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To Fruit Growers.

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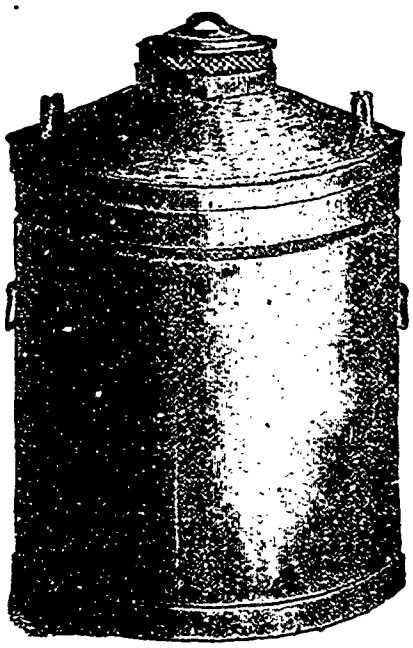

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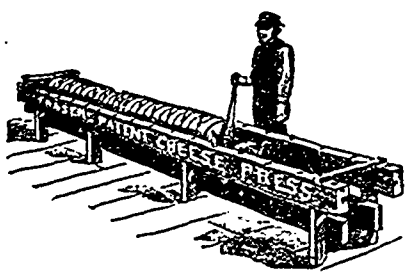

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THE ILLUSTRATED

Journal of Agriculture

Montreal, June 1, 1893.

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THE DELIBERATIONS OF THE COUNCIL OF AGRICULTURE, published in our last number, not having been approved by the Lieutenant-Governor in Council, were only given as a matter of information.

Notes by the Way.

May 1st, 1893.

CLOVER.—Does the seed of white-clover, like the seed of charlock—wild mustard—lie in the ground for years without sprouting? If not, why does a dressing of certain matters bring it up in abundance?

Many years ago, in 1849, if our memory serves us, a meadow near our house in England that had been mown yearly for season after season, gave up growing the clovers altogether. There was nothing but orchard-grass, sweet-scented meadow grass, with a little perennial ryegrass and plenty of ox-eyed daisies, but no creeping clover — *trifolium medium*, — white-clover, or trefoil, i. e., yellow-clover.

We dressed the meadow with a mixture of lime and road-scrapings, and the following year, the meadow was completely restored, the different clovers having evidently received the food that suited them. The following extract from the London "Field" would seem to show that basic-slag has the same effect.

CLOVER WITHOUT SOWING SEEDS.

SIR,—I have read, with great interest, in your issue of April, the letter of your correspondent H. E. on the improvement of pastures, and I may say that I have had a good deal of experience, if not in improving pastures, at least of trying to do so. In some cases I have succeeded fairly well, but according to your correspondent, a rough, poor arable field, left unploughed for two years, with all the weeds known growing at random, can, without let or hindrance, without grass or clover seeds being sown, after a dressing of 6 cwt. of basic slag to the acre, become a sheet of white clover. A most desirable transformation scene! I can understand this dressing improving the grass; but not to the extent of making the field a clover field, nor have I ever seen such an example of a self-sown pasture, though I have travelled far and wide. I should like to know whose basic slag was employed to produce the clover, as no seeds were sown, and whether, either in Sussex or any other county, a similar result has elsewhere been obtained. If so, I need hardly say I shall be busy next week dressing the self-sown fields with basic slag. I shall be glad of any information from H. E., or, indeed, from any of your readers on the subject.

MARDEN PARK.

A PROLIFIC EWE.—M. J. Maxtone Graham, sends an account of marvellous fecundity in a ewe, half-bred Leicester-Blackface. On the 14th April she lambed down 4 ram- and 2 ewe lambs, five of which she is suckling, and the sixth is being brought up "on the bottle," as the farmer's wife, fancying it was rather cold after its birth, took it in to the kitchen fire, and the dam refused, very wisely, to have anything to do with it when the lamb was returned to the pen. It seems that plurality of births are very rife in Britain this spring.

A CURIOSITY IN BREEDING.—Mr Fowler, a well known shorthorn breeder, bought, at Betts' sale, a cow in-calf to Grand Duke IV. She produced a bull-calf, Royal Duke, the worst specimen of a shorthorn Mr. Fowler ever had on his place. His pedigree was so good, that in spite of his mean looks he was used as a sire, and his son, Lord Eglinton and his daughter Lady Eglinton, were among the most noted winners of their day!

CROSS-BRED SHORTHORNS AND JERSEYS.—Side by side, in M. Bouthiller's cowhouse, at Bleury, St. Thérèse, stand two heifers. When we visited the herd, we asked the owner if the larger one of the two was not a half-bred Jersey and shorthorn; the reply was in the affirmative, of course, for the double type was distinct. "But how is her companion bred?" asked M. Bouthillier; "well," we replied, "she looks like a large Jersey. If we were to guess, we should say that there may have been a cross somewhere of some kind, but what cross we cannot say." The heifer turned out to be by the same Jersey bull as her companion, out of another shorthorn cow! Colour, black switch, an almost typical Jersey, she was as different in appearance from her half-sister as a Devon is from a Welsh cow. Can any biologist account for this?

LEAN MEAT.—Small, fine bone and thickness of lean meat rarely go together. Those who are trying to supply packers with a better stamp of pig than those that have been in use heretofore, had better note this. If a good carcase of mixed lean and fat is wanted; and every bacon curer is crying out for such now; stout-boned sows and boars should be bred from. We well remember the disgust we used to feel when our sales' note from the London markets used to come back with the observation from the salesman: Not enough lean meat. The pigs sent—about 120 annually—were high-bred Suffolks, with very fine bone.

SHEEP.—Every one who has visited England will remember the mutton-chops he ate there. Many a Montrealer has said to the writer, during the last few years, "Are we never to eat a real mutton-chop here?" The reply of course was: "No, you will never taste such a thing in its perfection until the farmers take to breeding short-wools more extensively, and the butchers learn that a mutton-chop is not cut from the long bones of the neck." The best chop is from the saddle, cut about 1¼ inch thick, right across the two loins that compose the saddle. It should be cut with a saw, not with the knife.

MANGELS FOR COWS.—A correspondent of the Rural New-Yorker wants to know if mangels are injurious to cows, as he has lost several and his veterinary surgeon says their deaths were caused by eating mangels! We beg to assure the Editor of the Rural—he asks for information on the subject—that if experience teaches anything, mangels are the most harmless of foods for all kinds of stock. Millions of tons are given every year by English farmers to their milch cows, and we never heard of any complaints arising from their use. We ourselves have had no little experience in cow-feeding, and we never found mangels anything but beneficial to our stock, though our friend and farm-tutor, the late William Rigden, had an idea that the formation of a curious crystalline substance in the urethra of his show-rams was due to the mangels they received after the other roots were done.

CLOVER-HAY.—What is the good of sowing 2 or 3 pounds of clover to the acre, as I regret to see too many of the competitors in the competition of Agricultural Merit are in the habit of doing. Seven pounds of red-clover with timothy, and fourteen pounds when sown alone, are about the proper quantities. And in making clover-hay, cut it when the majority of heads are in full bloom, but before there is the least sign of the blossom turning brown. Above all, if the crop is heavy, and shows signs of going down, cut it at once; the leaf will be smothered, if the clover is allowed to stand, and drop off,—the leaf is the most valuable part of this plant.

BARLEY.—At the last meeting of the Council of Agriculture, Mr Andrew Dawes, of Lachine, "drew the attention of the Council to the bad results obtained from the sowing he had made of 2-rowed barley lately imported from Europe." In 1862, we were working the brewery at Chambly, and as we did not much fancy the 6-rowed barley the farmers in that neighbourhood were in the habit of growing, we imported from Hertfordshire England, a lot of superb Chevalier 2-rowed barley which we distributed among our customers, gratis, to persuade them to grow it. The first year's crop produced a miserable, thin, hard sample, and many farmers refused to grow it again; but those who persevered were rewarded for their patience, as the second year's crop was very fine, and the third weighed nearly as much as the original, i. e. 57 lbs. a bushel. The quality, as malting-barley was, as are all 2-rowed barley grown here, inferior to the original.

HUNGARIAN GRASS.—Where the seeds of the previous year's sowing fail, Hungarian grass is a very fair substitute. Sowing 30 lbs. an acre, in June, will, if the land be in decent order, both as to manure and cultivation, bring a fair cut of hay in August. Mow very early, as this grass, if the blossom is allowed to die, will be as hard as a stick.

THE DAIRY-ASSOCIATION.—The Eleventh Report of the Dairymen's Association, now soon to be published, will be found very interesting reading. The discussion on the various subjects treated by the lecturers are worthy of all consideration, particularly those on "Butter-packages" and on "French-cheese." During my visit to St. Thérèse in April, I found that the farmers of that district were highly pleased with the instruction afforded them at the convention; and a most intelligent foreman, or bailiff as we should call him in England, told me that he had no idea before that so much was to be learnt on the subject of feeding cows and preparing the milk-products.

SWINE.—Feeding young pigs in a clover field is good, but perhaps it would be better to cut the clover and give it to the swine in a well littered yard. In spite of the large quantity of nitrogenous matter in clover, I would recommend that a few pease be added to it for the young ones, as the plant in its immature condition is rather washy, and the pease would tend to firm the flesh, and promote the growth of lean meat.

CAPONS.—If any of our readers has tried the caponising of his young cockerels, we should be glad to hear from him on the subject. If the job were a difficult one, it could not be so commonly performed by the wives and daughters of our Surrey and Sussex small farmers.

The Farm.

CLOVER-SICKNESS.

A month ago, we mentioned that a well known correspondent of the "Country Gentleman," Mr Terry, sneered at the idea that there was any such thing as "clover sickness," treating it as a malady many people had heard of but no one had ever seen.

On February, 3rd 1887, a letter appeared in the same paper, from Mr A. P. Root, which established the fact that in the soils of the United-States, clover-sickness prevailed wherever clover had been too long grown, or had been too frequently repeated. Mr Root described the results just as they occur elsewhere. First, the benefit which the wheat derives from the growing of clover; next, the benefit clover derives from land-plaster; and finally, the inability to grow clover,

which is followed by bad crops of wheat.

Sir John Lawes, in a letter to the Country Gentleman, written in May, 1887, observes that considering the immense difference in the amount of fertility to be found in different soils, it is not strange that those who farm in the most favoured localities should be hard to convince that the disease really exists. They never saw its effects, therefore there is no such thing.

But any one who has ever watched the changes that have taken place in the 4-course rotation, as practised in the Eastern counties of England, and has, by asking questions, found that the failure of the clover-crop has been the sole cause of these changes, must be hard to convince if he does not believe in the existence of this mysterious disease.

When we were, in 1852, in the habit of visiting the markets of Essex, Hertfordshire, and Cambridgeshire, the constant subject of conversation among the farmers was the failure of the clover-crop, and the best possible substitute for that plant. The general opinion seemed to be that the red-clover should not be sown more frequently than once in twelve years, the 4-course rotation being extended to a 12-course rotation, as thus:

First round.—Roots, barley, clover, wheat;
Second round.—Roots, barley, trefoil, wheat;
Third round.—Roots, barley, pease, wheat.

The *trefoil* being the yellow or hop-clover - *medicago lupulina*—and the horse-bean, *faba vulgaris*, being sometimes, on heavy land, substituted for the pea. This change in the rotation turned out to be about the best that could be made, but, in spite of it, the wheat-crop in the second and third rounds was never so good as the wheat-crop in the first round.

Now we ask any unbiassed man: would the farmers of the above mentioned counties, men acknowledged to be the best farmers in England, have been likely to be so unwise as to give up the repetition of their best wheat producing crop, if the disease that prevented its growth was a mere matter of fancy?

The conclusion Sir John arrived at, after long and patiently conducted experiments on the failure of clover if too often repeated, was, in the first instance, that no combination of manures, natural or artificial, would cause land that was *clover-sick* to produce that crop. Of late years, however, the continuation of the Rothamsted experiments had taught Sir John, as he says, "two or three scraps of knowledge."

Red-clover had been grown continuously for 35 years on an old garden-soil without the application of any manure of any kind. Both soil and subsoil to the depth of 18 inches were very rich in nitrogen, it being evident that great quantities of dung had been trenched in to that depth. When Lawes wrote, the top-soil had lost a vast percentage of this nitrogen, but the land was still much richer than the farm-soil; the subsoil, even then, containing much more nitrogen than the topsoil of the farm-land. "This large reduction in the fertility of the surface-soil is contrary to what takes place when red-clover is grown on the farm, although the crops are made into hay and carried off the land; and even when the clover-roots are, as far as possible picked out of the soil, we still find an increase of nitrogen to have taken place."

The crops of clover grown on this garden-piece were equal, if not superior, to the crops grown on the farm-land; but they were very inferior to those grown in the earlier periods of the experiment. The clover, at first, stood out for four or five years, but latterly had to be resown every other year. "We have evidence here that, while clover has been grown for 35 years in succession without any sign of disease, *it is hardly safe to repeat it on the farm unless at intervals of* 8 *or* 12 *years.*

A field at Rothamsted had been under experiment for nearly 40 years. Part of it had received no manure at all during that whole period. Another part had received mineral manure only—phosphoric acid and potash—while a third part had been very highly dressed with rape-cake, ammonia salts, *and* minerals Turnips were tried to be grown every fourth year; but whereas the minerals only gave 8 or 9 tons an acre, the highly manured land yielded about 20 tons On half of each plot, the turnips were carted off, and on the other half, they were chopped to pieces and ploughed in. The wheat, barley, and clover or beans which were grown during the other three years of the four rotation crops, were all carried off, straw and all

Nothing could be poorer, in organic matter and nitrogen, than the land from which the turnips and other crops were carried off, it having received only mineral manures. Where the turnips were ploughed in, the condition of the land would be a little better, and in the full-dressed portion the soil must have been full of fertility, particularly, again, where the turnips were interred

In 1874, and again in 1882, red-clover was grown over the whole of the experiment-land. Crops were large; on the highly manured land 4 tons of clover-hay each year; on the land manured with minerals only, 3 tons each year, and in the unmanured land, rather more that 1¼ *ton each year.* In 1885, red-clover was sown again, and lo! the disease made its appearance in 1886. As usual, the plant, that during the fall and winter had looked well, began to die off in patches in the spring. Sometimes, considerable strips were not attacked, and the hay was a fair crop, but, on the whole, about one-half was destroyed. On the two lands or ridges that had only received mineral manures and from which all the crops of the course had been carried off over since the experiment began (35 years). *there was no disease whatever!* Where the turnips had been ploughed in, there was some slight disease, though the crop was, in appearance, the more vigorous of the two: 2 tons 4 cwt., against 2 tons 2 cwt. an acre. Upon the unmanured portion there was nothing but plantain and coltsfoot, the clover seeming to have been starved out.

And, now, let us look at the two manured plots. The unmanured plot had been so completely exhausted, for all practical purposes, that it refused to grow either turnips or clover. Fancy the state of land after the entire removal of *thirty eight* crops in succession! Where the disease was absent, no organic or nitrogenous manure had been applied, and all the vegetable matter grown had been removed, while the mineral manures applied contained more phosphoric acid and potash than was carried off in the crops.

But, where the disease committed the greatest ravages was on the portion that had received 2,000 lbs. of rape-cake, 200 lbs. of ammonium salts, and the mineral manure as well. besides the large crops (20 tons), of turnips having been ploughed in.

Did the immense amount of organic matter in this portion encourage the presence of an increased number of microbes, or other living organisms, that fed upon and thereby destroyed the clover plant? If this were so, why should the taking of a crop of beans or pease at the end of the fourth and eighth years, have rendered the growth of clover n the twelfth year free from the disease, at it probably from all practice would have been? Here, is the trouble. Can it be set at rest by concluding that the red clover requires, as part of its food, some special organic compound?

Again, here is a curious thing, deduced from the same course of experiments. No one ever heard of the *bean disease*—we speak, of course, of the horse-bean—; and yet, at Rothamsted, when beans were grown for a long series of years, in unmanured land, the crop degenerated so as at last to be only a few inches high. Was the plant-food exhausted on this plot? By no means, for although when the last miserable crop of beans was succeeded by barley sown down with clover, although the barley was "no great shakes," the clover-crop was magnificent! Now, after the last bean-crop, the soil was analysed, and found to have lost a large amount of organic nitrogen, and to be very poor in nitric acid. Remember, that beans and clover are both leguminous plants, and yet we have the fact that a soil that was becoming poorer in organic matter, nitrogen, phosphoric acid, and potash, ceased to furnish food for one leguminous plant, while it was preparing food for another plant of the same natural order. If the "magnificent" clover-crop was attributable to its imbibition of the free nitrogen of the air, why, the bean-plant has the same power as the clover; so we are as far off as ever from arriving at a solution of the puzzle.

The soil of the garden that grew clover for 35 successive years, had had no dressing of recent organic matter during all that period; so we may conclude that it afforded no food to the larger sorts of organic life in the soil, such as worms, &c., that might destroy the plant.

The conclusions Sir John Lawes draws from his experiments in connection with the "clover-desease," are the following:

"1. That this disease does not occur, even when the crop is grown continuously, provided that the soil contains in abundance the appropriate (*dominant*) food of the plant.

2. That the clover disease occurs in highly manured soils if the crop be repeated too frequently, and sufficient time is not followed for the formation of the appropriate food of clover.

3. That the fertility of a soil may be largely reduced by cropping, and by the absence of manure, while at the same time the food specially required by the clover may be increasing in the soil. The crops grown during the process of exhaustion may be, partly or wholly, plants of the same natural order as the clover, provided that they differ from the clover in certain properties of their growth and in the range of their roots.

4. That although clover does not appear to possess the same power of appropriating the mineral food of the soil as the cereal crops possess (for which reason mineral manures are often advantageously applied to this crop), still, mineral manures cannot be depended upon to grow clover on clover-sick land."

And now we turn to Dr Storer, another agricultural chemist, who says that clover-sickness is due to a want of *potash* in the soil. Those farmers, says he, that have applied kainit (Stassfurt potash) to land that was formerly clover sick, have succeeded in raising splendid crops of clover again. They have also found that *their clover is no longer thrown out* in the winter months, as was often the case before potash was used, and this *is doubtless* due to the increased *root* growth in the fall. So here we have two philosophers, Lawes and Storer, diametrically opposed to one another on a subject of vast importance. Lawes says: mineral manures, including potash, do not cure the clover-richness; Storer, on the other hand, says that the German farmers find that potash is a perfect remedy for that disease; only the latter does not say whether or no the German farmers, finding the clover-plant fail, allow a certain time to elapse before sowing it again.

Well, we presume that most readers of this excursus will be satisfied that there is such a thing as the clover-sickness, and that the most likely way to bring it on is the too frequent repetition of the crop on the same field. Therefore we say: sow clover: sow lots of clover; but be warned by the failure of this valuable plant in the hands of some of the best farmers in the world, and do not repeat the seeding more than once in eight years.

HEDGE-PLANTS.

WE are much interested in the introduction and growth of all useful and ornamental trees and shrubbery. Recently we spoke of the holly, desiring to know how far north it has been found growing. We now note the following in the Montreal *Journal of Agriculture*, with reference to the hardiness of the buckthorn as a hedge plant: "Buckthorn is also used in some localities, but it is doubtful if it is hardy enough to stand the cold of this Province; at least of the eastern and north-eastern part of it." As to the hardiness of buckthorn, we are pretty well prepared to testify, as we raised a lot of the plants from seed more than twenty-five years ago. We grew them in the nursery until about twenty inches high; then set a hedge of these over 700 feet long. It stood until three or fours years ago, when, although it was eight or ten feet high, thick and thorny, yet it was neither cattle nor thief proof; and as it occupied a strip ten feet wide, we uprooted it, and replaced it with an *eight-foot tight fence, which some of* our readers may have noticed as just completed three years ago, at the time the state muster was held in the adjoining field.

(*Watchman.*)

SEED GRAIN.

BY J. E. RICHARDSON, PRINCETON, ONT.

In a few months' time farmers will be commencing their spring work. Before spring opens up it would be well to take time to consider what different kinds of grain are to be sown. So much depends on the soil, that a farmer should be careful to sow grain that is adapted to his land. After deciding what kind of grain you intend sowing, say oats, peas, barley, the next question is, what variety of the above is best? This is a question which is very hard to answer. One thing is very important, and this is, whatever variety you select, try to get it pure and free from foul seeds. Many farm

ors are very indifferent about getting pure seed. One says: "What does it matter if grain is mixed, it will all grow; I don't want to sell it for seed, and I get just as good a price for it at the market as if it were pure. And, besides, I can buy my seed from my neighbors at the market price; whereas, if I buy pure seed, I shall have to pay more for it." In answer, I would say, "Supposing you intend to sow six rowed barley and buy some from your neighbour; when it comes out in head you notice it is badly mixed with two-rowed, and when the six-rowed is ready to cut, the two-rowed will want about twelve days longer to ripen. Either one or the other must be a poor sample, and when taken to the market will you get such a good price as if you had sown pure seed? Most decidedly not."

