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Vol. 19. No. 3. MONTREAL, SEPTEMBER 1, 1897. $1.00 per annum, in advance

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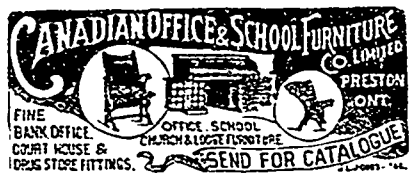

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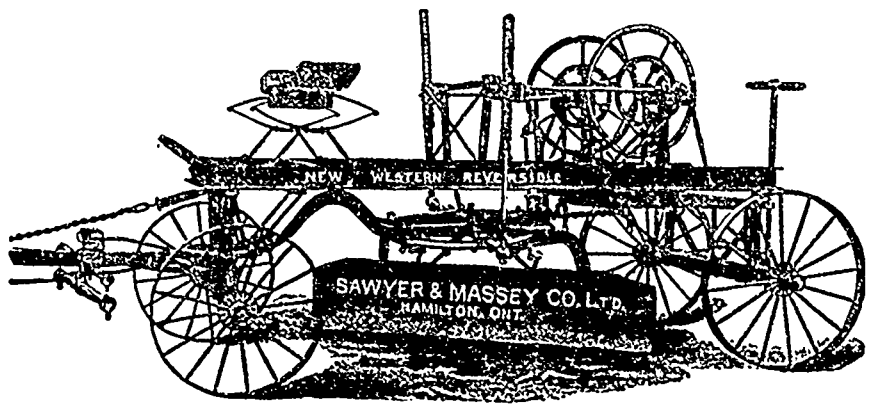

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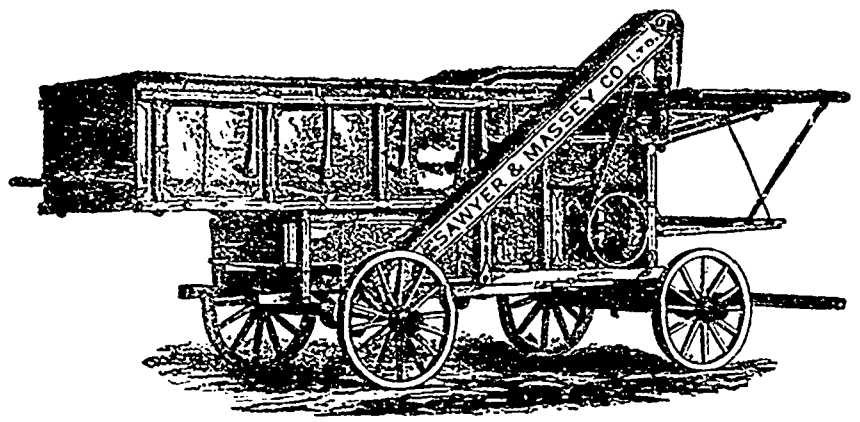

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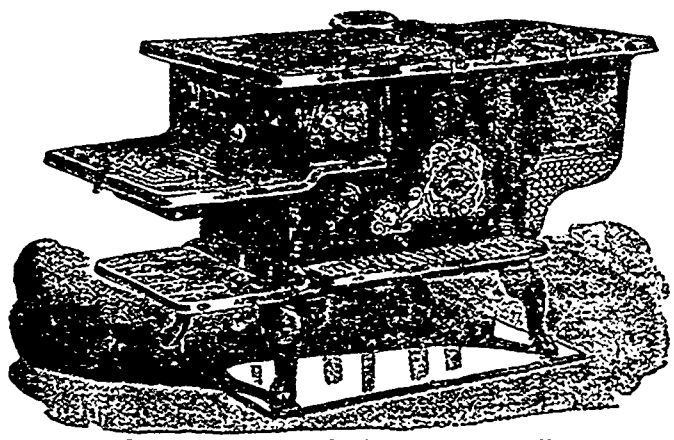

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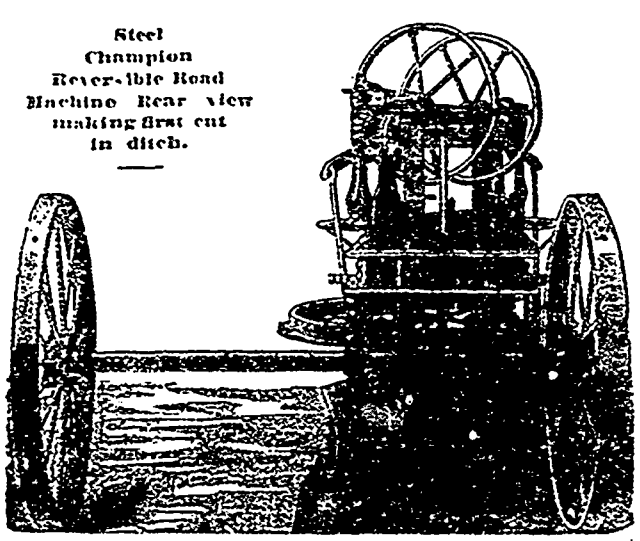

