesh are not incompatible with the best and most economical dairy performance.
4. In feeding dairy cows successfully they must be treated as individuals, each with likes and dislikes peculiar to herself. "One cow's meat" may be "another's poison."
5. Regard must be had to the same question of individuality in the stable management. Rosa enjoyed a temperature entirely too low for the comfort of the other cows in the herd.
6. Cows should be given a variety of feeds.
7. They should be allowed an abundance of succulent food in winter.
8. In these cases, an ample grain ration while at pasture was accompanied by extraordinary yields. It hardly

seems possible that the later could have been produced without the former.

9. The individuality of the cow is the determining factor, (a) in the amount of milk she can be made to yield; (b) in the quality of her milk; (c) in the relation of quantity and quality to the lapse of the period of lactation; (d) in the selection of her feed; (e) in her stable management as to temperature, frequency of feeding and watering.

10. While the richness of the milk in fat is largely determined by the individuality of the cow herself it is influenced within narrow limits by the season, the richer milk being yielded in the colder months.

11. The fact that each of these cows descended from ancestors of merit confirms the idea that ability in the dairy is a matter of inheritance, and that therefore in the selection of his cows the dairyman should regard (a) their forms, (b) the performance of their ancestors and (c) their record with scales and tests. The later is the deciding factor.

12. In feeding, the general plan should be to place the cows in the hands of an experienced and skillful feeder, and then provide an abundance of succulent feed, a variety of grains and hay and insist that these materials shall be presented in the most appetizing form. The judgment of the feeder, rather than any predetermined formula, must decide what the ration of each cow shall be, both in amount and composition. This judgment will be governed largely by the appetite of the cow and the condition of her bowels and milk glands, but will attach due weight to the knowledge of the chemical constitution and specific effect of each element of the ration.—"Hoard."

PROFITABLE?—According to "Hoard's Dairyman", the Minnesota creameries report dividends ranging from 42 to 53 cents per 100 lbs. of milk; average 47 cents, equal to about 4 1/2 cents a gallon!

Household-Matters.

In town or country, every mistress will strain every energy, to make her house look as nice as her circumstances will permit, and, where there is taste, the cost of doing so will not be much.

There are so many, very pretty, inexpensive things sold now, that it is only a matter of using them in the nicest way to display their look. A few yards of Art muslin, thrown about a room, perhaps to hide an ugly scratch on the furniture, or to twist round a photograph, or to cover up an old picture frame.

In fact, it is impossible to say where it will not be a pleasure to look upon. Choose pretty colours and see that they blend well together.

A bunch of flowers or green leaves, in the centre of the dinner table, with about a yard and a half of muslin thrown round it, and carefully picked up in puffs, so as to completely hide the vessel used. If the flowers or plants are drooping ones, let them fall carelessly over the muslin, and I think you will find something so pretty to look at that you will eat slowly, thereby giving the digestive organs plenty of time to do their work; for people, as a rule, eat much too fast. A hanging lamp with a pretty paper shade will add much to the furnishing of a plain room, and be quite safe for children.

About window blinds; to look well they must hang straight, and to get them to do this, never use a cord, but get a piece of cane or wood, and run through the hem, fasten firmly at both ends, and you will not be bothered with ugly hanging blinds. Curtains can be got at almost any price; cheese-cloth, at 6 cents a yard, will make very pretty ones, and if hung nicely, and tied back with a bright ribbon or a strip of muslin, will add much to the pleasing look of the room.

In the far back woods, it matters not where, all these little items sum up a pleasing whole, and the work can be done at odd times, when it will serve to keep those very tiresome people, the grumblers, from feeling lonely.

Idle little people can a chance of whittle to some use, and the girls can whistle to some use, and the girls can always find flowers for the trouble of seeking.

APPLES.—The children will eat the early windfall apples, and there is no harm in their doing so if they are stewed first with a little sugar to flavour them; they are really very good, as long as the pips are tender, indeed some people gather them from the tree and use them in this way.