"Then, again, oats. Perhaps you may wish to sow a very early variety and find them mixed with a late kind. If you do not cut the early oats when they are ready, waiting for the late ones to ripen, the early ones will shell out badly in the field and be wasted; and if you cut the early ones when they are ready, the late ones will not be matured, and will be light, and when you thresh them the light ones will be blown out upon the straw stack."

So much has been written about foul seeds that I think it is hardly necessary to refer to them, but at the same time there is a large amount sold with grain every year. I remember one day I was cleaning up some wheat in my barn, when a neighbor brought over some wheat he wished to weigh on my scales. He was selling it for seed. After weighing the wheat, he asked me what I thought of it? I replied, "The wheat would look well if you would only clean it." He answered, "Well, I ran it through the mill once; my mill won't take out any of those seeds unless I run it through two or three times, and I might just as well take it to the market as do that, as I am only getting five cents a bushel above the market price, and possibly may have to wait some months before I get my pay for some of it." I may add that you couldn't take up a handful without finding seeds of cockle, red root, and even wild flax. This farmer sold between one and two hundred bushels of that wheat and foul seeds.

As to the variety of grain to sow, which I said was a hard question to answer. First of all, I would recommend every farmer to take a farm journal. The *Farmer's Advocate*, for instance, takes a great deal of pains in sending experienced men through the country to report on different varieties of wheat, &c, which report appears later in their valuable journal. Then, by reading the reports of the experimental farms, a large amount of information may be gathered. By looking through seedsmen's catalogues you can see descriptions of different varieties of grain. Lastly, by keeping your eyes and ears open, seeing what your neighbor has, watching his crop grow, enquiring about the variety if you see a good crop, and listening to what any one may say regarding some new or good variety they may have tried.—*Farmer's Advocate.*

Manures.

TOP-DRESSINGS.

Many men, many opinions. Sometimes, in a difficult question, science decides, sometimes practice; but when science and practice both agree, who shall oppose them.

Our readers are doubtless aware that the editor of this periodical differs entirely from those who hold that, although in a moist climate like the climate of England top-dressing may be productive of favourable results, in a country like Canada, where the summers are so hot and dry, there is only one really profitable means of employing manure, namely ploughing it in. And, we are happy to find that, besides the support our tenets on the matter meet with from many first-rate practical farmers, Professor Shutt, the chemist of the Ottawa experiment-farm, has conducted a series of experiments, on the loss of nitrogen experienced by farm-yard manure by exposure, which leaves no doubt upon the matter. As the professor puts it tersely: "We may therefore safely infer that the loss of ammonia though volatilisation on the field is extremely small.

Mr Shutt, as wil be observed in the subjoined article from his pen, took a certain quantity of "well rotted manure, after fermentation," and, after spreading it, in a thin layer, on glass, "exposed it every day to the sun for a month:" the manure was of course protected from the rain. The amount of nitrogen was carefully noted before and after the experiment. Now, let us see what was the loss of nitrogen incurrrd by the trial layers.

NITROGEN IN FARM-YARD MANURE.

No.	Manure.		Per cent.	Amount per ton in pounds.	Per cent lost on exposure.	Value at 17c. per lb.
1	Well rotted, after fermentation.	Before exposure.	515	10 3	...	$1 75
		After exposure.	505	10 1	01	1 72
2	Rotting during fermentation.	Before exposure.	490	9.8	...	1 67
		After exposure.	466	93	0.24	1 58

Perhaps, it would be as well to compute the loss of nitrogen on a large scale, supposing ten tons to be a fair dressing for an acre of land. We must bother our readers, here, with a few more figures:

Before exposure... 10. 3 x 10 = 103 pounds of nitrogen, at 17 cents = ... $17.51

After exposure.... 10. 1 x 10 = 101 pounds of nitrogen, at 17 cents = ... 17.17

0.34

That is the loss of nitrogen in ten tons of farmyard dung spread over an acre of land and left exposed for a month, *without rain*, would amount to the insignificent sum of 2 pounds, equal in value to 34 cents! We need hardly observe that if rain did fall during the manure's exposure to the air, the leaching of the dresssing would be washed into the soil.

In the second example, where the dung was in active fermentation at the time of its exposure, the loss of nitrogen was a little greater than in the previous instance; but, even then, it was but trifling: Taking again the ten tons to the acres, we see that:

9.8 x 10 = 98 pounds of nitrogen, at 17 cts, = $16.66

9.3 x 10 = 93 pounds of nitrogen, at 17 cts, = 15.81

.85

This, it appears to us, ought to settle the question, as to the profit of top-dressing, and it only remains to take care that dung is not deprived of its most valuable constituent, *nitrogen*, before it is applied to the land; the other manurial elements, such as potash and phosphoric acid, are not capable of volatilisation, so no loss of them can be incurred except by leaching. The italics in the subjoined article of Professor Shutt are ours; we desire greatly to draw attention to the fact that, before *rotting*, the plant-food in farmyard manure is with difficulty appropriated by the crop it is intended to nourish.

By a printer's error, at p. 76, April No., the requisite weights of nitrate of soda and sulphate of ammonia for an acre of mangels were transposed. The passage should read: "300 lbs. of sulphate of ammonia, or 400 lbs. of nitrate of soda." Strictly speaking, if the latter is of the purest quality, 300 lbs. of sulphate of ammonia should contain as much nitrogen as 380 lbs. of nitrate of soda; but the latter is rarely to be had here in a perfectly sound condition.

TREATMENT OF MANURE.

FROM A SCIENTIFIC POINT OF VIEW—VALUABLE LETTER BY THE CHIEF CHEMIST OF THE DOMINION EXPERIMENTAL FARM.

When stables and cow houses are badly kept or there is a deficiency of litter, ammonia is abundantly developed, and being extremely volatile much is lost. This ammonia is formed by the fermentation of the urine—carbonate of ammonia being produced at the expense of its urea. Urea is that component of urine which holds the nitrogen. While carbonate of ammonia is volatile, it is also extremely soluble in water, and hence it is that the greater escape of this valuable material occurs when the manure heap is allowed to become dry. In order to rot manure and *render available its plant food*, this conversion to a greater or less extent must take place, and moisture and warmth are requisite. If the heap be kept constantly moistened, preferably with its own drainage fluid (or if necessary with water only), no appreciable loss of ammonia need be feared. Manure must not, on the other hand, be kept in such a soaked condition that the air cannot ferment it, else—as we shall see later on—but little fermentation can ensue. These are the principles to be followed in the economical fermenting of manure.

When well rotted manure is spread on the field, preparatory to being ploughed in, it cannot of course have this care bestowed upon it. Does it then when so lying on the field lose any of this ammonia? To answer this question, the experiments about to be described were made this summer.

Two samples of manure were taken, as before stated; one during fermentation and while the heap was very hot—the other after fermentation had apparently ceased and the heat subsided. Careful estimations of their nitrogen were at once made. These two samples were then spread in a thin layer on panes of glass and exposed to the sun every day for a month, being protected from rain. Being in comparatively thin layers, no fermentation took place after the experiment was begun, the manure soon becoming hard and dry. Any loss then that might occur would result from the volatilisation of ammonia formed in the manure before the experiment. As far as the answer to our question is concerned these conditions are the same as those after spreading manure in the field—since in the latter case previous fermentation would be arrested, and fertilising material washed from the manure by the rain would be received and retained by the soil. Any loss that might occur through volatilisation on the field would also take place on the glass plates of our experiment. At the end of the month the amount of nitrogen in the samples was again taken, with the results set forth in the above table, which also shows the value of the manure in nitrogen before and after the experiment.

KEEPING MANURE IN OPEN HEAPS.

EDS. COUNTRY GENTLEMAN—Your correspondent "X" (p. 254) is needlessly anxious about the possible waste of his manure heap. He does not state the comparative amount of straw, cornstalks and animal droppings in his compost, but if his farm is mainly devoted to grain raising there is probably enough litter among it to make any other absorbent unnecessary; especially as he complains that it will not rot sufficiently while under cover. The salt and gypsum might be kept in the barrel, the idea that carbonate of ammonia will decompose the latter being a popular fallacy. The only thing wrong with your correspondent's practice is in building his heap too high; four feet when settled would be as high as I should like to pile ordinary mixtures of that kind, and if it is desired to add purchased fertility to the mass, on my land I should use some cheap acid phosphate, the freed acid of which would fix the small amount of ammonia likely to be lost.

But manure-piling, eight feet or four, takes considerable work, and as "X" raises corn, or at least cornstalks, why not draw the manure to the field and spread it as made? One of our best hill farmers said at a late institute that his yield of corn last year, running from 120 bushels per acre down to 80, was exactly proportional to the time the manure had lain on the surface before being turned under, and my experience with last year's crop was the same; and the wheat, now (April 1st) green as a meadow, is manifestly better at the side of the field where the spreading commenced—about New Year's. The wheat was sown between the rows of shocks without plowing and will yield 35 bushels per acre. A space now in wheat the second year, on land similarly treated the year before and the manure now turned to the surface, does not look quite as well, which I attribute altogether to lack of proper condition of the soil at sowing time; the preceding stubble had been mown and drawn off, and the land plowed when very dry and not having rain enough to wet it until the middle of November.

Of the various ways of handling manure, good and bad, the best form seems to be to spread it as made. The more soluble parts are carried down a few inches by the winter rains; and the coarser remainder, turned under just as the soil begins to warm up in the spring, starts a chemical reaction that is probably as beneficial to the soil as is the actual plant food contained in it.

FARMING WITH CHEMICAL MANURES.

MANURING ACCORDING TO THE TASTE OF THE CROP GROWN.

Every plant has its preference for one or the other element of a complete manure. This element is called,

in reference to the plant, its *dominant or ruler*. It is therefore this preferred element that must be applied to it in a greater proportion than the other elements, all other things being equal.

PLANTS WHOSE DOMINANT IS NITROGEN

Nitrogen is the dominant of wheat, barley, oats, rye, of hemp, colza and rape, of beets and mangels, of fodder-corn and meadow-grasses (as distinguished from the clovers, of leafy vegetables (such as cabbages and kale), of bulbous plants (such as onions and tulips) and of ornamental herbaceous shrubs.

For such plants the following formula will be found useful: (1)

200 lbs of sulphate of ammonia;
400 lbs. of superphosphate;
200 lbs. of nitrate of soda;
150 lbs. of nitrate of potash;
300 lbs. of plaster.

For those plants that pass the winter in the ground, half the dressing should be given in the fall, unless there is danger of its being washed away as in the case of hill-sides. (2)

Halve thefore the manure-dose as follows:

AUTUMN.

200 lbs. of sulphate of ammonia;
250 lbs. of superphosphate;
80 lbs. of muriate of potash;
150 lbs. of plaster.

SPRING.

200 lbs. of nitrate of soda;
250 lbs. of superphosphate;
70 lbs. of muriate of potash;
150 lbs. of plaster.

The two will constitute a full manuring.

For spring-sown plants, nitrate of soda should take the place of sulphate of ammonia, and less should be used. (3)

PLANTS WHOSE DOMINANT IS PHOSPHORIC ACID.

Plants whose *dominant* is phosphoric acid are: maize for seed, buckwheat, turnips radishes, swedes, Jerusalem artichokes, roots, such as carrots, parsnips, &c., and flowering shrubs.

The formula for these is:

600 lbs. of superphosphate;
250 " of nitrate of soda;
150 " of nuriate of potash;
300 " of plaster.

PLANTS WHOSE DOMINANT IS POTASH.

These are: the vine, the *leguminosæ*, (such as peas, horse-beans, lucerne and the clovers, haricot-beans, sainfoin, vetches or tares, &c.) flax, perhaps potatoes and tobacco, fruit-trees and seed vegetables (what *are* the *legumes-graines*? ED.)

Let us give a few preliminary remarks.

The *leguminosæ*, pease and the pod-bearers, get nitrogen, in some way or other, from the air; it is then almost useless to offer them nitrogenous manure; so this formula will suit them:

Superphosphate	500 lbs.
Muriate of potash	200 "
Nitrate of soda	150 "
Plaster	200 "

Muriate of potash prevents the formation of starch in the potato and is also hurtful to tobacco. For these two plants, then, substitute potash in the form of nitrate or sulphate. Take this formula:

Superphosphate	400 lbs.
Nitrate of potash	300 "
Plaster	250 "
or:	
Superphosphate	400 lbs.
Nitrate of soda	260 "
Sulphate of potash	260 "
Plaster	250 "

POTATOES.

1. Without manure.
2. With complete manure.

For *the vine*, fruit-trees, and ornamental trees:

Superphosphate	600 lbs.
Nitrate of soda	300 "
Carbonate of potash	450 "
Plaster	300 "
Sulphate of iron	300 "

WITHOUT AND WITH POTASH.

The manure to be broadcasted over the whole surface of the ground occupied by the roots of the trees, that is, by the branches and dug or ploughed in.

SOME OBSERVATIONS.

Note — We have not mentioned sulphate of iron in most of these formulæ. In red soils, it seems useless; in white land, 300 or 400 pounds are, so to speak, necessary; in other soils, more or less can be used according as they are more or less white.

On meadows troubled with moss, 350 to 500 lbs. of sulphate of iron will destroy the moss. Harrow well after spreading.

SUBSTITUTION OF ONE MATTER FOR ANOTHER.

The above formulæ only treat of the matters usually employed; such as nitrate of soda, sulphate of ammonia, &c.

In practice, other equivalents may be substituted for these matters, such as may be more advantageous as regards price, freight, &c. It is the business of the farmer to keep himself informed on this subject, and to vary his combinations for the good of his purse and of his crops.

Thus, if any one has at his disposal nightsoil, liquid manure, &c., he can save the nitrate of soda. If he is in the neighbourhood of a foundry where *basic-slag* can be had, he should use that phosphate instead of using superphosphate or ground Carolina-rock.

THE PURCHASE OF READY MIXED FERTILISERS.

We have only hitherto spoken of the raw materials of fertilisers; supposing them to have been bought separately so that the buyer could mix them according to the demands of his soil and his crops.

This is, assuredly, the best way of proceeding.

But commercial firms sell these manures all mixed, quite ready for sowing. Beginners, who fear to make mistakes in the mixing and preparation of them, may at first use these thoroughly prepared manures; but they will very soon find out the advantage of mixing for themselves.

When the ready-made mixture is bought, the work of mixing has to be paid for, and one is much more likely to be cheated. The mixture may deteriorate pretty quickly, and after all, we shall not be able to give to the land just than quantity it requires of each separate element of fertility.

PRESERVATION OF MANURES.

More advice.— Do not buy saline manures too long before using them; keep them in a very dry place, where *no animals can get at them. They* are almost all poisonous, and the cattle take them simply for common salt.

SIDERAL CULTIVATION.

We have said that leguminous (pease, clover, beans, &c.,) absorb the nitrogen they need from the air. Thus, they enrich the land with the nitrogen by their roots, and by the stems and leaves that are left after harvest on the ground.

It is, also, not an uncommon thing to see a grain-crop go down—get laid—after a good clover- or lucerne-crop. In this case, there must have been a superabundance of nitrogen. This "getting laid" can be prevented by dressing the crop with phosphoric acid and potash, whereby the balance will be reestablished.

In buying artificial manures, you will observe that nitrogenous fertilisers are always the most costly. You can often replace them by clover, vetches or lupins, ploughed in green.

The manuring can be made complete by the addition of phosphates and potash, which will affect the green-manure-plant, as well as the grain-crop that follows it.

It is this green-manuring, completed by mineral manures, that is called *sideration* or *sideral cultivation*. (1)

A correspondent writes to us on this system:

"Plants belonging to the family of *leguminosæ*, especially clover, lucerne, and lupins, have the property of enriching the soil with nitrogen, not only by their *roots, stems and leaves*, as we remarked above, but still more because their roots, when the plant is in full vigour, act as intermediaries between the soil and the atmosphere.

"If a root of any of these plants be examined, we shall see that it bears several lumps, (like warts), which, seen through a powerful microscope appear to be full of little animalcules, otherwise called *bacteria*. It is these that fix the atmospheric nitrogen in the soil.

"All this has been throughly proved by most conclusive experiments on the white lupin, conducted by M Bréale. I only mention these experiments, for, to describe them would be going out of my subject.

"As to *green-manuring*, it should *only* be *employed by* those who understand the principles of its action.

"It has been found, indeed, that in heavy land, it answers better than nitrogenous manures, such as sulphate of ammonia, dried blood, &c., but, on the contrary, on light land, the last named fertilisers pay better, for M. Muntz found that in the former case, in heavy land, the nitrogen of the green-manure nitrified more easily than in light land.

"We may also grow, but as a stolen crop, certain plants that are greedy of the nitrates, those belonging to the *crucifere*, such as mustard, rape or cole, &c. The plants will hinder the loss of the nitrates from the soil, and restore plenty of nitrogenous manure to the land after they have been ploughed in green.

CONCLUSION.

Such, then, is the system of farming with chemical manures.

On the whole, you will see that it is simple enough; still it must be understood.

You see that with a judicious outlay, you can obtain a considerable increase of crop, that will cover all expenses and leave a profit behind it.

Combined with a wise selection of seed and a through cultivation of the soil, the well advised use of chemical manures constitutes what is called intensive cultivation. But more important still, is the blessing of the Creator on our fields and our toil.

(*From the French.*)

(1) For sugar beets, substitute 100 lbs of sulphate of potash for the 150 lbs of the muriate, do not give quite so much nitrate of soda, and add a fourth more of superphosphate. (No mention made of the amount of the phosphoric acid contents of the superphosphate! *Ed.*)

(2) We demur to the use of such soluble manures as sulphate of ammonia and superphosphate being used before winter in this climate.—*Ed.*

(3) For all crops, but especially for sugar-beets, make 2 or 3 sowings of the nitrate of soda, at intervals of 15 days. (Good for the sugar-beets, but the growth of grain-crops is so rapid in our climate, that there would not be time for the three or even two sowings *Ed.*)

(1) *Sidus* is the latin for a star: hence, the words *sideration* or *siderale*. What the stars can have to do with it we must confess that we do not know. *Ed.*

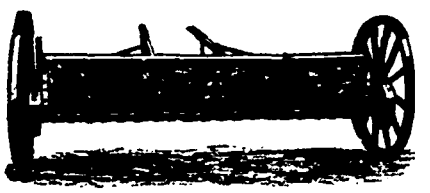
Gypsum.

Plaster.—It seems, from several paragraphs we have lately met with in the English papers, that plaster, or gypsum, sulphate of lime in fact, has at present been found to be very useful to the clover-crop in England. Many years ago, in consequence of reports of its successful application to leguminous crops on this continent, it was tried by many farmers in England, but proved to be useless there.

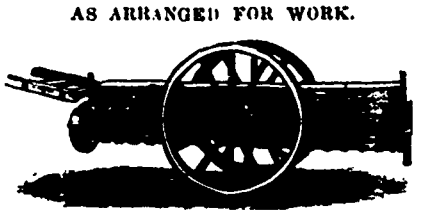
CLOVER.—Of this plant Gypsum is the indispensable, natural, and most favourite food, in which it delights to luxuriate. Upon a measured portion of young clover and other spring seeds, on a light gravelly soil, Mr. Long, of Bancroft, sowed the prepared Gypsum as a top-dressing in showery weather. Comparing the produce and growth of this portion with the remainder of the field, he expresses himself thus: "You have often seen a particular spot where a manure heap has been laid, its thickening and towering above everything around it: now that is exactly what the Gypsum has done." The best time for applying Gypsum to clover is April or May.—MARK LANE EXPRESS.

THE MANURE DISTRIBUTOR

Adapted for all kinds of Artificial Manures, and specially suited for BASIC SLAG.



AS ARRANGED FOR WORK.



AS ARRANGED FOR TRANSPORT.

Using Nitrate of Soda.—G. S., La Plume, Pa.—Six dollars for 100 pounds of nitrate is too much—$2.25 per 100 pounds is enough. Mix it with three time its bulk of soil and sow it at once. Use it *only* upon plants coming into bearing *this* season. It would be money utterly thrown away to use it upon plants which do not yield this season.—R. N. Y.

FERTILISER PRICES.