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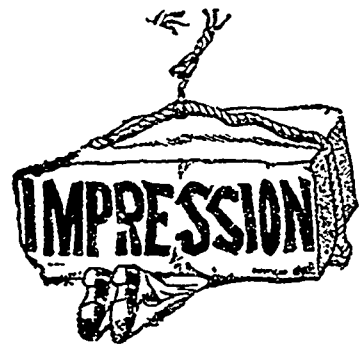

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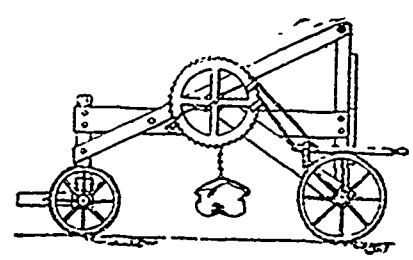

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THE ILLUSTRATED JOURNAL OF AGRICULTURE is the official organ of the Council of agriculture of the Province of Quebec. It is issued Monthly and is designed to include not only in name, but in fact, anything concerned with agriculture, as Stock-Raising, Horticulture, &c., &c.

All matters relating to the reading columns of the Journal must be addressed to Arthur R. Jenner Fust, Editor of the JOURNAL OF AGRICULTURE, 4 Lincoln Avenue, Montreal. For subscriptions and advertisements address the Publishers

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Table of Contents.

THE ILLUSTRATED

Journal of Agriculture.

Montreal, September 1, 1897.

The Farm.

FARM-WORK FOR SEPTEMBER.

The season is a very backward one, a good deal of the land in grain was not sown till very late, and, consequently, the work of CLEARING THE STUBBLES cannot be proceeded with until the middle of this month, when the sun can no longer be trusted to kill the couch and other root-weeds. In such a state of things these enemies must necessarily be gathered at once, after the grubber has brought them to the surface, and burnt carefully, so as that not a single rootlet be left undestroyed; the ashes may either be spread where they lie, or, which is better, be stored under shelter till the spring, when they will come in very handily for mixing with any bone-meal or other artificial manure for turnips, swedes, or mangels. There should be no delay in setting about this work as soon as the harvest is finished; few things save spring-work so much as cleaning the stubbles in the fall, particularly in heavy land, as if the cleaning is thoroughly done, and the first furrow for the root-crop is given before the frosts, the grubber and the harrows will sufficiently prepare the land for the reception of the manure, rendering the use of the plough in the spring quite unnecessary. Every one knows that, on clays, the plough has a tendency to produce clods, and, on sands, to dry up the land; whereas, the grubber and harrow stir the land thoroughly, keep the topsoil, finely pulverised as it is by the winter's frosts and thaws, in its proper place, and retain the humidity needed to start the seed into germination.

THE FLOCK.—The care of the flock is not troublesome this month, as the stubbles, etc., are open to them, and the rape, that all wise farmers have taken the trouble to sow, is in full bearing. And here, we beg to call the attention of all our readers to Mr. Macfarlane's letter on our—page. They will see how astonished that worthy correspondent of ours was at the sight of a real field of rape, with its 100 lambs at work upon it, and how surprised he was at the description the farmer gave him of the returns in mutton and wool from a fifteen acre piece of that plant. So, it is not without reason that we have been for nearly 20 years continually pressing upon the subscribers to this periodical the advisability of providing a good sized field of this mutton-making plant for their sheep.

The ewes intended to lamb down early should now be getting into good condition, as a lean ewe seldom bears twins, and twins are highly desirable in flocks that are properly looked after, though we have heard men, who keep sheep as weed-killers, complain of ewes twinning, because the dam in such cases requires more food! Almost as silly a speech as that of Mr. Dickson's friend, the Englishman (of whom we have not the slightest recollection), who wrote, in this periodical, that he had known stock PREFER BROWN HAY TO GREEN! Of course he was referring to meadow-hay; as for clover-hay, that, if put together fresh enough in the stack, cannot be green, the sweating it takes on there changing the colour, however green it may be when carried. The English clover-hay taken from the stack to the London markets would surprise any foreigner who had been used to barn-kept hay.

SWINE.--The early spring pigs will be getting on in flesh by the middle of this month, and a few pease will help them amazingly on the "shack" of the stubbles. See that they have abundant supplies of water and a place to wallow in at mid-day, for we have many a hot noon in September.

Take care that THE COWS do not fall off in milk, should a dry time ensue; but you know all about these regular duties quite as well as we do.

GLOUCESTERSHIRE CHAMBER OF AGRICULTURE.

Draining—Surface grips—Turf—Rotations—Manures

HOW TO KEEP LAND IN CONDITION.