TOMATO PICKLES AND PRESERVES.—Green Tomato Pickles: Four quarts green tomatoes, 8 medium-sized onions, 1 quart vinegar, 2 cups of granulated sugar, 1 tablespoonful each of salt, pepper and ground mustard, 2 teaspoonfuls each of whole allspice and cloves, 1 teaspoonful of mace. Peel and slice the onions. Slice but do not peel the tomatoes. Dissolve the sugar in the vinegar, and pour this over the tomatoes, onions and spices. Heat gradually, and simmer until the vegetables are tender. Stir every now and then to prevent scorching. Put up in pint or quart jars, sealed. This is a delicious pickle.

Tomato Sweet Pickles: One-half bushel of green tomatoes sliced. Sprinkle with a cupful of salt and let them stand all night. In the morning drain the water off. Add 2 quarts of water and 1 quart of vinegar to the tomatoes and cook until tender. Drain again, and throw the vinegar and water away. Put 3 quarts of vinegar, 4 pounds of sugar, 2 tablespoonfuls each of cinnamon, cloves, allspice and ginger. The spices should be tied in a cloth. When the syrup is boiling, add the tomatoes and boil a few minutes. Put into stone jars and tie a cloth over them. These will keep without sealing in a cool place.

Ripe Tomato Preserves: Peel 7 pounds of small yellow tomatoes. Sprinkle over them 7 pounds of sugar and let them stand all night. Then drain off the juice and boil 20 minutes. Take out the fruit with a perforated skimmer and put into jars. Boil the syrup until it is thick; just before taking it off the fire add the juice of three lemons. Pour the hot syrup over the tomatoes. These need not be sealed.

Tomato catsup: Peel 1 peck of ripe tomatoes and stew them half an hour. Press through a coarse sieve. Return to the stove and add 1 ounce of salt, 1 of mace, 1 tablespoonful each of black pepper, powdered mace, and celery seed tied in a thin muslin cloth, 1 teaspoonful of cayenne and 7 tablespoonfuls ground mustard. Let it boil

at least 5 hours, stirring constantly the last hour and frequently before that. Then let it stand until cold, add a pint of strong cider vinegar, take out the celery seed and bottle, covering the corks with sealing wax. Keep in a cool, dark place.

To make use of sweet, insipid and tasteless apples, stew them and mix them with stewed cranberries in the proportion of one part of cranberries to two parts of apples. Not quite as much sugar will be required as for the cranberries alone. Strain them through a colander and serve cold with meats or towl.

"Chutney Sauce."—Twelve green sour apples, 2 green peppers, 6 green tomatoes, 1 small onion, 1 cup of raisins, 1 quart of vinegar, 2 tablespoonfuls of mustard seed, 2 of salt, 1 of powdered sugar, 2 cups of brown sugar. Remove the seeds from the raisins and peppers, then add the tomatoes and onions and chop all very fine. Put the vinegar sugar and spices on to boil, add the chopped mixture and simmer one hour. Then add the apples, pared and cored and cook slowly until soft. Keep it in small bottles, well sealed.

LITTLE HEALTH HINTS.—How to Purify Water.—A simple mode of purifying water is to sprinkle a tablespoonful of powdered alum into a hogshead of water, stirring the water at the same time. This will precipitate all the impurities to the bottom after being allowed a few hours to settle and will so purify it that it will be found to possess nearly all the freshness and clearness of the finest spring water. A pailful containing four gallons may be purified in this manner by using no more than a teaspoonful of the alum.

HEALTHY FUN FOR CHILDREN.—Japanese Shuttle-Cock.—Draw the outline of a yataghan blade—yataghan is a Turkish sword—similar to that shown



JAPANESE SHUTTLE-COCK.

In the illustration, using strong paper let the base be circular. Cut out the drawing, and, using it for a model, cut as many more as may be required. Decorate them with a design painted in water-color, or drawn with colored crayon. Stick wax seals or little round bits of bread on the circular portions for ballast. Now throw them up in the air and you will see them come down slowly, turning round as they fall, and presenting a graceful and pretty appearance with their bright colors and beautiful motion.—Once a Week.

HOUSEKEEPER.

A damp handkerchief or a large green leaf in your hat these hot sunny days promotes comfort and may save sunstroke.

Carry a lemon in the pocket while in the hay or harvest field, and take a little of the juice occasionally. It will quench the thirst. One should not drink too much water when overheated.