It will be seen by the following reports from our trustworthy correspondents at Liverpool, Messrs. Downs and Co., that *nitrate of soda* has risen considerably in price:

"NITRATE OF SODA.—An increased business is passing in all positions, and several off coast cargoes have been realised at £10 to £10 2s 1d, now £10 2s 6d to £10 7s 6d is asked for handy sized cargoes. The improvement is ascribed to the strong statistical position—about 125,000 tons deficiency in the available supply for the season, contrasted with that of last year; and holders allege higher values will presently rule. To-day, the finest quality, guaranteed at least 95 per cent pure, and genuine as imported, meets an increased agricultural demand at £10 5s to £10 7s 6d; no firm offers are now obtainable owing to the daily hardening tendency of the market. For future deliveries, we are prepared to quote, and shall have pleasure in making offers on hearing the probable requirements and specified deliveries from intending buyers. To those who are not conversant with nitrate of soda it is well to remark that it contains but one essential element of plant food (nitrogen), consequently it should be applied only to land in good heart, unless the other fertilising ingredients are artificially applied."

In January last, the same firm sent us the annexed statement, showing clearly the prospects of the trade:

"LIVERPOOL, SATURDAY.—Nitrate cargoes have been in active request, chiefly on Continental account, and the sales comprise several thousands of tons at advanced values; it is difficult to accurately estimate what the ruling prices will be during the period of the agricultural home demand (which, by the way, present data justify the opinion, will not be an extensive one), until the extent of the Continental requirements are known, and which solely influence the market at this period; but, suffice it to say, that at present the market closes strong at £9 17s. 6d. for port-of call cargoes, £9 17s. 6d. to £9 17s. 6d. as in position for November-December sailings, and at £9 15s. to £10 according to quality on the spot.

Superphosphate, however, remains law—$9.00 a ton of 2,000 lbs—containing 26 o/o of soluble, guaranteed, phosphate of lime.

Basic slag is dearer; cannot we get it from our own iron-works instead of having to fetch it all the way from Liverpool?

Basic-slag.—As the season for this fertiliser is now rapidly closing there is an extremely active demand, and values are very firm at late rates; makers experience considerable difficulty in supplying requirements and this has occasioned some delay. Purchasers will therefore observe that orders can only be executed in the priority in which they are received, and that delivery cannot be guaranteed under 7 or 14 days. The finest quality is 35s to 37s per ton, in bags, on rails, at works.

But the worst news of all, for those who are intending to lay down permanent pastures in this country, is that Mr. Evans, the seedsman, has not been able to import any of the true *cow-grass* this spring; his correspondents in England inform him that the yield of that clover—*trifolium pratense perenne*—was so bad that the price is almost prohibitory. Mr Evans thinks the *Rawdon* clover would answer, but never having tested its permanency, we do not feel inclined to back it. Mr. Evans has "Pacey's perennial ryegrass" and sainfoin for sale.

Monsieur Auzias-Turenne informs us that the orders for manures, &c., are coming in to the Central Syndicate in most unexpected numbers.

A LECTURE BY A. JENNER FUST

THE USE OF FERTILISERS IN THE GARDEN.

You will naturally ask me: What has been your experience of the articles on the use of which you propose to enlighten us this evening? When I reply, that I used guano very shortly after its first cargo was imported into England, that is, in or about 1844, and that I have used sulphate of ammonia, nitrate of soda, bone-dust, superphosphate of lime, wood-ashes, in large quantities, and over a considerable extent of land, you will probably allow that, at all events, *I ought* to know something of the matter I am about to discuss.

It is, I know, a common opinion among gardeners and florists—at least, it used to be—that however useful the above fertilisers may be to farmers, they are comparatively useless in the garden. This point, I hope to show you, later, is a fallacy. Time saved, is time gained; and though dung must always be, on account of its mechanical effects on the soil, the mainstay of the gardner, the marvellously *pushing* effects of certain fertilisers must always render their use advisable by all those who desire to present to their employers, or on the market, the earliest specimens of flowers or of vegetables.

Farmyard dung need not detain us. It, if properly made and cared for, contains all the food necessary to the life of plants. The dung of an adult animal is richer than the dung of a young one, because the latter takes more from its food than the former, having to furnish the materials that go to form its flesh and bones out of the constituents of the rations given to it. For the same reason the dung of a milch-cow is far poorer than the dung of a fatting beast.

Food, too, affects the quality of dung. A beast fed on corn and straw yields only a poor manure; on the other hand, one fed on oil-cake, beans, and clover will yield rich manure.

Take care of the urine; for, though when used alone its effects are not what its composition, chemically considered, would lead one to expect, when mixed with the solid droppings of cattle, horses, &c., it imparts great strength to the whole.

Let your manure ferment but do not allow it to carry the fermentation too far: check it by turning before it becomes "fire-fanged." When the fermentation occurs in a place protected from rain, carbonaceous matter is destroyed, of course, but little loss of the most valuable constituent, nitrogen, takes place.

A ton (2240) lbs. of farmyard dung will contain: from 9 to 15 lbs. of nitrogen; the same amount of potash, and from 4 to 9 lbs. of phosphoric acid.

Now these three constituents of farmyard dung are the three matters that are more generally wanting in all soils, that is, in a state fit for the consumption of growing plants. There may be plenty of each kind present, but unless they are prepared by soil cultivation, which subjects them to the influence either of the air or of the action of the acids in the land, they will be in an effete state, and might almost as well be absent altogether. And so it is with the same elements in farmyard dung. When in a fresh state, the above elements are not immediately available as plant food. And here comes in the true value that our chemical fertilisers possess. The nitrogen in sulphate of ammonia is at once assimilable by plants, and the nitrogen in nitrate of soda is even more soluble than in the former manure. This is the reason why the three elements we are considering are worth more per pound in the chemical form than in dung: because they go to work at once. So we arrive at this conclusion: fill your gardens as full of farmyard manure as possible, but when you wish to bring any crop fruit, flower, or vegetable, very forward, add to the topsoil the chemical manure that contains the elements likely to produce the effect required.

Chemical fertilisers, or artificial manures, for both terms mean the same thing, are those that contain the three elements, nitrogen, potash, and phosphoric acid in a state fit for immediate consumption by plants. Bear in mind, please, that these elements have specific effects. For instance, if you want to get a rich, luxuriant growth of leaf and stem, practice concurs with science in advising the use of a manure containing nitrogen. If bulb, like the turnip, is wanted, phosphoric, acid is required. If grain, both nitrogen and phosphoric acid must be employed. Of potash I take but little notice, as in all comparatively new soils, in all heavy soils, and wherever farmyard dung has been largely used, the quantity of potash is so great in the soil, and that in its most available form, that it is sending coals to Newcastle to add more. Of course, I am not depreciating the use of hardwood ashes, for, in addition to the potash, these contain a notable proportion of phosphoric acid, so much so, that, in England, I once grew a very fair crop of white-turnips with no other manure than 30 bushels of wood-ashes an acre.

The principal forms in which these elements are to be found are the following:

Nitrogenous.	Phos. acid	Potash
Blood	Bones.	Wood ashes.
Nitrate of soda.	Carolina rock.	Kainit
Sulphate of ammonia	Coprolites	Muriate of potash.
Guano.	Superphosp. of lime.	
	Basic slag.	

And first of BLOOD. Dried blood contains from 10 to 13 o/o of nitrogen. This element is not quite so ready in blood for plant consumption as in some other forms, but it soon decomposes in the soil, yielding ammonia and nitric acid.

NITRATE OF SODA is found in Peru, in an enormous deposit of the crude salt, containing much chloride of sodium or common salt. It contains, as it is put on the market, about 15¾ o/o of nitrogen, which is its sole manurial constituent. It is the quickest to act of all nitrogenous manures, and therefore the best suited to the purpose of the florist and the vegetable gardener. It should be used as a top-dressing, its extreme solubility aiding it to escape readily into the subsoil.

SULPHATE OF AMMONIA.—Prepared from the liquor of the gas-works. Not quite so rapid in its effects as nitrate of soda, but rapid enough for all purposes. It contains about 20 o/o of nitrogen, and no other constituent of any value as a manure.

These two matters, nitrate of soda and sulphate of ammonia, are the best sources of nitrogen for your purpose. Let us now consider their real value to a purchaser.

According to their contents in nitrogen, we see that one should be worth more than the other in the proportion of 20 to 15.50, and, of course, we have to find out, as regards their relative money value, what is the value of a pound of nitrogen in each, if bought in the usual course of trade.

Mr. Vasey, of the Hochelaga works, offers sulphate of ammonia, guaranteed to contain at least 19 o/o of nitrogen, at $3.50 a 100 lbs., therefore it follows that the value of nitrogen in that form is 7½ cents a pound. Mr. Evans, the seedsman in McGill Street, tells me he cannot afford to sell nitrate of soda—contents in nitrogen not mentioned—for less that $3.00 a hundred lbs. Taking the latter to contain 15 o/o of nitrogen, that element will, in this form, cost 20 cents a pound. In England, nitrogen, in nitrate of soda, is worth about 11 to 11½ cents a pound: such an enormous difference in price ought not to go on much longer. I have done my best to get the price reduced, but, hitherto, unsuccessfully.

BONES.—M. Ewing, of McGill Street, has very fine Indian bone-meal, beautifully ground, containing about 4 o/o of nitrogen and 23 o/o of phosphoric acid. But for your purpose, in which rapid action is the main point, I should recommend the invariable use of superphosphate, made from our own Canadian apatite dissolved insulphuric acid. Do not be tempted to get this anywhere but at the manure-factory at Capelton, and order either the *plain* superphosphate, 8 to 10 o/o phosphoric acid guaranteed, which is sold at the very reasonable price of $12 50 a ton, or a very high grade superphosphate, which is to be had at the works containing from 17 to 20 o/o of phosphoric acid, the price of which is $25.00 a ton. You will observe that the price of phosphoric acid in the former of these samples is, taking the average of 9 o/o, 7 cents a pound, in the latter, 6.80 cents; not much difference, practically, but the more concentrated form is the better suited to your purpose; besides, there is a saving in carriage.

All the bones in every house should be carefully collected, and mixed with hardwood ashes, in a box or barrel. If kept moderately moist, they will heat and moulder down in a few weeks, when the mixture is most useful for all kinds of turnips, and for the kitchen-garden in general.

For common purposes, where the land is fairly manured with good farmyard dung, it will be found useful to sow broadcast—always on the top—the following mixture:

300 lbs. of sulphate of ammonia; and
400 " of superphosphate of the best quality.

The dung will provide all the potash necessary. The above is sufficient for an acre imperial measure.

On some of the very highly manured market-gardens on the "Old Kent Road," near London, there used

to be a practice of sowing a crop of grain every five or six years, to work out the dung," as the owners called it The *quality* of the produce seemed to be improved by it. I should like to know if any of you have ever met with this practice.

In the extensive melon grounds round Montreal, it has often struck me that, where the place is much exposed to the wind, a belt of Indian corn, sown early, would afford a good deal of protection to the crop, and prevent the vines from being blown about so much. Shelter from wind, in a high lying place like Montreal, is worth more than some people imagine.

Would not the deep trenching—a costly operation, I know—save the vegetable gardens from burning up in our hot Canadian summers? I need not tell you that the practice is universal in England, but I never saw it done here, and I have often wondered why it is not followed. If it answers at home, in our dampish climate, would it not answer still better here?

Try a dressing of nitrate of soda for your tomatoes, you who grow them on the *single stem* plan. It will not answer where the plant is allowed to run wild, as it has a decided tendency to produce unlimited growth of stem and leaves.

WASTE OF MANURE.

The following extracts from the Vermont Watchman, on the "Waste of manure on a hillside," will be read with interest by all unprejudiced minds. Our readers will please to remember that Dr Hoskins, the agricultural editor of that paper, is a thoroughly practical farmer and nurseryman, and that nothing coming from him is to be regarded as the mere evanescent impression of one not accustomed to weigh matters with nicety.

DO WE LOSE MANURE.

BY EVAPORATION, BY WASHING AWAY, OR BY LEACHING?

Agricultural Editor: — As no one has volunteered to answer Mr. Thomas's question as to the advisability of spreading manure in the fall and winter, I venture an opinion based on experience. Our soil is not clayey, but a stiff loam. I once spread manure on a piece, early in the winter, that was ploughed the fall before. It was frozen and partly covered with snow and ice. It sloped towards a run and seemed a very dangerous experiment, so much so that I left a strip next to the run without manure, to be enriched by the manure washing from the land above. When the snow was melting away in the spring, the colored water was seen coursing down to the run. The whole was sown to oats, and at harvest time we had a beautiful piece of grain where the manure was spread, but not the least sign of benefit from the manure appeared on the strip below. No one can go through the world with his eyes open and not see that the fertility of the soil washes toward the low land, but the waste is so slight that no one need hesitate to draw and spread manure any time before the pressure of spring work. I used to think that manure must be plowed or harrowed in as soon as it was drawn to the field, but I have got over that; it don't lose much but water, and that is generally cheap. Do we lose as much fertility by leaching as we are accustomed to think? I have moved off two sets of old fashioned farm barns, expecting to find a mine of wealth under them, but in both cases I have been disappointed. The land needed enriching very soon. As we draw manure from the barn cellar I look with some anxiety at the liquid manure in the bottom of the heaps. Does it go down, or does it form a salt and so get carried to the field? Well, how differently we do look at things! While Bro. Brook of South Newbury is mourning for the good old fashioned clover, I have been comforting myself with sowing grass seed thicker and getting a good yield and a better feeding quality of hay. I. N. P.

I. N. P.'s article, in another column will interest a great many of our readers. He asks a number of important questions, and we hope to see them well discussed by our practical and experienced farmers on various kinds of land and under varying conditions.

As to the waste of manure on a hillside, we have a large and long experience, which has taught us that while there is a little waste, it is much less than we would expect. Our market garden at our old place slopes to the south about two feet on a hundred. It has been under the plow now for upwards of twenty five years, and has been manured heavily nearly every year. The crops have been onions, beets, tomatoes, early peas and beets, with winter squashes to succeed the earlier crops as they were taken off.

BELOW this garden of rather more than an acre is a steeper slope of some fifty feet wide down to a piece of wet meadow. Before the garden was commenced very little grass grew on this steep part, but after a few years of the above treatment to the garden the grass below began to improve. Part of this improvement was perhaps due to the mere wash of fine soil; but of course, as the case is, some fine portions of the dressing, or of a watery solution of fertilizing material goes down the slope. But the gain was not very rapid. Yet, for now a dozen or fifteen years, we have cut very heavy grass on that bank, where originally only a little plantain, all-heal and June grass appeared. This, remember, is on quite light soil, which experience shows not to hold material matter so strongly as clay soil. The heavy annual dressing gives a good garden crop, and what is washed down gives a good grass crop, although it took some years to make the last fact conspicuous. We hope this subject will be fully discussed by our readers, for it is matter of great practical importance.

Science.

PLANT FOOD

By D. P. Penhallow.

APPROPRIATION OF FOOD.

In our last number it was ascertained what elements of plant food are derived from the air, and the character of the organs through which this food enters the plant. We now have to turn our attention to those elements derived from the soil, which, as already seen, far exceed in number, those obtained from the air, and preliminary to this it will be desirable to make a brief inquiry into the structure, distribution and specific action of roots in the performance of the work assigned them.

ROOT STRUCTURE.

If we examine the root system of a bean one or two weeks after germination, we shall see that proceeding downward from the original seed is a strongly defined axis—the axial or tap root—from which are developed numerous branches, the whole bearing a somewhat marked resemblance to the trunk and branches of a tree turned upside down. Roots of this type are commonly characteristic of those plants which are termed exogenous, such as may be found among our common trees and also among root crops such as the carrot and beet. If on the other hand we similarly examine the roots of seedling wheat, it will be observed that there is a total absence of a central axis, and that all the various divisions of the root system arise from a common point of attachment, the base of the stem, and, presenting as they do, the appearance of a mass of fibers, constitute the so called fibrous root system of the endogenous plants. Such a root system is therefore commonly found in the grasses, including our common and well known forage plants, corn, bamboo, sugar cane, sorghum, &c. These considerations are of primary importance because, as will appear presently, plants sustain very different relations to the soil according to whether they have one or the other of these root systems, and the methods of tillage applicable to one, will not answer as a rule for the other.

If now our young roots are permitted to grow in water containing a certain amount of nourishing matter, under such conditions that with all the members growing freely, their various parts may be examined, it will be noted that near the extremity of each growing root there is what appears to be a fringe surrounding it on all sides. This fringe does not extend quite to the very tip, but commencing a little way back, it extends towards the older parts of the root possibly for a distance of one-half to two inches, where it suddenly terminates. If this fringe is examined with a glass capable of magnifying about ten or twelve times, it will be seen to consist of a multitude of fine, hair like outgrowths from the surface of the root. If these are again placed under a more powerful microscope, magnifying about one-hundred times, each filament will then be seen to consist of a slender, tubular hair which grows directly out of a cell forming part of the outer membrane or epidermis of the root itself. These structures, then, from their origin, are known to botanists as epidermal hairs, and otherwise, on account of the organs on which they occur, as root hairs. Minute and apparently insignificant as these organs are, they are nevertheless of the greatest value in the plant economy as we shall soon have occasion to learn.

It has been stated that these root hairs (1) do not quite reach the tip of the root and (2) that they terminate abruptly at a short distance back of the growing tip. The first fact noted is caused by the skin or epidermis being in an unformed or incomplete state, so that that point nearest the end of the root, at which these hairs first make their appearance, indicates the full maturity of the epidermis. On the other hand, it is found that the epidermis of plants is always liable to be removed sooner or later, by the formation beneath it, of a layer of cork tissue, a structure which is exactly represented by the material out of which the stoppers of bottles are commonly made. Such cork tissue is, however, a dead structure. It is commonly formed for purposes of protection whenever there is an injury, or where, in the natural process of growth, certain structures require to be removed from the plant system. Thus in the dropping of a leaf in autumn, there is left a scar the surface of which is invested by a cork membrane. As the bark of the grape vine exfoliates each year, protection is still given to the growing parts within by a tissue of cork formed prior to the removal of the old bark. All this necessarily points to the fact that the cork, as a dead tissue is also impervious, and, therefore, there can be no living structure external to it. Hence, as soon as such a tissue forms on a root beneath the epidermis, the latter falls away and, together with it, the hairs developed from it. It is a conspicuous feature in the structure of most roots, that their outer surfaces are covered chiefly, not by epidermis but by cork, and as this latter appears very early in the growth of any root, we have an explanation at once, of the sudden termination of the roots hairs at a short distance from the growing tip. It is important then, to keep clearly in view that as impervious cork covers the greater part of the surfaces of roots, no absorption of material from the soil can take place over such areas, but this function must of necessity be confined to the root hairs themselves and to the surfaces upon which they are developed. A failure to properly appreciate this fact has often led to curious mistakes in the application of food to plants, while its recognition will admit of these methods of cultivation which are most likely to produce the best and most immediate results.

One other fact may be noted before we leave these important structures. The root hairs are produced each spring with the renewal of growth, or in plants which are annual, they necessarily appear with the first development of roots after germination. During the progress of growth, as new roots are formed in the extension of the root system, new root hairs are constantly being thrown out, while the older ones are as constantly drying off. Thus while the number of hairs on any given root branch remains tolerably constant, the whole number will necessarily increase with multiplication of roots, and in this way the feeding surface is augmented as the plant increases in size.

At the close of the growing season, all the root hairs perish, and the time when this change occurs is indicated in perennial plants, by the shedding of their leaves. From this time on, until the return of higher temperature in spring, the plant in all its parts remains dormant.

A recapitulation of the leading facts thus considered, shows that:

(1) According to their form and distribution of members, roots are
  (a) Axial
  (b) Fibrous.

(2) The principal surface of roots is covered by impervious cork which prevents absorption of food and water over such areas.

(3) The absorption of food and water is confined to the root hairs and the surfaces from which they grow.

(4) The root hairs are confined to very limited areas near the growing extremities of the roots, and while they are always present during the season of growth, they disappear at the end of this period.

DISTRIBUTION OF ROOTS.

By distribution of roots we mean to imply their relations to the soil

with respect to depth and area, and even a very cursory examination of plants will suffice to show that there is great diversity in this respect. We may, however, reduce all these variations to two types which will practically agree with the distinctions already made between the axial and fibrous root systems. If then we were to examine the roots of any plants having a fibrous root system, as for instance grasses, it will be seen at once that while there is, relatively to the size of the plant, a very considerable horizontal extension, there is very little penetration, that is the roots do not extend to any considerable depth. Although roots necessarily vary greatly in both these respects, according to the kind of plant and the nature of the soil in which they grow, yet the general limitations are so well defined as a whole, that we can safely designate all such as surface feeders, from the fact that their food is gathered for the most part if not wholly, from the soil which lies within one foot or less of the surface.

On the other hand plants with axial roots differ widely, and feed not only over a much greater area, but draw substance from a much greater depth. This is the result of two causes, (1) the great penetration of the axial root, and (2) the further penetration of special branches as feeding roots. These statements may be illustrated by reference to well known plants which have been made the subject of special examination.

Clark has shown that the roots of the common red clover may, under favorable conditions, penetrate to a depth of eight feet. The soil in this case was an open drift composed of fine gravel and sand, so that the conditions were more favourable than would occur ordinarily in cultivation. In the common squash vine, the roots which form at the position of each leaf, will be found to have a strong central axis which penetrates to great depths, and under favourable conditions would attain a length of four to six feet. Yet another mode of distribution may be observed in the roots of trees. Trees upturned by a strong wind exhibit a mass of large roots which have assumed a horizontal position in growth. This shows that in the growth of the young tree, the original axial root was arrested in its downward course in some way, assuming, together with its branches, a horizontal direction. The observation which we may make upon upturned trees as well as by cutting a trench in such a way as to gain a side view of the roots, shows that these organs are chiefly confined to a zone which rarely exceeds two feet in depth, and from numerous cases brought under my own notice, it is safe to say that the principal roots of most trees lie within eighteen inches of the surface. These roots, however, perform no function in the appropriation of food—they are not feeding roots. Their only value is to safely anchor the tree to the soil and serve as the point of departure for the feeding roots which extend the limits of the plant more widely, both vertically and horizontally. During the process of constructing some recent buildings in McGill College grounds, the laying of deep foundations and of drains at a much greater depth, afforded excellent opportunities to note the distribution of roots in various soils. In the case of the common bitter sweet, the roots as a whole, penetrated an open gravel soil to a maximum depth of six feet. In maples, poplars and other common forest trees, it was found that whilethe main roots all lay within eighteen inches of the surface, there were developed from them numerous slender roots of one-fourth inch or less diameter. These in most cases, grow directly downward without branching for several feet and generally attained a total vertical penetration of eight or nine feet Within a foot of the extremity each root branched freely, the branches forming a broadly tufted termination much like a brush, and these branches constituted the feeding roots proper The soil in which these trees were growing was a sandy loam, so that the conditions were in all respects very favorable to greatpenetration, and although the results would have been somewhat differntin a more compact soily, yet we may take the fact observed as fairly indicating the manner of distribution of roots in plants having an axial root system. We may, therefore, class all such as deep soil or sub-soil feeders in contra distinction to the surface soil feeders already considered.

With respect to horizontal extension, it is probably not easy to assign definite limits, but the extension of underground structures to distances of sixty, eighty or even one hundred feet from the parent tree, as is clearly shown by the ability of the locust and white poplar to throw up suckers at these distances, indicates a very wide horizontal extension of the root system. The majority of trees, do not, fortunately, possess such great vigor of growth although instances are on record of the root of the elm extending 75 and even 450 feet from the tree, and it is perhaps safe to say that as a rule, the roots are distributed over an area, somewhat greater than the horizontal extension of the branches.

This conclusion then, in connection with what has already been ascertained respecting the particular part of the root concerned in the appropriation of food, leads us to recognise that for the most economical application of food substances, only that part of the soil lying within a circle from two to three feet wide and directly beneath or slightly beyond the ends of the branches, need be considered. The application of food to the area lying between this zone and the trunk of the tree will result in loss of time, since the food so applied must first be carried outward and downward though the soil until it reaches the feeding roots, by means of rain. This is necessarily a slow and tedious process, and one which the intelligent cultivator cannot afford to give encouragement to.

ACTION OF THE ROOTS IN APPROPRIATING FOOD FROM THE SOIL.

If a seedling plant is carefully washed out of the soil so as to disturb the roots as little as possible, it will be observed that the fine roots still retain among them, numerous particles of soil which the washing failed to dislodge. This fact in itself is proof that there is a relation between the roots and soil particles which is not fully represented by the idea of simple association. If some of these roots to which particles cling are examined under a microscope, it will be seen that the particles are held among the root hairs, and a more searching examination would very soon disclose the fact that this is again not a mere entanglement, but that the particles of the soil are actually imbedded in the cell walls of the various root hairs, and that considerable force would be required to dislodge them. This is a relation which at once offers an explanation of the operation of roots in drawing fluid material from the soil, but to gain a clear conception of this, it becomes necessary to ascertain what conditions of soil are most favorable to root action.

It may be assumed at the outset that all food passing into the plant must be in a fluid condition, that is that it is dissolved in water, so that the action of the roots becomes reduced to a consideration of how they take up water and what conditions of distribution of this solvent through the soil, are most favorable. It is a matter of common observation and experience that a certain degree of moisture in the soil is essential while there are two extremes which requires to be avoided. On the one hand, a soil either permanently or temporarily saturated with water is injurious to vegetation and according to the degree of saturation, renders the cultivation of plants more or less difficult if not impossible. This arises from the action of the water in excluding air from the soil, and at preventing the normal respiration of the roots which is essential to their growth and activity. The land is then, as we say, sour, and the remedy is sought in drainage.

The other extreme is found during very dry periods when there is a deficiency of water in the soil. In such cases the loss by transpiration from the leaves exceeds the supply through the roots, and the effect is at once seen in the drooping foliage. The remedy is here found in irrigation. But between these two extreme limits, there is a mean condition which permits the plant to grow with full vigor, and it will always be found that when this condition is best fulfilled, the soil, while obviously possessing an element of dampness, shows no free water among its particles. It thus becomes obvious that it is by no means necessary that roots should be immersed in water for the absorption of that fluid, but rather that such conditions would be as a rule, adverse to functional activity It is true that the roots of trees especially, often send large masses of fine branches into neighbouring streams or that they sometimes show a peculiar persistency in penetrating drains which they eventually fill to their complete obstruction. Such water roots, are, however, exceptional, and need not be regarded as entering into the considerations now before us. The question still remains to be answered, how this water is distributed and held in the soil? The present view, based not only upon theoretical grounds, but upon considerations which are susceptible of proof by actual experiment is, that each separate particle of soil is invested by a thin layer of water which is held there by the well known laws of attraction. If then we conceive of our soil as a whole, we will at once be able to understand how it can contain a large volume of water, but this water will be so distributed over the surfaces of the various particles as to leave ample room between for the circulation of large volumes of air If the water be then withdrawn from one particle or from any number, the deficiency will be met by the movement this of fluid from adjoining particles or areas to take its place, through what is known as capillarity, and thus there is always a movement of water from the more humid to the less humid areas with a constant tendency towards uniform distribution, and this again, is one of the most important fundamental principles involved in the proper drainage of land by means of the modern tile system.

The conditions thus applied to water in the soil may be exactly reproduced by means of a porous brick. A brick is placed with one end in a vessel of water and the other exposed to the air. It will be shortly seen that by capillary diffusion the upper extremity of the brick becomes moist though water does not exude from it. As now evaporation takes place from the upper end, the loss of water is met by an upward movement from below, and this continues until all the water in the vessel is exhausted. This is the counterpart of the movement of water in the soil from the area of saturation below—the water table—to the area of exhaustion above.

But again, to a perfectly dry brick we apply a limited volume of water which rapidly disappears. It is obvious that it has passed into the brick, but this shows no free water, though it may now have a certain element of dampness. It would also be quite possible to show that air will also pass through the brick as freely as before, showing clearly that the water introduced does not in any way interfere with its porosity. The conditions thus observed can only be explained satisfactorily by considering that the absorbed water has been deposited upon the surfaces of the component particles of the brick, and this is in reality, what has taken place. We thus have again, an exact representation of those conditions of water distribution in the soil, which are most congenial to the growth of plants.

Returning then to the original question, it is easy to see how root hairs in which particles of soil are included, may take from those particles the thin film of water investing them and transfer it to their interior cavities, but in order to gain a clear conception of this process we may briefly review the conditions essential to such transfer.

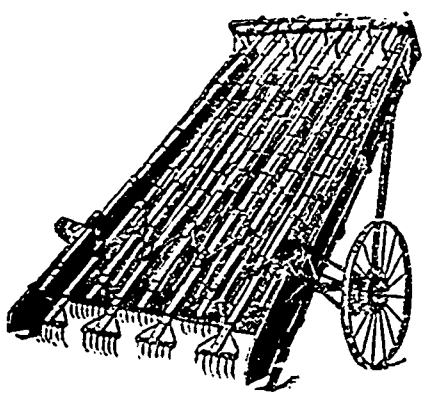
It is a well known physical law that if two liquids of unequal density be separated by a porous membrane, each will pass through and mingle with the other, but at such different rates that the total volume of the less dense liquid will steadily decrease, while the volume of the more dense as steadily and to an equal extent, increases. This is the law of osmosis and it shows that with few exceptions, the less dense fluid passes through the porous membrane much faster than the more dense fluid. This may be easily ascertained by any one who is curious enough to investigate these matters for himself.

Thus we may take a dried animal bladder which is filled with a syrup or an ordinary solution of sugar, and a glass tube about one or two feet long is then inserted into the opening of the bladder and firmly secured by a string so that no leakage can take place at that point. The bladder is next placed in a vessel of water. In a short time it will be observed that the bladder swells slightly, the water in the outer vessel diminishes, and that there is a corresponding rise of water or syrup in the glass tube. It is then clear that water has passed into the bladder by what we may designate as endosmosis—an inward diffusion. If now the top of the glass tube be tightly closed, it will still be seen that endosmosis continues as is shown not only by decrease in the water, but by a decided swelling of the bladder, and this may continue until the bladder or some part of the apparatus gives way, thus making it clear that the diffusion of liquids in such cases takes place in opposition to considerable resistance, and is generative of a definite amount of force.

Applying these principles to the roots, it is easy to see that the root

hair is the counterpart of the porous bladder; the fluid and semi-fluid materials which the hair contains are represented by the syrup, while the water of the surrounding soil is again represented by the water in the vessel surrounding the bladder. Thus it appears obvious that as water from the soil passes into the root hair, it causes a distension of this organ, the elasticity of whose walls always tends to force the fluid out again. But this takes place always, in the direction of least resistance, and this, in accordance with the structure itself, is found to be into adjoining cells and not back into the soil. Here the process is repeated from cell to cell so that the water taken in by the roots finds its way first into the interior of the organ, and thence upward through root and stem un' it eventually reaches the leaves. In grasses and many other plants the fluids thus forced up from the roots may exude from the leaves in drops, showing clearly that a very definite and considerable amount of energy is expended by the roots in this process. But the case is probably better illustrated if we take for example, the results of observations made within recent years upon large plants. Thus my own observations have shown that in the case of common yellow corn, the root pressure as it is called, is capable of sustaining a column of mercury eighteen inches high, which would be equal to a pressure of about nine pounds to the square inch of surface. While Clark has shown (1) that the grape will sustain a mercurial column 78.3 inches high, equal to about 39 pounds to the square inch. In the common black birch the pressure amounts to 68 inches of mercury or 34 pounds to the square inch while in the apple it gives only 13.5 inches of mercury or 6.5 pounds to the square inch.

These facts are of great significance and throw important light upon the physiology of the plant. We are now prepared to consider the main question at issue, the elements of food taken up by plants from the soil, and the forms in which they are appropriated, together with their value to the plant.



THE DEERE HAY LOADER.

The Breeder & Grazier.

FATTENING OF SWINE AND STEERS.

CIRCULAR LETTER BY THE FEDERAL MINISTER OF AGRICULTURE.

We extract from an official circular which all of our reader can secure gratuitously by applying to the Department of agriculture at Ottawa, the following important information.

(1) Agriculture of Massachusetts 1874-5, of 271, &c.

The superior excellence of the swine products which are sent from Canada is shown by the current market reports in Great Britain; and, yet, though Canadian bacon and hams will bring in that market from one to two cents per pound more than those from the United States, during the last three years the United States have, on an average, exported to the United Kingdom 444 million pounds, while Canada has not sent more than 6 million pounds. Again while the United States have, during the same period, sent about 20 million lbs. of pork every year to the United Kingdom, Canada has only sent about 7,000 lbs. In lard also the United States send over 100 million pounds annually, while Canada does not send more than some 67,000 pounds. It is within the easy reach of our farmers to capture a much larger share of this market, with direct advantage to their pockets, as well as to the fertility of their fields, through the feeding of swine on barley, wheat or other grains which may have been slightly damaged, in exceptional circumstances, by frost or unfavourable weather. Farmers would thus find a profitable outlet for what have hitherto been unsaleable product at remunerative prices. The experiments which have been tried at the Dominion Experimental Farms show that from 43 to 73 cents per bushel, may be realized for frozen wheat when fed to swine, when they bring five cents per pound live weight

To meet the requirements of the foreign markets, it seems desirable that the farmers should sell their swine alive, in order that they may be slaughtered, dressed and cured in such a uniform manner as to meet the preferences of the foreign customers who are willing and able to pay the highest price per pound for the products.

I desire also to call attention to the information which has been presented to the farmers in the pages of Bulletin No. 16, giving results from experience in the feeding of steers. The economy of growing fodder-corn for ensilage or for feeding as cured fodder-corn, is clearly set forth by the experiments which have been made and reported on. In our competition with the producers of foods in other countries, our ultimate success must arise from our farmers adopting those methods which will enable them to produce at the lowest possible cost, in order that they may have a margin of profit for themselves, no matter in what market they may meet competitors. It appears that a large number of farmers in Canada, feed excessive quantities of meal and concentrated feed to steers which are being fattened. This is unquestionably a most wasteful practice. By adopting the methods which are recommended in the bulletin for the fattening of cattle, it may become more profitable for our farmers to finish until fit for the butcher, all the beef cattle which they have to sell.

I feel confident that when the attention of farmers is directed to these matters, they will derive great benefit from the adoption of the best methods of feeding both of these classes of stock. It would be to the advantage of every one interested in the welfare of Canada, to encourage and assist the farmers to produce what they have to sell in the most economical way, and to make it of the very best quality. They would thus obtain larger profits, as well as a most desirable and valuable preference in the market to which Canadian products are finally sent.

(Signed) JOHN CARLING.

LEANER SWINE WANTED.

BY WM. DAVIES.

We are indebted to you in the past for the publicity you have given to our views on the hog question in its various phases, and we again ask for space for the same purpose.

We think it will be conceded that the question of farmers raising hogs is of equal importance with the raising and feeding of cattle. Agriculturists know full well that unless they produce and feed cattle fit for export, they cannot obtain the highest prices. This rule has not been applied to hogs nearly as strictly as to cattle, but every year brings us nearer to a close discrimination. We have pointed out forcibly and frequently in the press that the day is past for consumers eating fat pork; every day makes this more apparent. We do probably the largest business in the Dominion with consumers direct in our retail stores, where we find it simply impossible to sell fat bacon and hams. It is not so absolutely impossible to sell this description in England, but we have to take a reduced price, varying from ½c. to 1c. per pound on the live hogs. At the present time a large proportion of the hogs arriving, though of desirable weights, have been fed so liberally that they are entirely unsuitable for the English or the retail trade, hence they are made into a second class article which sells at a low figure. We are informed that this has arisen from two or three causes—the abundant supply of food, a scarcity of store hogs, and last, but not least, the fact that many drovers have contracted for the hogs at high prices, and the market having declined they have induced the farmers to keep them on for a while.

We again press upon all concerned that, to attain the highest price, they must produce the animal wanted—a long, lean pig, fairly fatted, weighing from 160 to 220 pounds alive. We are not asking the farmers to do anything against their own interest; so far from that, it has been shown at our experimental stations in Canada, and at similar institutions in the U. S., that it takes less food to make a pound of pork before the animal reaches 200 pounds than after. We are quite aware that this is not the generally received opinion; but facts are stubborn things, and those farmers who have adopted the plan of selling off their hogs at about 180 pounds, and having others to replace them, have told us that they are well satisfied with the results.

Farmer's Advocate.

SUCCULENT AND DRY FOOD.

AGE OF STEERS FOR FEEDING.

EDS. COUNTRY GENTLEMAN—In your answer to my inquiries about ensilage, I did not get quite all I wanted. I was especially anxious to get the judgment of experienced men on the wisdom of using ensilage in fattening cattle, and also, if possible, to ascertain what the extent of its advantage over dry fodder for that purpose is, if any. My cattle seem crazy to get ensilage, and it seems to me that what they like so well ought to be good for them. If I go into this business I shall have to build another silo and enlarge my barn and fit it for handling cattle inside. I should like to have your idea as to whether it would pay to do this, assuming, of course, that the business would have proper management. I have bulletins from the experiment farms in Kansas, Michigan, Wisconsin, Massachusetts, Indiana and other, giving the results of feeding ensilage to fattening cattle, and all make a favorable showing, but so far as I have heard, but few practical feeders use ensilage. It seems to be well settled that it is excellent for producing milk, but no one talks about the other thing.

I like your plan of a barn. It is about what I had planned, except I had thought of fastening the cattle instead of standing them in stalls. I want to ask if the 3½-foot stalls will do for a 1,400 to 1,600-lb. steer? Will 2 inch uprights be strong enough, and 2 feet 10 inches be high enough, for wild steers? I don't intend to handle range cattle, but our native steers; still, most of them never had a hand laid on them in their lives. I think the stall plan is probably better than fastening the steers by stanchions or chains, and I think I can easily overcome the difficulty of the steers getting wet in their manure. Would it do to have the floor slope 2 inches in 7 feet when steers stood a long time—six months? Tell me what you think about feeding ensilage to such cattle.

Hutchison, Kas. W. E. H.

We have read W. E. H.'s second letter with interest. He finds that his steers are very eager for ensilage, and he does not see why what they are so eager for should not be good for them. Neither do we see it, and we may as well here make a few general observations applying to succulent grasses and ensilage on the one side, and dry hay and corn fodder on the other.

We find some chemists who state that dry hay has just the same nutriment in it as when it was grass. We have often raised the point here, that while millions of cattle are fattened and sent to market annually on grass alone, but few cattle are fattened and sent to market on hay alone. The simple fact is, that grass in its succulent state is very digestible, and affords a well balanced ration for fattening, while after it is cured the albuminoids of the hay are much less digestible, and instead of having a nutritive ration of 1 to 4, as in grass, it has a nutritive ration of 1 to 6½ to 7½, and the steer cannot digest a sufficient quantity of fodder to furnish the food for fattening. The same rule applies to ensilage and dry corn fodder. Although the ensilage is quite inferior to the grass, yet it is very superior to the dry fodder.

When feeding 30 year-old-past steers and heifers, a few years ago, our ensilage gave out in April, and when the feeding was continued on dry hay the grain was increased 50 per cent. without producing as good gain as on the ensilage with one-half the grain. We merely instance this to show the effect upon these young steers of changing from ensilage to hay. In our advice on feeding rations we think we have had good evidence in at least 100 cases of the beneficial effects of ensilage in fattening steers. We think ensilage is quite as superior to dry fodder in fattening steers as in the milk ration.

In regard to W. E. H.'s question about the width of stall—3 feet 3 inches inside being wide enough, and 3 feet 10 inches high enough for the partition, we think he would find no difficulty with steers of from 1,000 to 1,200 lb., or even 1300. But if he wished to feed 1,600 lb. steers, he might make 50 stalls of 2 inches extra width, which would no doubt accommodate all that he would have of that size.

In reference to his question as to whether this feeding business could be made to pay, we say unhesitatingly, yes; but we should require him to cut

down the age of those put up to feed to year-old pasts—say steers 14 to 16 months old.

When H. becomes a close observer of the grain in proportion to the food of animals that he is feeding he will find that a 2 year-old past steer will require 25 per cent. more food to make a pound gain than a year-old-past.

By selecting thrifty year-old-past steers, and feeding them not beyond 2 years old, he will get as high a price in the market as for the older steers with a much less percentage of cost. Instead of feeding corn ensilage, and corn alone, as the grain food, he should feed a proportion of wheat bran and oil meal or cottonseed meal, so as to furnish a well balanced ration, and he will thus find his profit in adopting the best feeding science of the time.

A FIRE-ESCAPE CATTLE-TIE.

Prof. GEORGESON of the Kansas Agricultural college describes (in the Breeder's Gazette) the arrangement given below, which he has found "highly satisfactory:"

The college herd had for many years been tied on a system which was at once simple and convenient, but which nevertheless had some serious drawbacks for which I could find no remedy. A rope which passed through the partitions between the stalls was stretched over the mangers the whole length of each row of stalls, and by a knot on each side of each partition was held security in place. To this rope a snap was tied in the middle of each stall, and the animal was fastened by this snap by means of a strap around the neck.

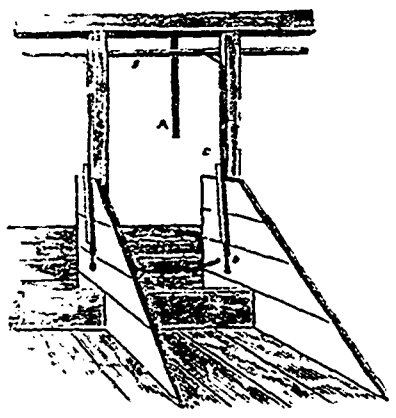


FIG. 1.—TIE FOR SINGLE STALLS.