Salt added to new milk will curdle it; therefore, in preparing porridge, custards, or gravies, do not add the salt until the last thing.

Clover tea is excellent for purifying the blood, clearing the complexion, and removing pimples. Dried clover may be used for the tea.

A cup of hot water taken the first thing in the morning will often prevent a bilious attack. Hot water as a beverage is exceedingly wholesome, especially when the digestive organs are weak. It should be taken before each meal as well as after. A half teaspoonful of lemon juice makes it palatable.

THE HOG FOR THE BRITISH MARKET.

In our April number, we gave an extract from an English paper, showing the ruinously low prices at which both home and foreign bacon has been selling in the English markets, and at the same time we drew attention to the fact that both Continental and Irish bacon ranked from 30 per cent. to 50 per cent. higher than the Canadian article.

Since then we have had an opportunity of looking over the sales account of one of our large packing establishments that caters largely to the English trade, and when we saw the balance that stood on the wrong side of the ledger we were not surprised at being told that the company had decided to close down to a great extent until things began to brighten up a little.

One fact, however, we noticed particularly, and that was that, in several cases, the return from the consignees in England were accompanied by the injunction to ship nothing but light weights of the best quality, containing plenty of lean meat, fat heavy weight, being practically unsaleable. We drew the manager's attention to the difference in price between Canadian and Irish curings, and asked him to tell us frankly whether the fault lay with the quality of hogs supplied by the farmers or whether the curing had something to do with it.

His reply was that undoubtedly the fact that Canadian bacon-curers were obliged to salt rather more than the Irish and Danish curers do for their best qualities, owing to the necessity for keeping the meat longer before it is consumed, prevented their realizing the highest prices for fancy, mild-cured goods; still the main trouble with Canadian bacon was the fact that packers experienced the greatest difficulty in getting a steady supply of suitable hogs for producing the quality of bacon most in demand, and until packers could depend on getting such hogs in

sufficient quantities to supply a steady demand for the furnished products, Canadian bacon would never reach the standing it might in the English markets. This gentleman is an excellent authority on all matters relating to the bacon trade, and we cannot urge our readers too strongly to lay his words to heart; it has been proved over and over again by actual tests that every pound over the first two hundred pounds live weight costs the feeder far more than the preceding one, and when the market calls for a light hog, and when it has been proved that a light hog costs less per pound to feed than a heavy one, why will so many of our farmers persist in feeding their pigs up to weights that are practically unsaleable, except for mess pork, and for supplying local shantymen.

England is the market of the world, and the men who have captured the English markets for their products are the men who are making the most money. We have every facility in Canada for raising the quality of hog our trade calls for, and it is our own fault if we do not do so.—"Farming."

BREEDING SOWS.

That well-known American authority, John A. Jamieson, in reply to a correspondent who enquires as to the advisability of breeding a sow three days after farrowing, writes as follows: "While our experience is limited, so far as it went it was a failure. I have an acquaintance that once owned a fine Berkshire sow that was suckling an excellent litter of pigs, which he was anxious to have do their best. At six weeks old they were attacked with the scours. For a time he could assign no reason, but in hunting for the cause he remembered that the sow had been served at three days after farrowing. To save the pigs they had to be weaned at six weeks old, which was against their making as fine animals as they would had they been allowed to suckle two to four weeks longer.

"This plan of breeding has, in the main, been advised by men growing roasting pigs, in which case the practice may be a success for a time. But in general farm practice it can but prove a failure in a short time. About the third litter under this plan will be a failure. The over-crowded machine is bound to go to pieces. It is the same with the brood sow; if crowded beyond her limit, nature will call a halt, and give the farmer possibly one or two pigs where he expected a large litter. It is simply beyond the powers of endurance of a sow to suckle a large litter and feed another in embryo at the same time."

This corresponds exactly with our own experience. We have frequently heard the question discussed as to whether it was possible to breed a sow successfully while suckling her pigs, and we have had no hesitation in answering in the affirmative, as we have done so ourselves on more than one occasion, but, like Mr. Jamieson, we highly disapprove of the practice.

Two litters a year is all any sow should be called on to farrow, and very often one will pay as well as two.