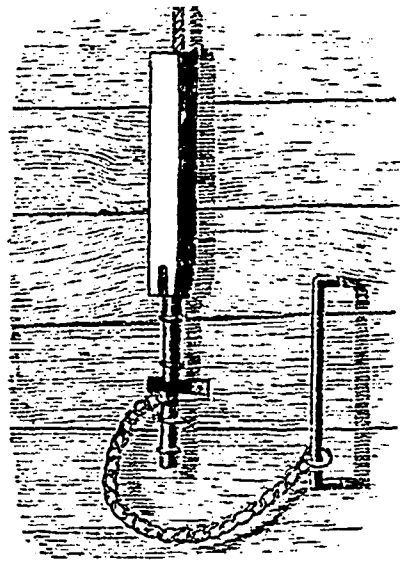


FIG. 2.—TIE FOR DOUBLE STALLS.

This arrangement had some excellent points. It allowed the animal much freedom. The head could be moved freely in all directions, and the rope being close to the neck it was impossible for the animal to get its fore legs over it; but it had its failings also. The snaps were not secure fastenings. Scarcely a night passed that one or more animals did not get loose and cause trouble. It was, moreover, a slow process to set the whole herd loose, as each stall had to be entered, and nervous animals eager to get out often pulled back so hard that it was difficult to release the hooked snap from the ring in the neck strap. In an emergency, when the safety of the herd would depend upon its rapid release, the results might be most disastrous. These considerations led us to decide on a change, but to what should it be? Every one of the long list of patented and common devices had in my estimation drawbacks more or less serious. I desired to retain the feature of fastening the cattle by the neck as the most humane form of confinement, but it must be accompanied by some plan for the rapid release of the herd. To make a long story short, let me say that my experiments on the subject resulted in the device which is shown in the illustrations. It is not patented, and does not infringe any patent.

In the illustration showing its attachment to a single stall (fig. 1) the horizontal bar *B*, which is placed some 8 feet from the floor to be out of the way, runs the whole length of each row of stalls. It is of wood, dressed smooth, and 2 by 3 inches square. It rests in wooden brackets secured to the outside (or alley side) of the posts and in which it can slide freely. It is moved back and forth by the means of the lever *A*. A few inches from each post, a common sash cord, *C*, is attached to the bar at one end, and passing over a common small pulley secured to the post, as shown in the illustration, it hangs by the side of the post and terminates in a heavy iron pin, a foot or more long, made of ½-inch round iron. This pin passes through two pieces of gas pipe which are secured to the side of the stall by heavy staples. This part of the device is best shown in fig. 2. The two pieces of pipe are about ¾ of an inch apart. The chain *E*, which is secured to the stall at one end and has the other end free, is slipped through the ring in the neck-strap on the animal and the terminal link is put into the opening between the two pieces of gas pipe, the pin dropped through it as shown at *D*, and the animal is securely fastened. An entire row of cattle thus secured is released in an instant by simply moving the lever *A* a few inches, in which moving the bar, raises the pins, the chains drop, and all the cattle are loose at once. To prevent the cord being pulled by the horns it is covered as far as the horns can reach by a piece of wood provided with a groove through which it slides. This could be improved by making the upper piece of gas pipe longer and the pin correspondingly longer also, which is necessary since the eye to which the cord is tied is too large to slip inside the pipe.

When the cattle stand in the same stall, the chains cannot, of course, be stretched across the stall, but must have both ends fastened to the same partition or post as in fig. 2. The chains for single stalls should be a few inches longer than the stall is wide, in order that they may sag some eight or nine inches, which gives the animals still greater freedom. Each animal must of course be fastened by itself, but it can be done from the alley in front, which allows of more rapid work than when the stalls are entered. All things considered, I know of no cattle-tie which offers the same advantages. The cattle are released instantaneously, which saves much time in handling them; they are securely fastened, and withal they have as much freedom and comfort as it is possible to give them and still keep them tied. The materials are cheap and can be had anywhere; they should not be over twenty-five or thirty cents per head, and the device is so simple that any one who is handy with tools can put it up."

Cultivator.

The Horse.

A TYPICAL ARAB STALLION.

This picture (reëngraved from the London Live-Stock Journal) shows the Arab stallion, Sir Robert, the property of Sir Humphrey de Trafford, Florden Hall Farm, Norfolk. "He is," says our contemporary, "a beautiful gray, with all the quality of his race. He possesses excellent limbs and shapes, and far more action than the Arab as a rule displays—in fact, he goes as well behind as a Hackney. He has won steeplechases, hurdle and flat races, and was hunted in Cheshire last season."

FEEDING WORK HORSES.

It is generally safe to judge of things on principles, and as the alimentation of all kinds of animals, human and otherwise, is based on well known principles, it is safe to be guided to a large extent in feeding our farm animals by what we know of our own needs and liking. We know that a variety of food is desirable on many accounts, that the food is eaten with better appetite, that the digestion is better for the variety, and that the food is more useful, as it is better digested. Thus, in feeding working horses at this season of the year, when the work is heavy, and calls for perfect assimilation of the food for the maintenance of the strength, it is desirable that the feeding should be in accordance with these principles. As a rule, we are careless in this respect, and as long as the tiresome uniform hay and oats, or corn, are supplied, the result of this worrying sameness is overlooked. It is well known that the digestion is improved by the addition of whatever may increase the secretion of the saliva, which is an important digestive agent, and that savory food not only increases the secretion but aids the appetite that may be pulled by the use of the same unvarying food day after day. Then, it should be a matter for study how the appetite and digestion of the food of farm horses may be stimulated and the food made more nutritious.

There is a great variety of food that may be safely and economically fed to horses, some articles of which are really cheaper than the common hay and grain of which the unvarying ration is made up. There are all the grains; some of the waste products, as dried brewers' grains; dried gluten meal; mixed dry fodders, as oats and pea straw, millet hay, and the different green forage crops that may be procured so easily by farmers. The latter are especially desirable at this season; and a single test of them will satisfy any man of their desirability. This is better known in towns and cities than on the farm, and one may see the city draught horses enjoying a mid-day meal of green rye or clover with infinite pleasure, while the horse on the farm has the dry hay day after day, and never a taste of the sweet succulent fodders that are so plentiful on the farm or may be made so.

The horses should not be neglected in this way. Ample preparations should be made for them. A plot of clover, or rye, or orchard-grass, should be always laid out for them for the early spring feeding. A stock of bran should be especially provided for the season when the old coat is shedding, and a daily ration of it given through the summer. It has an excellent effect on the skin, and will prevent that frequent irritation which so annoys the animals at this season after a winter's feeding of corn. A mash of bran and linseed, two quarts of each, lightly salted and sweetened with sugar or molasses, will be most useful, and the thankful whinney with which the horse will receive this luxury will tell as eloquently as words might how it is appreciated by him. It may be given in addition to the regular feeding, or this may be somewhat reduced, but this will hardly be necessary, for it puts an edge on the appetite which makes it keen, and the extra food will only increase the desire for the steady ration.

One sees the finest draught horses in the world in the streets of English cities. Those equine monsters, the brewers' horses, black as a coal, sleek, spirited and strong enough to walk off with ease with a load of six or seven tons, are kept in such condition by the use of a bucketful of beer twice a day, and this they take with the same relish and nutritious result as the quart taken at a draught by their lusty drivers, who handle the heavy barrels with the most perfect ease. The solid food of these giants of their race mainly consists of crushed oats, or barley, and beans, with sheaves of green barley and tares, in addition to the accustomed hay. Sometimes bread is given and eaten with avidity, and on Sundays a mash having a dozen eggs in it, as a sweet morsel, in addition to the regular food. This is an excellent thing for the skin, and the coat glistens like satin under this kind of feeding.

The horses have the advantage of the richest kind of diet in their beans. These contain as much nitrogen as lean beef, and for the restoration of wasted muscle caused by hard work, the nitrogenous elements of food are specially useful. We have no such food for horses on this side of the world; our climate seems to be unfavorable for the growth of the crop, (1) but we have a substitute almost precisely constituted in the dried brewers' grains that have recently come into the market. Peas have nearly the same composition as beans, and might be used as a substitute for them, but the southern cow pea is a bean, and the soja bean, closely related, is equally rich in this needed nitrogenous matter. This bean is the choice food for horses in India, and it is well worth cultivation here as a partial substitute for our too starchy corn.

No doubt many of the common ailment of horses in America are due to excessive corn-feeding, and our animals would be far more healthy if such food as bran, or linseed oil meal—quite different now from what it was years ago, since the oil is almost completely extracted by the new process—were used more frequently.

But anyhow, there should be a great or variety provided for these valuable animals, to whom so much gratitude is due for their indispensable services in the field; and more labor

(1) Beans do well here, *if sown early*. ED.

might be well spent in the preparation of the food. The hay should be cut finely, or as it is otherwise called, chaffed. This should be the rule. The food thus prepared is fully one-third more nutritious than the long hay, given with whole grain — the most wasteful manner of feeding a horse. This cut hay, or partly hay and straw, (1) is wetted with water sweetened with a few ounces of molasses, and the ground grain food is mixed with it. This is the ordinary ration, changed frequently by the mash, and the green fodder with the other kinds of meals. On resting days oats may be given whole, when the animal will relish the change and take time to eat them slowly.

One of the most acceptable green foods for a horse is the mixed oats and peas —1½ bushel of peas sown with 2½ of oats on an acre, and when the peas are in full blossom the fodder is ready for use That which is not used before the grain is ripe is cut and dried for feeding with the grain in it, but cut into chaff, or it may be threshed and the grain ground and fed with the cut straw moistened with sweetened water. This sweetness makes the food more palatable, and also more nutritious, for sugar is the sole carbonaceous food of animals, except fat; as the starch and the cellulose of the food are always changed into sugar by the digestive process before they can be assimilated. And the small quantity of sugar thus given with the food acts as a ferment to more readily make the change of the starch of the food into sugar in the stomach.

The digestion of food may be very much interfered with by mistakes in watering This should always be done before feeding and never soon after it The water is absorbed by the intestines with great rapidity. A few minutes will suffice to absorb three or four gallons of water, and this dilutes the salivary secretion so as to supply all the water needed for the digestion of the food, and no water will then be needed soon after feeding This avoids the washing of undigested food from the stomach into the intestines where it ferments and produces much gas and causes those frequent colics that on the whole reduce the usefulness of our work horses fully one half For every attack of disease cuts off so much of the thread of life, and there are very few horses that are not affected injuriously with colic—the result of mistakes in feeding, but more in watering—sufficiently to have an appreciable result on the duration of life. H. STEWART.

(*Cultivator.*)

IN-FOAL MARES.

The foaling season is within the near future, and it is not out of place to consider a few points in connection with it, even though there is perhaps not much that is new to be said. But if there is not much which is fresh to say, there is always a fresh generation to say it to The whole require no physician. The mare has now got into a condition when the foal makes a serious draught on her system, and although it is unwise to let her get fat, she requires a plentiful supply of food, particularly if she is at work, and undoubtedly the mare is better at work than kept in close quarters; and she may be kept at work up to the time of foaling with advantage, but discretion is advisable in this matter. A mare rarely dies through being at work up to the time of foaling, but undoubtedly there are many instances where mares are unnecessarily fatigued, and made to suffer by being compelled to exert themselves to the full at a time when nature calls for exercise, but not for too severe labour. Mares at grass generally foal with least complications; the food and the moderate exercise being the natural conditions under which the animal exists, and it is a recognised fact that the nearer nature is approached, the better the chance of a natural parturition.

Perhaps nothing does so much to upset the fœtus as causing the mare to "back" a load; a steady forward draught strains no part, but the unnatural action of forcing a load backwards cramps the hinder quarters, and the sensitive parts are so inconvenienced that an effort of expulsion is attempted, or the fœtus is forced from its natural position. Heavy loads on the back are also prejudicial, and not unfrequently cause difficulties. Very heavy walking, where the animal can only lift her legs out of the slough by an extraordinary effort, are hurtful. For the same reason it is wrong to allow a mare heavy in foal to act as a chain horse on a manure heap. (1)

If it is too early to obtain freshly grown green food, a small allowance of carrots act beneficially on the system, and a small quantity of pulped mangolds may be given with advantage The idea is to give them rather as a medicine than as a food. When a mare foals before grass time she is in advance of nature, and therefore her artificial food should be as nearly in accordance with her natural food as circumstances permit. When animals are left to themselves they invariably produce their young at a time when there is a new supply of green food coming on, so that both they and their offspring may take advantage of it. Domesticity upsets this, and the females come into season earlier. A few roots keep the bowels free and the blood in a healthy condition. Perhaps the efficacy of the roots at this period of the year is best realised when their effect on out of health horses is noticed. Every-one who has had the misfortune of owning a horse afflicted with grease or other "humoury" diseases knows how soon the benefit of a few roots added to its diet becomes apparent, for the swellings rapidly decrease, and the animal is more comfortable. The medicinal as well as feeding properties of bran are well known to every horse-keeper, and during the few weeks previous to foaling an occasional bran mash —made of scalding water, and allowed to become thoroughly softened before use, is most valuable; and when the time of foaling approaches, a small mash may be given daily with advantage.

Perhaps no domestic animal shows signs of approaching parturition more unevenly than does the mare. The ordinary signs of the udder distending, the teats becoming waxed, commence in different mares at such irregular times that no definite time can be fixed when the foaling will actually take place. Even men of great experience with mares are constantly far out of their reckonings. The "dropping of the bones" is a fairly reliable sign, but mares differ much in the length of time which elapses between this action and parturition. Then again, the period of gestation is sufficiently irregular to afford only an approximate guide as to when the mare will foal; consequently, it usually becomes necessary to watch the mare for several days before the foal appears, as neglect to do this not rarely causes loss. We can speak of personal loss through being too certain, and we know of others who have suffered in a similar manner. When all is right, the foal comes speedily, and the whole operation is rapidly over, the foal up and sucking, and the mare little worse for her labour. The danger is chiefly in that the mare may get down and the foal may not get clear. We remember seeing a mare and foal dead at 6. a. m. which, according to the horse-keeper, who had forty years' experience, did not show signs of immediate parturition two hours previously. Yet the foal was coming all right, but the mare fell backwards, and became cast in her loose box, and both succumbed. A man at hand would have prevented the loss, yet the mare had been visited every night for more than a week. So the need of constant watching is very evident.

(*The Mark Lane Express.*)

(1) Hay should never be given, when chaffed, without straw. It *balls* in the stomach very frequently. ED.

(1) That is, in drawing loads of manure up to the top of a mixen to compress the dung—a universal practice in England. ED.

Competition of Agricultural Merit.

THIRD YEAR, 1892.

Report of the Judges of the Competition.

No. 42.—M. THOMAS POULIN.

The 10th July we visited the farm of M. Thomas Poulin, of Ste. Croix, Lotbinière. There are 250 acres in all; 247 arable, 3 not ploughable, and a garden 50 x 150 feet. Soil: the major part heavy land, the rest sandy.

M. Poulin's rotation would be perfect if all the land he ploughs received manure, it is this: First year, wheat, barley, oats, buckwheat, flax, with seeds, hoed crops with dung ploughed in. Second year, wheat with grass-seeds, after the hoed-crops. He mows 5 or 6 years and pastures 3 or 4 years. He manures every year about 12 to 15 arpents of the ploughed part; but a large part gets no manure; wherefore we deducted 1 mark for this item.

The division of the farm, and the fences, are good.

As there were some daisies in the field, we took off half a mark from the item of freedom from weeds.

House good, but the cellar too low.

Barns, stable, cowhouse, piggery, sheepshed, are well suited to the farm. We found a silo outside the cowhouse, and a boiler at one end of the cowhouse, for scalding the fodder and fermenting it. This we approve of, as tending to increase the production of milk.

Implements nearly complete.

Manure well preserved and increased.

The general order good except in the buildings.

No books kept.

Satisfactory permanent improvements, as will be seen by the marks allowed.

M. Poulin has a half-bred Hambletonian stallion, 2 brood-mares, a yearling colt, and a foal; 1 bull, 19 cows, 2 fatting beasts, 15 2-yr.-old beasts, 5 calves; 1 ram, 12 ewes, and 13 lambs.

Crops: 8 arpents of wheat, 32 of oats, ½ of seed-timothy, 2¼ of potatoes, ¼ corn to ripen, 1 of silage-corn, 120 in meadow, 70 in pasture, and a garden of 50 x 150 feet.

M. Poulin having been accorded 76.50 points wins a bronze medal and a diploma of Great Merit.

No. 43.—MR. DUNCAN STEWART.

On the 6th of July, we were at the farm of Mr. Duncan Stewart of Inverness, Megantic. This contains 265 acres. 55 arable, 10 unploughable, 193 in bush, 1 in orchard, and a garden 75 x 77 feet. The soil is loam with porous subsoil.

Rotation perfect: First year, oats, pease and oats. Second year, dunged oats with seeds, dunged hoed-crops. Third year, after the hoed-crops, wheat, and barley with seeds. He mows 4 or 5 years, and pastures 3 years.

The division is perfect, and the fences fair.

No weeds in either the hoed-crops, the meadows, or the pastures; the two last are pretty good.

The house is good and well suited to the wants of a family.

Barn, stable, cowhouse, piggery, wood and cart-lodge, are all in excellent order.

The splendid silo, which gives great satisfaction, is close to the cattle.

Implements nearly sufficient.

Maximum of marks allowed for increase and preservation of dung, which are perfect. General management good, but the fences are not quite perfect.

Only one point out of three accorded for accounts. Permanent improvements satisfactory, as will be seen by the marks granted.

Stock: 2 work horses, 1 2-yr-old colt and a foal; 1 bull, 1 cow, 8 butcher's beasts, fine and large ones, 4 young shorthorns, 4 yearling steers, and a bull-calf.

Crops: 1 acre of wheat, 3 of oats, 4 of gabourage, 1 of potatoes 1 of silage-corn, 12 in meadow, 35 in pasture, 1 in orchard, and a garden of 75 feet square.

The number of points, 76.15, accorded to Mr. Stewart, entitle him to a bronze medal and a diploma of Great Merit.

No. 44.—M. HYACINTHE LAUZE.

We were at the farm of M. Hyacinthe Lauzé of St. Louis de Lotbinière on the 17th of July. It contains 200 arpents, 100 arable, 99 not arable, and a garden 60 x 90 feet.

The soil is strong clay, but a part is sandy.

M. Lauzé's system of rotation is faulty, for he manures a fewer number of arpents than he ploughs, and we deduct one mark in consequence.

We take off a half-mark from the division of his farm, as the fields we think are too large. The fences are well made and in good order.

No weeds in the fields.

The house is well suited to the wants of a family.

Barn, stable, cowhouse, sheepshed, piggery, are of the old-fashion, and not very suitable.

Implements almost sufficient in number, of good kinds, and in good order.

Preservation and increase of manure not perfect; there is no shelter for it.

General order, good.

M. Lauzé keeps no books.

Satisfactory permanent improvements—⅔ marks for this item.

Stock: 2 brood-mares, 1 yearling colt; 2 bulls, 7 cows, 6 yearling beasts, 2 calves; 1 ram, 6 ewes, 3 lambs.

Crops: 7 arpents of wheat, 30 of oats, ½ of pease, 3 of buckwheat, 2 of timothy, ⅓ of beans, 1½ potatoes, 40 in meadow, 30 in pasture, and a garden 60 x 90 feet.

We granted M. Lauzé 75.95 marks; so he is entitled to a bronze medal and and a diploma of Great Merit.

No. 45.—M. Germain Caron.

It was on the 26th July that we inspected the farm of M. Germain Caron, in the parish of St. Jean Port Joli, Trois Saumons, l'Islet county. It contains 64 arpents, of which 60 are arable, 4 non-arable, including an arpent in orchard, and a garden 24 x 60 feet. The soil is partly clay and partly sandy.

Rotation: First year, oats. Second year, oats with seeds on the land intended for pasture, and on that intended for meadow, oats. Third year, after oats, wheat, barley, with dung ploughed in, and grass-seeds—2 gals. mixed timothy and clover; he top-dresses his meadows with dung and ashes. The meadow stands 4 or 5 years, and the pasture 3 or 4 years. We deduct a mark from this item, because part of the land he ploughs gets no manure.

Division and fences, good; fields free from weeds. The house is excellent, and the barn, stable, cowhouse, piggery, granary, are all in good order.

The implements are well cared for, but there is not enough of them, so on this item we cut off 2 marks out of the 5 allowed.

Preservation and increase of manure perfect; full marks for this item.

General order, good.

No accounts kept by M. Caron.

Ditches sufficiently numerous and kept well cleaned out. Besides the manures of the farm, M. Caron bought 150 bushels of ashes.

Stock: 3 brood-mares, 2 2-yr old colts; 1 bull, 7 cows, 2 of which are Canadian crosses, 1 butcher's beast, and 2 calves.

Crops: 1½ arpents of barley, 15 of oats, 3 of goudriole of oats and rye, 5 of potatoes, 14 in meadow, 24 in pasture, ¼ in green-fodder-crop, and a garden of 24 x 60 feet.

We assigned 75.95 marks to M. Caron who is thereby entitled to a bronze Medal and a diploma of Great Merit.

No. 46.—M. Pierre Lagueux.

On the 28th of last July we visited the farm of M. Pierre Lagueux, of St. Romuald, Lévis containing 100 arpents, of which 80 are arable, 15 non-arable, 2 in bush, with a garden of 200 feet square. Soil partly heavy land and partly sandy.

Rotation: First year, after meadow, wheat, oats, buckwheat with seeds; part of the dung is ploughed in, the other part used as top dressing; after pasture, oats, barley, pease with grass-seeds: he sometimes sows grain 2 years in succession and seeds with the second year's grain. The meadows, stand 3 to 5 years, and the pasture 1 year. He only manures one fourth of his meadows, and pastures them 3 to 5 years. He ought not to plough more land than he can manure, and wrong in using half of his dung as top-dressing. For this he loses 1 mark.

The division of the farm is not perfect; we only allow him 1 mark out out of the 2 for this item.

Fences, good.

Some weeds to be seen in the fields; we deduct 2 marks for this.

The house is good, and well suited to the wants of a family.

Barns, stable, cowhouse, cart-lodge, cupboards, henhouse, and piggery, are all very convenient and suited to the wants of the farm.

Not enough implements, so we deduct 1 mark from those allowed for this item.

The care and increase of the manure is good.

General management and regularity of order not too good.

Farm-accounts not perfect, only 2 out of 3 points accorded.

Permanent improvements satisfactory, as the marks allowed testify.

M. Lagueux's stock: 1 brood-mare, 2 work horses, 1 3-yr-old colt, 2 2-yr-olds, 1 yearling; 2 bulls, 9 cows, 3 fatting beasts, 2 2-year-olds, and 3 calves.

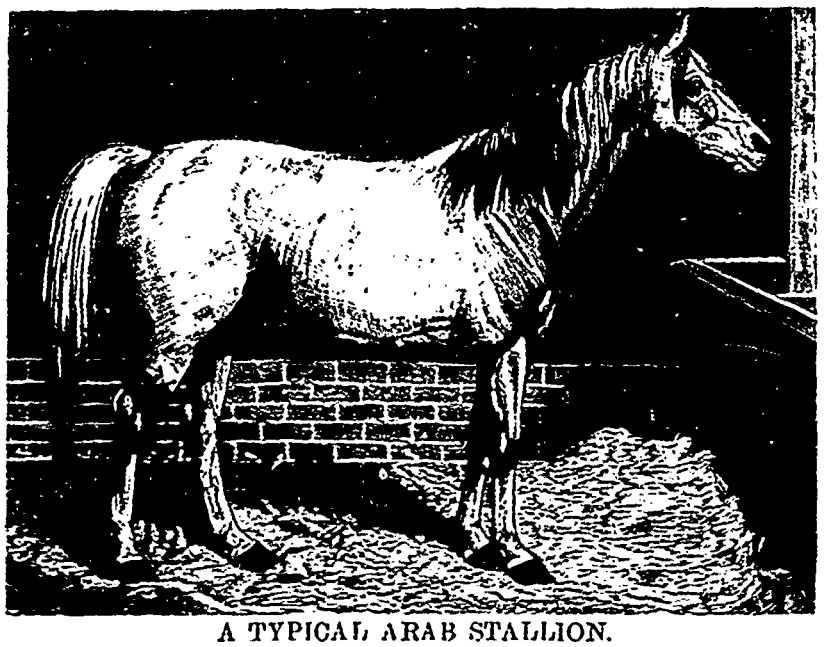
Crops: 2 arpents of barley, 20 of oats, 1½ of buckwheat, 1 of seed-timothy, ½ of flax, 3 of potatoes, 30 in meadow, 50 in pasture, 1 in green-fodder, 1 in orchard, and a garden of 200 feet square.

To M. Lagueux we assigned 75.70 marks, which gives him a right to a bronze medal and a diploma of Great Merit.

No. 47.—M. Vital Talbot.

The 1st July last saw us at the farm of M. Vital Talbot, St. Norbert, Arthabaska, consisting of 137 acres, 75 of which are arable, and 21 non arable, 40 in bush, 1 in orchard, with a garden 150 feet square. The soil is loam with a porous subsoil.

Rotation: First year, oats, pease, goudriole of pease and oats, wheat with interred dung and seeds, 2 gals. of timothy and 3 lbs. of alsike clover to the acre. Second year, where the oats were, 1½ arpent of potatoes, the rest in wheat with interred dung and seeds. Third year, where potatoes were, wheat with seeds. He mows 4 to 8 years, and pastures 3 to 5 years. One



A TYPICAL ARAB STALLION.

part gets no manure, so we deduct a mark for this.

Division and fences, good; no weeds in the fields; The house is good, and suited to the requirements of a family. Barn, stable, cowhouse, sheepshed, piggery, granary, cart-lodge, are all in good order.

Implements of good kinds, well cared for, and plenty of them.

No shelter for the manure, so we took off a mark for the item, preservation and increase of manure.

General order, good.

M. Talbot keeps no books.

As to the clearing off of stones, and their utilisation, there were but few here, M. Talbot has carted into a heap about 1,500 loads of them.

Stock: 2 brood mares, 1 work-horse; 1 bull, 11 cows, 3 2-yr.-old beasts, 2 calves; 1 ram, 6 ewes, and 4 lambs.

This year, M. Talbot has 2 acres of wheat, 6 of oats, 1 of pease, 1½ of buckwheat, 6 of goudriole, ¼ of seed-timothy, ½ of flax, ½ of potatoes, 20 in meadow, 40 in pasture, ½ in green-fodder, ½ in orchard, and a garden of 150 feet square.

We assign M. Talbot 75.25 marks, which entitles him to a bronze-medal and a diploma of Great Merit.

No. 48.—Louis Nap. Côté.

It was on the second day of last September that we found ourselves at the farm of M. Louis Napoléon Côté, of Bic, Rimouski. The farm contains 300 arpents, of which 80 are arable, 30 non arable, 190 in bush, with a garden 75 x 80 feet. The soil is partly heavy land and partly sandy.

We do not approve of M. Côté's rotation, so we only give him 2 marks for this item. It is this: First year, oats, pease and oats mixed, tares and oats. Second year, barley after oats with seeds; where grew the gabourage, and the tares and oats, he sows oats with seeds. Hay is made as long as it yields well.

The division of the farm and the fences are all right; the fields are in good order and free from weeds.

The house is convenient and well suited to family occupation.

Barn, stable, cowhouse, sheepshed, piggery, although old-fashioned, are all in good order. There is also a good silo with which M. Côté is very well satisfied.

Implements nearly sufficient in number and well cared for.

One mark deducted for neglect of the preservation of the manure.

General order, good.

M. Côté only got 2 marks out of the 3 for book keeping, as his was not complete. For permanent improvements, he got 10 out of the 15 marks allowed.

Stock: 1 brood-mare, 1 work-horse, 1 registered Canadian bull, 10 cows, 3 of which are registered Canadian, and 7 half-bred, 2 registered 2-yr.-olds, 11 young beasts, of which 3 are registered Canadian heifers, and a registered Oxford-down ram.

Crop: 8 arpents of oats, 1 of hay (?) 5 of tares and oats, 2 of buckwheat, 2 of potatoes, 22 in meadows, 50 in pasture, and a garden 75 x 80 feet.

We awarded M. Côté 75.15 points, which entitles him to a bronze-medal and a diploma of Great Merit.

No. 49.—M. Louis Carlus.

We, on the 25th of July, visited the farm of M Louis Carlus, of St. Cyrille, l'Islet, containing 100 arpents, of which 89 are arable; the soil mixed clay and loam.

M. Louis Carlus is the son of a working-man; after having worked for some years with his father, he engaged himself to a farmer, and afterwards bought the farm he now occupies, which was then in bush. As he had spare time, he went and cleared part of his land; he then built a house and a barn, and the next year he took up his abode there, having with him his aged father, his mother, his brother, his sister, then a widow, with her four children whom M. Louis Carlus supported.

In spite of the land being stony and cold, and seedtime there being very late, as a rule; by his talents, his industry, and his orderly life, he has become the model-farmer of the parish of St. Cyrille. None of his children have gone to the States; his two sons and two of his daughters are married, and live at St. Cyrille, the two sons helping their father to work the farm.

Rotation: First year, wheat, oats, pease, with seeds and interred dung where the land is poorest; the richer land gets no manure, it is only enriched by grazing. He leaves the meadows 3 to 4 years, and pastures them 4 or 5 years. We do not approve of M. Carlus' course, because he does not manure his best land, although he exhausts it as little as possible, only ploughing once, and then letting it lie for 4 or 5 years. However, if this system be pursued, the land will become exhausted soon enough. We advise M. Carlus, then, not to plough more land than he can find manure for.

The farm is well divided, and the fences are good. We took off 1 mark from the item, freedom from weeds, on account of some ox-eyed daisies we saw on the land.

The house is a good one, and well suited to the needs of a family.

Barns, stables, cowhouse, piggery, granary, sheds, are all in good order.

Implements sufficient in number, of good kinds, and well cared for.

Preservation and increase of manure perfect: full marks for this item.

General order, good. M. Carlus keeps no books.

Eight marks we allowed for ridding the land of stones and utilising them. The ditches we found sufficient and well cleaned out.

Stock: 1 brood-mare, 2 work-horses, 1 2-yr.-old colt and 1 yearling; 2 bulls, 9 cows, 1 butcher's beast, 2 2-yr.-olds, and 2 calves, 1 Shropshire ram, 8 cross-bred ewes, and 8 lambs.

Crops: 3 arpents of wheat, 18 of oats, 2 of pease, 1 of seed-timothy, ½ of flax, 3 of potatoes, 20 in meadow, 30 in pasture, ½ in green-fodder, and a garden of 1 arpent.

We gave M. Carlus 75.05 marks; he is therefore entitled to a bronze medal and a diploma of Great Merit.

No. 50.—John L. Smith.

On the 7th of September, we paid a visit to the farm of Mr. John Smith, of New-Carlisle, Bonaventure. This farm contains 80 acres, 60 of which are arable, 20 non-arable, and 16 in bush. The soil is sandy.

The system of rotation is fair; we took off one mark, however, because Mr. Smith does not manure all the land he ploughs.

Rotation: First year, after meadow, oats, wheat; after pasture, oats, wheat, buckwheat, potatoes with manure. Second year, dung on the furrow worked in with the spring-tooth harrow, then oats; after the previous year's potatoes, he sows wheat, and seeds over the whole shift. Third year, on the land intended for pasture, oats again with seeds. He generally manures 7 or 8 arpents annually, and the rest in the following rotation. He mows 2 or 3 years, and pastures 2 or 3 years.

The farm is well divided, the fences in good order, and the land free from weeds.

The house is good, healthy, and

well adapted to the needs of the family.

All the buildings necessary to the farm are sufficient for the cattle kept

The implements are almost sufficient in number, and good of their kind.

Manure is well preserved and increased in quantity.

General order, good.

Mr. Smith keeps no books. Besides the farm-manure, he uses 100 loads of sea weed and 50 barrels of fish. He has also planted some forest trees on his farm.

Stock. 1 brood mare, 1 work horse, 1 bull, 5 cows, 3 yearlings, 2 calves, 1 ram, 8 ewes, and 6 lambs.

Crops: 1½ arpents of wheat, 1 of barley, 20 of oats, 1 of buckwheat, ½ of seed timothy, ¼ of swedes, 3 of potatoes, 18 in meadow, 20 in pasture, and a garden of 150 x 160 feet.

M. Smith gains 75.05 marks, so he is entitled to a bronze-medal and a diploma of Great Merit.

No. 51.—M. John B. Cyr.

September the 9th saw us at the farm of M. John B. Cyr, Little Cassapedia, Bonaventure. It contains 216 arpents, 80 of which are arable, 12 non-arable, 100 in bush; Soil: partly sandy, partly clay.

As to his system of cropping, we like the way he makes one crop succeed another, but we think he ploughs more land than he can manure, wherefore he loses ½ a mark out of the 4.

The fields are sufficiently divided, the fences are well made and of good stuff; there are no weeds in the fields.

The house is pretty good; the barn, stable, cowhouse, piggery, sheepshed, are all good and conveniently arranged.

The implements are well kept, and almost sufficient in number.

The manure is taken good care of, and increased by the addition of seaweed and fish in compost.

General management good, but no books kept.

There are not many permanent improvements on the farm; but we found the ditches sufficient in number and well cleaned out.

Stock: 1 brood-mare, 1 work horse, 1 yearling colt; 2 half-bred Shorthorn bulls, 9 half-bred Canadian cows, 1 butcher's beast, 4 2-yr.-old beasts, 2 calves; 13 ewes and 11 lambs.

Crops: 8 arpents of wheat, 2 of barley, 12 of oats, 2 of buckwheat, ½ of seed-timothy, ¼ of flax, 6 of swedes 2 of potatoes, 18 in meadow, 20 in pasture, and a garden 100 feet square.

We accorded M. Cyr 75.05 marks, which entitles him to a bronze-medal and a diploma of Great Merit.

Reviews.

The U. S. Experiment-station's Record.

The bulletins of the Experiment-stations of the United-States are, as most of our readers know, sent into the office at Washington, where they are digested by the Director, Mr A. W. Harris, and published monthly in the form of a record of the most salient points mentioned in them. We propose to examine these records for the months of October, November, December 1892, and January 1893, and to give in a condensed—very much condensed indeed—form, the conclusions the agricultural experts of the States have deduced from their experiments.

Fertilisers.

"In the little State of New-Jersey, $1,346,000 were expended in the purchase of fertilisers. The cost per pound of nitrogen, phosphoric acid, and potash in raw, unmixed materials, is less than the stations, valuations, while that of the same elements in mixed fertilisers is at least 25 o/o greater." Thus, a farmer who buys his materials, as we have so often advised, and mixes them himself, would save 25 o/o by so doing A vast amount of rubbish has to be paid for, and increased freight, in these mixed fertilisers.

Potash is not so much needed in Rhode Island as phosphoric acid. Why? Because of the granitic origin of the soils of that state, and their consequent natural supply of potash. Do not the foothills of the Laurentides also contain an abundant supply of that element?

Valuation of fertilisers:—The New-Jersey station gives "the average composition, sale price, and commercial valuation of *complete fertilisers* for the years 1891 and 1892:

Years.	Total nitrogen	Total phosphoric acid	Available phosphoric acid	Insoluble phosphoric acid	Potash	Selling price	Station valuation.
						$	$
1891	2.71	10.12	7.29	2.84	4.21	31.23	25.31
1892	2.74	10.38	7.70	2.67	4.50	34.19	25.66

By this table, it will be seen that the buyer of complete fertilisers pays about $9.00 a ton more for his goods than the man who buys his fertiliser-materials separately, in the open market, and mixes them himself.

Field crops.

Potato-disease. — Experiments were tried, at the New-York station, on the relative values of the Bordeaux mixtures and an ammoniacal solution of copper, as remedies for the potato disease. They were both effective, but the Bordeaux mixture gave the better results. We should fear that the *ammoniacal* solution would be apt to produce a continued growth of the haulm, and thereby injure the quality of the tubers.

Ashes:—Rhode-Island station tried the relative effect of the application of "Canada ashes" on new meadow-land in winter and in spring. One-third of an acre of old sheep-pasture, seeded to timothy and red-top, got half a ton of ashes on January 6th. On a similar plot of the same size, the same quantity of ashes were applied on April 10th. The yield of hay was:

Winter application.....	1,906 lbs.
Spring do	1,497 "
Balance in favour of winter application....	409 lbs.

i. e. 27 o/o in favour of the earlier application; thus proving, for the thousandth time, that potash is, as we have remarked in this publication over and over again, the most refractory of all the manurial elements; and showing why those who apply ashes to their potato-crop in May in this country, hardly ever, if ever, reap any benefit from the outlay.

Cooperative tests: — Thirteen farmers, in Virginia, carried out, in connection with the station, a series of experiments on corn. "The details are incomplete and inconclusive." It is not every one who is capable of carrying out a series of even the simplest experiments. It requires no mean powers of observation, great patience, absolute indifference to the bearing of results, freedom from foregone conclusions, and constant attention to minutiæ. We have always felt that the present Prime-minister of England, had he turned his attention to that business, would have made one of the most capable experimental philosophers that ever weighed things in a balance.

Maize-tassels:— The experiments on the removal or non-removal of tassels from maize seem to have left the experimenters completely in the dark as to the benefits derived from the removal-process. There is no uniformity in gain or loss of yield with respect to the treated or untreated rows. In one case, the row in which the tassels were removed gave, as compared with the unremoved row, a yield of 151: 100; in another a yield of 37: 100!

Wheat.—For fall wheat, the quantity of seed that seems to be the most effective, in Indiana, &c., is 6 pecks to the acre. This is about the average seeding in well farmed English soils Four pecks grow our own great crop of 1852—60 bushels an acre—but we always found, that if any disease attacked the crop, the thinner the seeding the more certain the crop was to suffer. For spring wheat, in this country, we should begin with 8 pecks in April, and gradually increase the quantity until we reached 10 pecks by the 20th May.

Mowing wheat in the spring was tried, at the Indiana station, on the 26th April, the wheat being then about 6 inches high. The result was that the growth was considerably retarded, and the crop, both grain and straw, very much reduced. In England, when wheat is looking too luxuriant in a mild winter, we used, many years ago, to turn the sheep into it. But no one would have, even then, dreamt of doing so after the spring growth had once begun.

Ripe wheat, as seed, produced 22 bushels of grain and 1.04 tons of straw; and wheat cut in the milk 19.75 bushels and 0.80 ton of straw.

Spring-pastured wheat at the Kansas station—a cow was turned into it on April 6th!—yielded less than the unpastured lots. If our United-States' friends would harrow, horse-hoe, and roll their fall-wheats in early spring, as soon as the land is dry enough, and before the new growth has begun, they would soon find a difference in the yield.

Average yield of wheat from seeding at different rates.

Rate of seeding.	Grain.	Straw.
	Bushels	*Tons.*
2 pecks	20.46	1.18
3 pecks	31.83	1.75
4 pecks	34.76	2.13
5 pecks	35.05	1.76
6 pecks	36.99	1.87
7 pecks	36.16	2.06
8 pecks	37.91	2.17

It will be seen by the above table that there is no greater difference between the seeding of 5, 6, 7, 8 pecks on acre, so far as yield of grain is concerned, than may have been caused by variation of soil, &c. Wheat, from its marvellous tillering powers, requires less seed to the acre than any other grain.

Potato-sets:— "When tubers are of the same variety and weight, the number of shoots does not perceptibly increase with the increase of eyes in the tuber." Interesting, perhaps, but of no practical importance.

Foods—Animal production.

Cattle-feeding. — Old working oxen were fed against 30 months' old steers, at the Alabama station. Food: cotton-seed, cotton-seed meal, hulls and hay, continued for 12 weeks. The oxen, which were 18 years old and very poor, were fed at a loss of $8.08; the steers, in good condition when put up to fat, gave a profit of $11.36. The two oxen gained 202 lbs. and fetched 1½ cents a pound; the steers gained 476 lbs. and sold for 3 cents a pound. The former cost, when bought in for the purpose of the experiment, 1½ cents a pound, and the steers, 2 cents a pound. Fancy eating an eighteen-year-old ox! What was the object of this experiment does not appear.

Breeds of dairy-cattle: — The investigation of the value of the milk-products of the different breeds of dairy-cows has been carried on at the New-York station during the last four years, and the conclusion arrived at is, what we all knew before, that the Jersey and Guernsey breeds are "noticeable for their low cost in *butter* production, while the Dutch, Ayrshire, and Guernsey breeds are characterized by their relatively low cost of milk production." This being so, can any one doubt that the Guernsey is, of all breeds comeatable on this Continent—with a saving clause in favour of the Dairy-shorthorn — the veritable farmer's cow. "The Devons and the American Holderness stand nearly midway between these other breeds."

A most interesting statement is given by the Director of the New-York station, comparing the conclusions derived from the experiments carried on there, on the "Relation of *food* constituents to *milk* constituents, with the opinion of Dr Foster, an eminent physiologist, at Cambridge, England. Dr Foster says:

That the quantity of fat present in milk is largely and directly increased *by protein* (nitrogen matter), but not increased—on the contrary, diminished—by fatty food.

Now, the experiments of the New-York station, carried on, as we have just seen, for four years, go to show that the average of 13 cows, during August, gave a consumption of 62.3 lbs. of albuminoids (nitrogenous matter), and 26.4 lbs. of crude fat, with a production of 19.6 lbs. of fat in the milk. In September, they consumed an average of 78.9 lbs. of albuminoids and 22.3 lbs. of crude fat, and only produced in the milk 17.3 lbs. of fat; or a decrease of 15½ o/o of fat consumed, resulted in a decreased production of 11.7 o/o of milk-fat. This result is diametrically opposed to Dr Foster's statement, and to his quotation from Liebig: The butter fat present in the milk of a cow is much greater than can be accounted for by the scanty fat present in the grass or other fodder she consumes.

Again, in July, the nitrogenous matter fed was somewhat less than in June (63 o/o less), while the fat was 14.9 o/o less in July than in June; but the decrease of albuminoids did not decrease the production of fat in the milk, nor did the decrease of fat in food increase the fat in the milk, since in July it was within .05 o/o of what it was in June.

Source of fat in milk:—(pp. 124 129).—Bearing upon this question, the amounts of crude fat in the food

eaten and of butter fat in the milk produced have been compiled for each of the fifteen cows on trial and for each month of lactation.

The aggregate number of pounds of crude fat consumed by these animals was 4,587.9, and the aggregate amount of milk fat produced by them was 3,793.4 pounds, or as 121 to 100 If we allow upon an average 17.4 per cent of the crude fat as impurity, it would still leave fat enough in the food to account for all recovered in the milk * * * During the earlier months, the production of fat in milk is considerably in excess of even the crude fat of the food, but very soon the amount of crude fat eaten and the amount produced become equal, and by a rather steady increase, relatively, the amount of crude fat consumed becomes at later months of lactation largely in excess of the fat produced in the milk.

"It would appear, therefore, that whether or not the fat of the milk is wholly or in part obtained from the fat in the food, there is little if any room for doubt that ordinarily the food contains enough fat to equal that produced in the milk."

LAMBS:—The grain feeding of lambs was fairy tried at the Wisconsin station, only, as usual on this continent, no pulse of any kind was fed. We are not fond of repetition, but, in this case, we must insist upon its being proved by the long continued English practice, that all lambs intended for the butcher should have, as soon as they can eat it, a ration of pease, or beans, or lentils every day.

The grain-ration for the lambs at the above station was composed of: first three weeks, one part crushed linseed-cake, and three parts bran; and later, of one part of crushed linseed-cake, one part of crushed corn, and two parts of bran.

The gain in weight of the lambs and food consumed by each lot, exclusive of pasturage, the same for all, was as follows:

Gain of lambs and cost of feed.

Grain fed.	Gain of lambs.	Cost of feed *
	Pounds	
Lot 1.. Grain to both lambs and ewes.....	432	$8.59
Lot 2 Grain to lambs alone	450½	5 15
Lot 3.. Grain to ewes alone...	385½	6.05
Lot 4.. No grain	395½	2.10

* Exclusive of pasturage.

The difference in value in favour of lot 2 as compared with lot 4, was calculated to be, at Chicago market-prices, $9.05, obtained at a cost for food of $3.05.

"It is self evident," says the Director, "that it paid to give the lambs all the grain they would eat. Those that have been eating grain will not suffer at weaning time."

For feeding lambs, a mixture of ground linseed cake and corn meal paid better than a mixture of cotton seed-meal and corn-meal.

SOILING STEERS:—This was an experiment to see whether green or dry food pushed steers along the better. One lot grazed on two acres, another had the green grass cut for them, and a third lot had the dry hay from similar areas. The grass consisted of timothy, lucern, and red-clover. The lot that had the green meat cut and carried to them did not consume the whole of the growth of the two acres, but the gains made per steer were identical in all three lots, which is rather a blow to those who support the soiling system in a highly waged country.

SWINE-FEEDING:—"Salt added to mangels for feeding pigs causes them to make less gain." Well, mangels contain more salt than most vegetables.

Cotton-seed and *cotton-seed-meal* given to hogs, at the Texas station, in 1891, had the effect of killing ten out of twenty; and in 1892 seven pigs out of fifteen died from the same cause. Even if this were not so, we should hardly think that pigs fed on such terribly oily food would be likely to make good pork. Corn-fed pork is bad enough, but corn and cotton-seed fed pork—Faugh!

Corn vs barley for swine:—100 lbs. of barley produced as much gain as 120 lbs. of corn. Corn alone, produced too much fat, and the swine were unhealthy; but barley alone had not the above effect. Curiously enough, when given to pigs of 125 lbs. and more, 100 lbs. of mixed corn-meal and shorts produced as much gain as 119.1 lbs. of barley-meal and shorts! At the Minesota station, it took 11.9 lbs. of corn-meal to make a pound of pork, but only 6 lbs. of barley-meal.

Does the exclusive corn-diet, so universal in the N.-Western States pay better than mixed rations? This was the question proposed for solution at the Kansas station, and is not of much interest to the farmers of this province.

I only mention it to show the conclusion drawn from the following summary:

Summary of results of feeding trial with steers.

	Average gain in live weight.	Food consumed per pound of gain. Grain.	Food consumed per pound of gain. Coarse fodder.	Total cost of food per lot.	Selling price per lot.
	Pounds.	*Pounds*	*Pounds.*		
Lot 1, mixed-grain ration.....	435 6	10 0	3.2	$155.00	$311.46
Lot 2, corn-meal ration.....	268.0	13.3	3.5	105.56	299 30
Lot 3, whole-corn ration, in barn.....	284 2	14 1	4.7	101.57	300 53
Lot 4, whole-corn ration, in yard.....	312.8	15.3	2.8	126.01	300.53

The conclusion is, that "all four lots were fed at a financial loss, this loss ranging from $15.48 with lot 3 to $37.21 with lot 4.

Soiling-crops for Connecticut.—The same soiling-crops that suit the Connecticut climate should about suit our climate. The quantity of clover seed prescribed is ⅓ more than needed if the land is well prepared. We do not think that the *rowen* from much of our grass-land would pay for cutting; the dose of seed for the oats and pease *maslin* is not too much, though two of oats, 1 of pease, and 1 of tares to the acre we prefer. A full seeding of rye is recommended, 3 bushels an acre of that cereal being as much as even we, who love heavy doses for green-meat, would advise.

The advantages of *clover* to the dairy farmer are: it produces more milk than hay, though the butter has not so much flavour; it can be grown with mineral manures only, as it obtains much of its nitrogen from the air; it increases the value of the manure; and it improves the soil by the roots, stubble, &c, it leaves behind it.

Silage of clover did not do so well as corn silage for milch-cows at the Vermont station.

DAIRYING.

Cost of butter-food.—What breed of cows produces butter at the least cost for food? is a question worth solving. Accordingly, the New-York station has been working it out by a thorough study of the following breeds: Ayrshire, Devon, Guernsey, Holderness (a variety of the shorthorn), Holstein and Jersey. These were kept under experiment for the whole period of one lactation, ten months, and the results showed that the Jerseys gave the largest amount of butter to the 100 lbs. of milk; the Holstein (Dutch) averaged the largest yield of milk per diem; the Guernseys, closely followed by the Jerseys gave the largest daily yield of butter. The average cost of food per pound of butter was, for the Guernseys, 16.07 cents, for the Jerseys, 14.07, and, for the other four breeds, it varied from 22.04 to 23.03 cents. Guernseys, and next the Jerseys, paid the best; Devons and Ayrshires were the least profitable. But, and there is as great virtue in a *but*, as Touchstone says there is in an *if*: "No allowance was made of the value of the skim-milk and butter-milk." This would considerably affect the profits derived from the total yield of the Holsteins and Holderness cows both of which breeds are copious milkers.

The average cost of food per pound of butter produced is given for each breed and each month, as follows:

Cost of food consumed for each pound of butter made

Month of lactation.	Ayr-shire.	Devons.	Guern-seys.	Holder-nesses.	Hols-teins.	Jerseys.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1.....	14.24	15.00	9.57	8.63	.....	9.96
2.....	16.14	17.69	11.79	20.00	21.65	14.73
3.....	22.18	20.42	15.48	25.69	19.55	19.96
4.....	23 38	20.00	16.59	23.81	26.74	17.64
5.....	26.77	23.61	15.45	24.56	23.87	16.61
6.....	24.41	23.31	16.91	24.65	21.05	18.74
7.....	26 84	29 83	16.41	24.93	21.22	18.18
8.....	28.50	23.70	15.36	26.00	21.60	18.36
9.....	27.00	21 08	13.66	25.30	20.36	17.85
10.....	27.33	25.17	17.21	19.83	33.00	17.75
Average.....	23 03	22.17	14.07	22.04	22.61	16.70

Allowing 25 cents per pound for butter and making no allowance for the manurial value of the food or the value of skimmilk and butter-milk, the profits for each breed during the ten months are given as follows, the calculation being made to one cow in each case:

Guernseys $27.60, Jerseys $22.15, Holsteins $5 75, Holdernesses $4.65, Devons $4 30, Ayrshires $3 70.

The average daily yields of milk and butter show that the selection of the cows was not so judicious as it might have been, for, as we remarked just now, the Holderness—at all events the English Holderness—is a very copious milker, as a glance at the London cow-market at Islington, on any Friday in the year, would prove. Here, this breed only gave as much milk per diem as the Jersey. The Devons, too, could hardly have been fair specimens of the race, as they only gave half as much as the Holsteins. Devons are not copious milkers, as a rule, but they are not so bad as that.

Average daily yield of milk and butter.

Breed.	Milk.	Butter.
	Pounds.	*Pounds.*
Jersey	14.9	0.89
Guernsey.....	16.6	0.90
Devon.....	12.0	0.51
Holstein	24.3	0.79
Holderness	14.9	0.52
Ayrshire	18.6	0.61

The cream of the Holsteins took about three times as long to churn into butter as the Guernsey's cream, and it seems that if the milk of the Holsteins did not "lose so much fat in creaming, that breed would easily make the largest amount of butter." Surely, this could be altered by the use of the centrifugal separator, for we see, in an experiment made at the same station, that, "in the case of one cow, whose milk at all times has refused to cream by any gravity process employed (*Cooley-can, &c.*), the yield of butter was increased from 13.9 lbs. to 24.1 lbs., by using the separator."

	Gravity method.	Baby separator.
Pounds of milk required to make 1 pound of butter	32.01	23.17
Per cent of milk-fat recovered in cream. ...	78 5	97.9
Per cent of milk-fat recovered in butter.....	70.2	93.9
Pounds of butter per month	15 9	20.7

But, it appears to us, that one of the most important of all the calculations made at this same New-York station, is one on the "*Comparison of dairy-breeds of cattle with reference to the production of cheese.*" We could have wished that, instead of a theoretical calculation, a practical experiment had been made, for the impressiveness of practice is always greater than the impressiveness of theory.

However, it turns out that the average results are as follows:

Relative value of milk of different breeds for cheese-making

Breed.	Average composition of milk.			Milk required to make 1 pound of cheese.	Average yield of cheese per month.	Cost of food per pound of cheese produced.
	Fat.	Casein and albumen.	Ratio of fat to casein and albumen.	Pounds	Pounds.	Cents.
	Per cent	Per cent				
Jersey	5 68	3 76	1 : 1 50	8 60	56 13	4 95
Guernsey	5 02	3 60	1 : 1 40	8 30	59 60	6 61
Devon	4 46	3 81	1 : 1 17	8 61	41 32	8 20
Holstein	3 71	3 21	1 : 1 16	9 48	78 46	6 95
Holdernesse	3 60	3 19	1 : 1 13	9 72	46 28	7 48
Ayrshire	3 50	3 34	1 : 1 05	9 68	39 77	7 24

With one exception, the yield of cheese by the different breeds corresponds to the amounts of fat in the milk more closely than to the amount of casein and albumen, that is, the fat in the milk has a greater influence on the yield of cheese than the other constituents of the milk have.

The Guernseys were the most profitable both in cheese and butter-production of all the breeds tested, except that in the cheese there is a very trifling difference in favour of the Holsteins: as 20.20 : 20.96.

Profits from butter and cheese for each breed

	Profits from butter for one period of lactation	Profits from cheese for one period of lactation
Ayrshires	$3.70 (6)	$16 47 (3)
Devons	4.30 (5)	7 62 (6)
Guernseys	27 60 (1)	20 20 (2)
Holdernesses	1.65 (4)	11.68 (4)
Holsteins	7 76 (3)	20 96 (1)
Jerseys	22 15 (2)	11 54 (5)

"From the foregoing table it appears that the Guernseys and Jerseys are by far the most profitable for butter production as compared with the other breeds, while for cheese production the Holsteins stand first, with the Guernseys closely following."

SWEET VS SOUR CREAM BUTTER:—At the Iowa station, sour cream gave on an average 3 o|o more butter than sweet cream, but it did not keep so well as butter from sweet cream.

Effect of change from barn to pasture, at the Vermont station.

This was very marked in the case of all of the herds. After making allowances for the milk of fresh cows added to the herds, there is still left an increase of about 16 per cent in quantity of milk due to the pasturage, notwithstanding the fact that most of the herds had grain while in the barn and none while on pasture. There was also a gain in *quality* of milk on pasture amounting to about a third of a pound of butter to each 100 pounds of milk. These two results combined make the entire effect of change from barn to pasture a gain of about one fourth more butter per day per cow.

AGRICULTURAL STATIONS AND THEIR WORK.—We have not the pleasure of being acquainted with Professor Whitney, but we heartily concur with his opinion as expressed in a recent publication: "There has been no satisfactory interpretation, as yet, of much of the work that has been done on the chemical composition of soils and plants, and the results of plot experiments have, in most cases, been very conflicting and uncertain." Surely, this is at least partly owing to the chemist alone being at work on the investigations. As a writer, unknown to us, puts it: We have, it is true, advanced a step or two beyond the notions of the days of Liebig, when it was supposed that the chemical analyses of a soil was all that was needed to determine the crops to be grown and the fertilisers to be applied, but the evil traditions of that earlier time have still a potent influence.

Poultry.

HOW TO CARE FOR, FEED, MANAGE AND MATE THEM — SOME OF THE BEST FOWLS FOR THE FARMER — BREEDS WHICH LAY THE BEST IN WINTER — LARGE, MEDIUM AND SMALL SIZED COMBS — HOW THE CHICKENS MATURE — TABLE OF PROGRESS, &c.

(By A. G. Gilbert, manager of Poultry Dept., Exp Farm, Ottawa)

Having given some space to a description of the house and what it should contain, it is of next importance to consider the breeds best to put into it. It is presumed the intention is to have eggs in winter when they are high in price. The experience of many years has proved that popular opinion as to the breeds best adapted for winter laying is in many cases wrong. You frequently hear farmers say that "the breeds with the large combs are no good for us, because they freeze so easily." It may be added that any bird, or portions of it, will freeze if not afforded partial protection of some kind. But the farmer has to learn that, to make eggs in paying quantity, he must keep his laying stock in comfortable quarters. In the first article of this series it was stated that where the laying stock were kept in cold quarters the food that should go into eggs goes into keeping up animal heat. And it is just as true that where the temperature of the house is so cold that the large comb of the Minorca or Leghorn, will freeze, the fowls with the smaller combs will lay very few, if any eggs, at all. A temperature where the water will not freeze, if only a few degrees above the freezing point, would not be difficult to maintain in a well constructed poultry house, and it would make the work of the attendant easier. The following classification of the best known breeds with large medium, and small sized combs may be found useful:

BREEDS WITH LARGE COMBS.—Black and White Minorcas; Andalusians; White, Black and Brown Leghorns.

BREEDS WITH COMBS OF MEDIUM SIZE.—Plymouth Rocks, Langshans, Coloured Dorkings, Cochins, Red Caps.

BREEDS WITH SMALL COMBS.—Wyandottes, Brahmas, Black Hamburgs, Houdans.

GOOD WINTER LAYERS.

Of the above the Minorcas, Andalusians and Leghorns (1) will be found, with proper care and treatment, good layers in winter. So will the Plymouth Rocks, when under two years of age, as also the Wyandottes and the Red Caps. As before remarked, farmers, as a rule, keep their fowls until too old, and, as a result, instead of their being a source of profit they are a loss; because they moult late in the season, take most of the winter to get their new feathers, and meanwhile eat all future profit that they may make. The young birds moult early, and the earlier a fowl is over her moulting, the earlier will she lay. The advantage of having early hatched pullets is that they will begin to lay when the older birds are in their moult, provided, of course, that they (the pullets) have been pushed by proper care and feeding while they were chickens. By having the early hatched pullets begin to lay when the older stock are in their moult, a supply of eggs can be obtained just as the price is beginning to go up.

(1) How much prettier is the Italian "Livorno" than our harsh translation "Leghorn"!—ED.

HOW THE BIRDS MATURE.

It may be said that it is not always easy to get early hatched pullets, for early setters are difficult to obtain. No doubt this is true in many cases, but it is the result of so few hens laying during the winter. Or, it may be, that the farmer has a non-setting variety. If the ordinary barnyard fowls of the farmer are made to lay as they ought to do, and will do, if properly treated, there will be less difficulty in obtaining early setters. Having laid steadily during winter, on the approach of warmer weather, the "clucker" will make her presence known. A chicken hatched out by the time of the early grass, will make rapid progress. Earlier hatched chickens may have to be kept in doors for awhile, and they should be placed with the mother-hen on dry sand or earth. Board flooring weakens the legs of the little ones, and will eventually destroy them. Of course, where an incubator is used for artificial hatching, the chicks will go into the inside or outside brooder, as the season permits. But, with the old fash oned hen, the farmer will find that his chickens placed in a clean, well protected coop, on the new grass and properly fed will astonish him by their vigorous growth and appetites. The chickens of the Leghorn, Minorca or Andalusian varieties mature rapidly, the litt'e cockerels often giving a shrill crow at seven and eight weeks age. The pullets should be layers in 5 to 5½ months. No chicks will give more satisfactory results than those of the Plymouth-Rock breed. With proper feeding the cockerels should put on 1 lb. to 1¼ lb. per month. They should be marketable in 3 to 3½ months and should weigh by that time at least 3½ lbs. The writer has had Plymouth-Rock cockerels weigh 4¼ lbs. in 3 months and 8¾ lbs. in 5 months. But this was accomplished by constant care and special feeding. The best food and treatment for young and growing chickens will be given under its proper head. The Wyandottes will be found to give satisfaction as a rapidly maturing chicken for market. But the chickens must come from parent stock of constitutional vigour and large size. The pullets of the Plymouth-Rocks should be layers in 5½ months and the Wyandotte pullets soon after. The male chicks of the Asiatic family such as Brahmas, Cochins, Langshans, &c., take longer to mature, for they have large, bony frames which, while growing it is difficult to get much flesh on, but after seven months they make large fowls. The pullets should lay at six months of age. The following table taken from a report of the Central Experimental Farm will show the progress made by chicks of the different breeds named:

COMPARATIVE PROGRESS PER MONTH.

	Lbs.	Ozs.
Plymouth-Rocks per month.	1	8
Brahmas pullet	1	2
" Cockerel	1	
Wyandottes laced and white.	1	2
Buff Cochins	1	2
Houdans.	1	
Game-Minorca cross.	1	3
Incubator hatched chickens	1	2
	1	4

It may not be possible to get the full weight, as mentioned above, in the first month, but the gain should be made up during subsequent months. The Plymouth Rock cockerels will be found to develop quicker than any others, and are hardy chickens. Several points characteristic of the most popular breeds are given as follows:—

CHARACTERISTICS OF DIFFERENT BREEDS.

Plymouth-Rocks.—A hardy, vigorous breed, growing rapidly to large size. Small bones, great and rapid flesh-formers. Male birds go up to 10 and 12 lbs.; cockerels reach 8 lbs. in early fall. Females, good layers, good sitters, good mothers. A breed well suited to this climate. Chickens hardy. The best all round fowl for farmers. Pullets lay from 4½ to 6 months of age.

Wyandottes.—A comparatively new breed, of great merit. Cross of Dark Brahma and Silver Spangled Hamburg. Matures rapidly, having small bones and putting on flesh easily. Males go up to 7, 8 and 9 lbs. Females are good layers, good sitters, good mothers; apt to become broody, but easily broken up, and lay soon after. Chickens hardy. A good fowl for farmers. Pullets lay when 5 months old.

Brahmas.—A well-known and old-established breed, with many friends and admirers. Grow to large size and heavy weight, but take time to do so. Have large frames, and a good deal of feed is required to put flesh on them. Are very hardy, both as chickens and fowls. Are quiet, and bear confinement well. Females are fair layers of eggs of good size, but rather heavy for early sitters (when egg-shells are likely to be thin), and apt to be clumsy as mothers. After 7 or 8 months of age males make good table fowls. Pullets lay at 7 months old.

Buff Cochins.—Another of the Asiatic family that has many friends. Like the Brahmas, they grow to large size, but take time to do so. Are very quiet, and stand limited quarters well. The females are good sitters and careful mothers, fair layers of a large egg (when hens) of rich colour. Pullets lay when 7 months old; males grow to heavy weight; chickens and fowls hardy. (1)

Houdans.—A breed of French fowls of some merit as layers, but do not grow to the same weight in this as they do in the country of their origin. Are non-sitters, and lay a white egg of rather more than average size. Chickens are hardy, mature rapidly and are great foragers. Are not so suitable to farmers as either Plymouth-Rocks or White Leghorns. Owing to heavy crest on top of head are apt to fall easy prey to hawks and other enemies of the poultry yard. Crest will freeze and become solid with ice where

(1) We had almost the first imported into England. Their eggs were small, of good flavour, but their flesh, when fattened, very coarse.—ED.

water is not kept from freezing or a fountain with narrow lip is not used. A good table fowl.

White Leghorns.—One of the best layers at all seasons, when properly treated and cared for, as all fowls should be. Are non-sitters, hardy, and mature rapidly. Will lay well in winter, in a moderately comfortable house. Chickens thrive well and feather quickly. Hens lay a white egg of large size (see table of weight of eggs). Pullets lay at 5 or 6 months, sooner if hatched early. The Brown and Black Leghorns are also great layers. They are good fowls for farmers when kept with a breed of sitters. Great flyers, like all the Spanish family.

Black Minorcas.—An old English breed, comparatively new to this country, and fast taking the place of the Black Spanish. They are as good layers as the Black Spanish, and grow to much heavier weights, the males making fair table fowls. They are given weight allowance in the new standard of excellence (American). They lay well in winter, if properly housed. Both fowls and chickens are hardy; the latter grow rapidly. The males have large and high combs, which must be kept from freezing. Pullets lay at 5 or 6 months old.

Andalusians. — Another comparatively new-comer—to this side of the water—of the Spanish type, and as a breed of layers rivalling the Leghorns. They are likely to occupy a high position among poultry fanciers on their superior laying merits. They lay well in winter, when looked after, and are hardy, quick-growing chickens. They do not breed true to colour or markings in every case; but that is a matter of secondary importance to those who wish to keep them for their laying properties.

We will next consider the best methods of feeding and rearing the chicks and the proper food to give the layers in winter.

Poultry-Fairs.

Ste. Thérèse de Blainville,
3 May 1893.

To the Honorable
The Commissioner of Agriculture,
Quebec.

Sir,

I have the honor to report that in compliance with the request in your letter of 17th April, I visited Smith's Falls, Carleton Place and returned home via Ottawa, to obtain some further information from the Central Experimental Farm.

I found that the "Poultry-Fairs" as they are called, have been held annually in the beginning of December at Smith's Falls for over fifteen years. At other places such as Carleton Place, Almonte, Perth, &c., they are of more recent date. They are under no local management and no prizes are given. They were started by buyers for the Boston market going into that part of the country and buying turkeys, geese and fowls from farm to farm, and getting the farmers to deliver them in the town. For the first few years the birds were brought alive; but after a few years, to save time, these buyers commenced sending advertisements to certain storekeepers in the town to notify the farmers to bring in all their poultry on a certain day; and from this the fair or sale became an annual occurrence. Now, the farmer has to bring all the poultry dressed according to directions given in the advertisement. The farmers come in on the day named and place their vehicles along each side of the principal street, where the buyers make their bargains, and when a sale is effected, the farmer takes his stock to whichever store the buyer has made his head quarters, where it is at once weighed and paid for. The buyers do their own packing and provide their own boxes.

At Smith's Falls, these fairs last two days and from 75 to 100 tons of turkeys, geese and fowls are sold. At the other places, the fair only lasts one day and from 15 to 25 tons are sold. More turkeys are sold than of other kinds of poultry, and the price last fall was from 10c. to 12c. a pound. The storekeepers and others in these villages said the farmers—or rather their wives or daughters, for the eggs and poultry in this part of the country are always looked upon as the perquisite of the women—made lots of money by these fairs; but when I went into the country and asked the farmers, they said that for the last few years it had not been a paying business. A Mrs. Kelly, of Smith's Falls, said to be one of the most successful poultry raisers in that district, told me that, unless she could get 12c. for turkeys and 50c. a couple for chickens 3 or 4 months old, it did not pay. I could not find any one who used an incubator or made a specialty of this branch of farming. The ordinary common turkey that will weigh from 10 to 14 lbs. is the one most liked. And for chickens, when any special breed is raised, I found it was the Plymouth Rock. All agreed that to have large birds and good eggs it is absolutely necessary, no matter what breed is kept, to change the cock every year. The farmer who raise the most turkeys are those who live on the poorest farms. A good deal of this land is sandy, and in other places the rock is too near the surface to insure good paying crops. Most of the poultry bought at these fairs is shipped to Boston and the Eastern States, although for the past few years some local buyers are said to have done well by shipping to Winnipeg and British Columbia. The greatest difficulty I had was to ascertain any of the buyers' names and the exact way in which the poultry had to be dressed. The following are the directions for dressing as given on the bills announcing the fair.

When dressing attend to the following rules:

Shut up your poultry 24 hours before killing or until the crop is entirely empty. Poultry should be killed by bleeding in the neck; after dressing, remove the head, draw the skin over the neck-bone and tie it; hang in a cool place but don't let freeze. Have your poultry well fattened. Entrails must be drawn at vent hole, cut as small as possible; leave heart, liver and gizzard. Unless entrails are entirely drawn, the poultry will not be bought at any price, as a fine of $5.00 would be imposed on the buyers in the American market. In dressing geese and ducks, you may scald them, as it removes the down much cleaner than if dry plucked; but dont scald your turkeys and chickens as it reduces prices at least two cents a pound. Don't cut off the legs of poultry; you can cut off wings at first joint; be sure to remove all feathers, wing and tail included.

At the Experimental farm I had the pleasure of meeting Mr McDonald of Winnipeg, who told me he thought, my information as to the mode of dressing poultry for that market was not quite correct, and kindly gave me the name of the largest dealers in Winnipeg, Messrs. Gallagher and Sons. I have written to them, asking for full particulars as to the proper dressing of poultry to whatever market you are shipping. It is very important, as some slight detail omitted might mean a cut in the price of 2c. to 3c. a pound, which might cause a loss on the shipment instead of a profit. I have arranged with a buyer at Smith's Falls to secure for me, if wanted by your Department, samples of the birds dressed as they are offered for sale at these fairs. In the event of such fairs being held in this Province this coming fall, these sample birds might be very useful to show the farmer exactly how the birds should look when properly prepared and dressed. The cost would amount to very little.

I see no reason, now that we know how these fairs are managed, and how the birds are dressed, why we should not have several such fairs in this Province every fall. I am sure the Montreal buyers would gladly give us their support, as several of them told me some time ago that they were unable to get sufficient supplies in this Province, and were obliged to send to Ontario. The fairs should be held on a line of railway, and at a place where, at the very lowest estimate, at least 10 tons would be offered: several parishes might join together to make up the quantity.

It would be advisable to suit the convenience of the buyers by asking them to name the date, and, to give the business a good start, perhaps it would be advisable to advertise in the Boston and New-England papers—this would only be necessary for the first year. Might I be allowed to suggest that the lecturers sent by your Department should speak to the farmers during the summer, and point out to them the advisability of trying to secure a market at their own doors for all their poultry. They might also ascertain where the largest quantities were to be obtained. I will gladly meet your lecturers anywhere you desire, and give them any further information in my power. To show the extent of the egg and poultry business, I may say that, last year, about one million dollars worth of eggs alone were exported from the Dominion, and that the Province of Quebec supplied but a very small proportion.

My own opinion is that, owing to our proximity to the sea board, we ought to be able to ship largely both eggs and poultry to the English market. If it pay to ship to England from Western Ontario, it certainly ought to pay from this Province, with the shorter journey, and little or no inland freight, in our favor. I enclose two bulletins received at the experimental farm on the English market for both eggs and poultry. Poultry dressed for the American or Western markets will not suit the English market, and if sent in that shape would have to be disposed of at a sacrifice. The great thing to bear in mind is to prepare your goods to suit the market you are sending to.

If the idea of encouraging our farmers to hold one or more of those fairs meet with your approval, I will willingly see the principal Montreal buyers, talk the whole question over with them, try to secure their co-operation, and report their views to you.

Mr. Gilbert, of the experimental farm, informed me that he was preparing a series of papers on poultry for our *Journal of Agriculture*, and that he would now at once prepare one on the best breed of hens for the farmer to keep, and also on the best way to treat poultry to have them ready for fall fairs.

In closing, I beg to say that I am very much indebted to Messrs. Frost and Wood, and Mr. O. S. Hurlbert, of Smith's Falls, and M. J. Nagle and Jos. Yuill, of Carleton Place, for the valuable assistance they kindly gave me.

Your obedient Servant,
C. D. Tylee.

BEST BREED FOR CAPONS.

B. Butler.

Of course, the cockerels of any breed or variety can be caponised, but, obviously, the smaller breeds do not make as desirable capons as the larger. Nothing better can be used for this purpose than Indian Games, Dorkings, Brahmas, Cochins, and Plymouth Rocks, with their various crosses. The Indian Game crosses are specially desirable, as the birds have immense breasts, and an abundance of white meat is regarded as the one thing needful in capons. All of these breeds have size, and all, except the Dorking, have yellow legs and yellow skin, little matters that are of considerable moment in selling the fowls in American markets.(1) Better than the pure breeds would be the cross of an Indian Game with a Dorking, a Plymouth Rock, a Brahma, or a Cochin. Probably the first cross, Indian Game-Dorking, would be the best, though the coloring would not be very rich. Both these breeds have a remarkably meaty frame, and the breast is fully developed. The Indian Game-Plymouth Rock cross would give a fine, meaty fowl, but the birds, if they happened to be plucked when growing feathers, would show dark pin feathers. The Indian Game-Brahma cross would probably give the greatest size, and the capons would be something immense in proportions, if kept till full grown. The Brahma breast would be filled out by the Indian Game blood, and the Brahma would furnish the frame to build upon. The Indian Game-Cochin cross would be somewhat similar to that with the Brahmas, though probably not quite equal to the Brahma. Some breeders make a cross of the Plymouth Rock and the Light Brahma, and this gives a large fowl maturing a little quicker than the pure Brahma, and making a good market fowl. Capons from this cross are large and desirable specimens, though not equalling in breast meat the Indian Game crosses which we have seen. The Dorking, crossed with these other breeds, would be admirable except in color, it having a white skin and white legs, and its crosses showing a pale yellow, where a richer color is considered desirable.

American Agriculturist.

The Flock.

DRESSING HOTHOUSE LAMBS.

The growing of early lambs for market is becoming an extensive industry: not the lambs that are ushered into the world during the bleak March and early April days, but those which arrive from late fall until midwinter, are carefully reared in warm stables, and reach the markets all the way from Christmas until the outdoor lambs from the South make their appearance in midspring. These always command fancy prices, if properly

(1) For boiling, legs *must* be white, for roasting, &c., the colour of the legs does not signify.—Ed.

fattened and dressed, but the latter is so often improperly and imperfectly done that much loss results to shippers. Perhaps no product comes to market that shows such a marked profit from proper handling as these. To illustrate: during the past few weeks, good lambs have been selling for $7 to $9, very fine, large ones sometimes for $10 each. I have seen some as good at the average that were very poorly dressed, that sold for as low as $3 each, and I heard of one that was sent in skinned that sold for $1.50. Evidently the shippers of these have cause to think that early lambs don't pay.

Through the kindness of Messrs Archdeacon & Co., of 85 Barclay Street, who make a specialty of these, several illustrations are shown, reproduced from photographs of lambs on sale in their store. Fig. 107 shows a properly dressed lamb just as it is sent to market, except that the wrappings

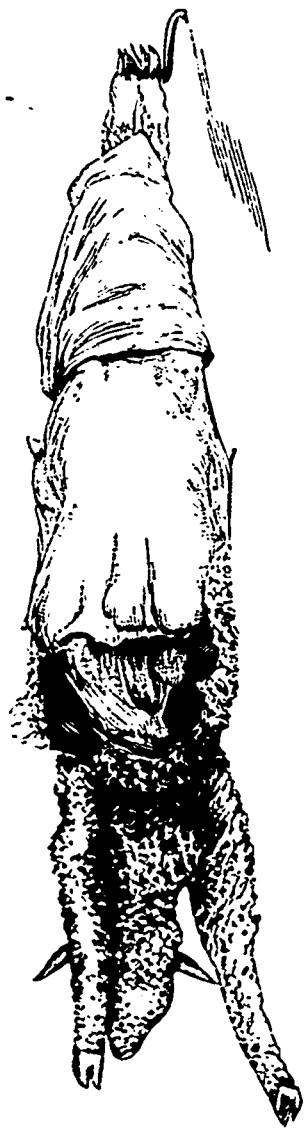


Fig. 107

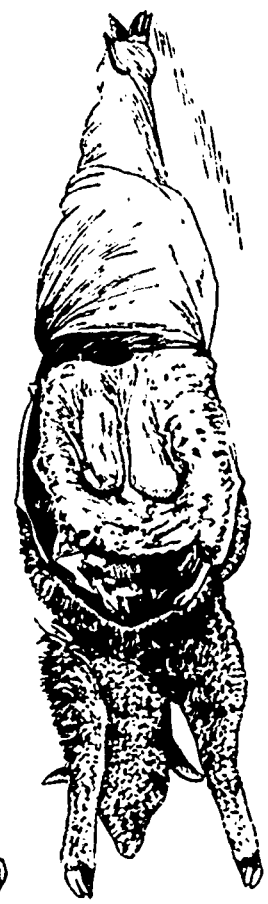


Fig. 108

Fig. 109

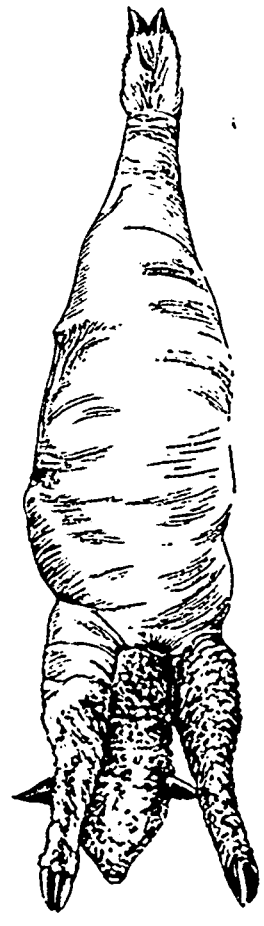


Fig. 119

are partially removed to show the manner of dressing. To begin with, the lambs must be fat and young. Sometimes shippers send in late summer-lambs, runts evidently, thinking that they will fill the bill. They will not; the lambs must be young and grown quickly. At Christmas time, those weighing 25 pounds, and perhaps less, will do, but later in the season 30 pounds or more is the required weight.

To kill the lamb, cut the throat, making as small an incision as possible, and hang up to let it bleed out thoroughly, this is important, as the good appearance of the meat depends upon the thoroughness with which the blood is removed. Cut open the lamb to a point about opposite the fore legs. Remove the entrails, leaving in the haslet. Leave on the head, feet and skin. Skin the hind legs and draw the caul over them, and also draw it well down over the kidneys securing it with skewers. Slit the caul just enough to let the kidneys through. Put in the back sets shown in Fig. 109. Much of the appearance of the carcass depends upon these. They should be of just the right length, about 14 inches for an ordinary sized carcass. Fasten one end in the flesh, and the other in the breast close to the first rib, crossing the sticks in the back as shown in Fig. 109, just behind the kidneys. The object of these is to spread the carcass out as flat as possible. Remove carefully all traces of blood, so that the carcass may present as neat and clean an appearance as possible. Let it hang until thoroughly cool. Replace the skin on the hind legs. Cover the exposed flesh with clean white cloth, then sew up carefully in burlap or bagging, as shown in Fig. 110, and the lamb is ready to ship. Send by express always.

Fig. 108 shows an improperly dressed specimen. The drawing doesn't show all the imperfections, but a comparison of it with Fig. 107 will give an idea of the difference. It was poorly bled, giving the meat a dark, unattractive color. The dressing was all slouchily done, the back sets were so short that the carcass was rolled too far over, breaking some of the ribs, the caul was not evenly and neatly spread over the kidneys. The two lambs were of about equal quality, but the one wouldn't sell for much more than half as much as the other. It would have paid well if many of the lambs which are sent to this market had been dressed by a professional, even though the latter had to be paid a high price for his services. Here is an opening for some one. F. H. V.

(*R. N.-Y.*)

THIS RAM WAS BOSS.

HE WOULD NOT BE CHASED AROUND BY ANY DOG.

Zip, a setter dog belonging to Arthur A. Means of Coolbaugh township, Pa., recently formed the habit of biting Mr. Mean's sheep. He injured three badly, and tore out wool on others. The habit grew on Zip, and punishment with the gad didn't break him. The dog was valuable as a bird hunter, and Means hated to kill him. He owns a large long wooled ram named Reuben. The ram is so vicious that Mr. Means keeps him confined in a pen alone. After all efforts to reform the dog had failed, Mr. Means fastened Zip in the pen with Reuben. The dog made for the ram as bold as a lion, and Reuben, who had been itching to go on a rampage, met him half way and butted him into a corner. Zip yelped and renewed the attack, and Reuben banged him against the boards, jammed him into a hayrick, knocked him flat and stamped on him. The dog howled and tried in vain to evade the angry ram's powerful butting organ. When he had been unmercifully licked by the ram, Mr Means took him out. Zip was laid up for a week, and Mr. Means says he can't get the dog to look at a sheep now.

SHEEP-WORRYING DOGS.—Some time during the last century, a M. F. H. (Master of foxhounds) in Dorsetshire had several hounds in his pack that were guilty of sheep-murder. To cure them of this evil habit, he put six or seven couple into a kennel in company with an aged ram of the county breed, with a *good-head* - i. e. large horns. About half an hour afterward, meeting a friend, he told him what he had done, adding: "Come along and see them. The old fellow lays about him famously, and he'll cure them, I'll warrant him." Going quietly up to the door of the kennel, the two friends were surprised to hear no sound. Alas! on entering, they found the only part of the ram left was the bones and skin: the hounds were quietly digesting him.

ENSILAGE FOR SHEEP.

EDS. COUNTRY GENTLEMAN.—Would a silo be a good thing for sheep? Object, raising early lambs. How much per days should be fed to large ewes, in connection with hay and grain, (grain mixed equal weights of bran, oats and corn?) Would ensilage be an equivalent for roots? Would a mow 10 by 25 feet, with 15 feet posts, if properly sheathed answer for a silo? How would it do raise a crop of field corn, pick off ears when glazed and leave on ground to cure, cut stalks half-inch and fill silo? Would such ensilage be equal to crop raised for fodder only? Would there be any bad results from feeding too much? C. L.

Windham, Conn.

A silo for sheep can be profitably used, but if used in connection with raising early lambs, the quality of the ensilage should be a prime object. The spent stalks of field corn, spent in maturing a crop of corn, might do to keep sheep alive, but would hardly answer a good purpose in connection with raising early lambs.

It would be much better that a considerable proportion of the ensilage to fill a silo for sheep should be composed of material finer, more fibrous than corn ensilage. A good mixed crop for this purpose would be peas and oats —10 quarts of oats, having a stiff straw, mixed with 2 bushels Canada field peas, drilled in at the rate of 4 bushels to the acre on land well prepared for such a crop. It will soon cover the ground and keep down weeds. It may be cut for ensilage when the pea is in blossom, but if circumstances favor, it is best when the pea is in the milk. (1)

With our present improvement in machinery, this combined crop is easily handled for the silo, by cutting it with a self-binder and then running the bundles through the cutter into the silo, thus greatly reducing the labor. This crop may be sown very early, as a spring frost does not injure either peas or oats. This would furnish an ensilage for ewes requiring but very little grain, and that mostly in the form of bran, until the ewes have dropped their lambs.

L. could have different compartments in his silo; fill one with medium-sized ensilage corn and the other with peas and oats, feeding one to the sheep at morning and the other at evening, or preferably mixing the two together. But we should advise corn ensilage to be cut into the silo not more than ¼ inch for sheep. Sheep may be fed from 2 to 3½ lbs. of ensilage per day.

We think the size of a silo mentioned by L. would work well in practice. After the ewes drop their lambs the proportion of grain, equal parts by weight of oats, corn and bran, would be all right. E. W. S.

(1) Very good. Ewes in lamb *must* have nitrogenous food.—ED.