Mr. Henry A. Howman, County Council Director of Agriculture and Dairy Instructor, then introduced the subject of "How to keep land in condition." Mr. Howman said his remarks were intended to stimulate thought and discussion, and did not pretend to be exhaustive of the subject. It was no doubt a matter for serious consideration how to meet the evil of what he thought he might call the decreasing fertility of land, though of course that was a difficult point to be certain about, viz., whether the land was really poorer in acquired fertility than it was, say, 50 years ago; but the stress and strain that was put upon farmers by the competition from abroad; by the increased cost of labour, not only in wages, but also in the decreased output of work, that labourers felt called upon to give for their daily wage than they did formerly, compelled attention to means by which larger crops should be grown, and the principles upon which that increase depended. It was necessary, in the first place, to divide the land for consideration into arable and pasture, because though the treatment in some details were identical, there must be a modification of some of them. Take draining as the first essential, common to both, before any improvement could be made. No practical man would think it necessary to drain pasture land so thoroughly as they would do arable land, because the natural habit of grasses were to require more moisture for the production of leaves or herbage, than crops grown on arable land for seed purposes, such as corn crops. But large as was the quantity of moisture required by grass land, it was also clear that some outlet must be made for the circulation of the water, or else stagnation ensued, and a deterioration of the herbage consequent upon it took place. Water grasses and mosses took the place of the better kinds. The conditions for the proper and vigorous growth of grasses were exactly the same as those for growing all other kinds of plants. They required warmth and air and moisture. It did not necessarily follow that because draining was necessary to ensure circulation of water, and thus the circulation of air and warmth were ensured at the same time, that draining should be deep and costly, and in the class of land that these rules had, would be utterly thrown away; it was the surface drainage of pastures that should be attended to, and was, he thought he might say, absolutely neglected. Nowhere had he seen pasture land surface-gripped, as it ought to be at intervals—a plough run down the low places. Cutting a narrow trench, about two inches deep and three inches wide, and connecting these trenches with a main channel into the nearest ditch, would have a marked effect not only in improving the herbage, but also in hastening the early growth in the spring by making an outlet for the surface water, which now could not escape except by evaporation, and by that very process lowering the temperature of the grasses often to freezing point. In arable land the question of drainage was, of course, paramount, and no money was so well laid out as on this work, but in this, the modern idea of depth was opposed to that held when draining was first invented, and nothing less than from three to four feet was thought admissable. This erroneous depth was thought necessary, when it was supposed that plants required a considerable depth of soil to enable their roots to descend in search of food; but modern knowledge showed that roots of plants got their chief sustenance from the surface soil, and this probably without exception, so that drains from 2 1-2 to 3 feet deep answered all purposes. The next, and probably the most important item, was the accumulation in land of the fibrous roots of plants, commonly known under the name of turf. The high pressure of continuous cropping was no doubt responsible for the loss of one of the most valuable materials for the support of plant life. No land that was full of decaying vegetable matter could be considered to be in an exhausted state, and no land without it could bear maximum crops. He was now alluding to the natural decay of the roots of plants, but under the head of decaying vegetable matter, they must include farm-yard manure. The chief value of farmyard manure, and in a great many cases the only value was due to this decaying vegetable matter that it contained, and which acted mechanically in not only keeping the soil open, and allowing the air to permeate through it, but also, in decomposing, it raised the temperature of the soil, and thus materially assist in promoting the germination of the seed, and also encouraged the growth of the plant. If a sufficiency of manure could be made on a farm to dress the arable land every year, the question of the maintenance of fertility would be solved, but as a matter of fact, with few exceptions, it was quite impossible to do this, and so recourse must be had to other means whereby the "turf," or they might call it the "staple of fertility," was maintained. This was, of course, done by the system of cropping, when the temporary seeds took their place in the rotation, and the true principle seemed to lie in so prolonging the growth of these seeds that the maximum of root growth should be attained. The same end appeared to be attained by the growth of any green crop, and then either feeding it off or ploughing it under; but neither feeding off the crop nor ploughing it under would fully attain the end they had in view. The reason why the obtaining of turf in land was so all important was, first because of its mechanical action, similar to farmyard manure, in aiding in the circulation of air through the soil, and in increasing its temperature; but secondly, and of equal importance, was that in the decomposition of the vegetable matter.

Nitrogen was produced, and became available for the next crop. Nitrogen was the key to all manuring. The soil might be full of available mineral matters such as the plants required, but without nitrogen they were inert. Nature herself seemed to avail themselves of the free nitrogen in the air surrounding their roots. These plants had the power of storing up the nitrogen in their roots, so that as these roots decayed the nitrogen was slowly given off, and became available for the succeeding crop. Hence the known value of clover roots as a preparation for wheat, the larger the clover roots the more nitrogen they contained, and the better would be the succeeding crop of corn. Bearing in mind this well known fact, and that also it was necessary for the production of roots that leaves be also produced, that without leaves roots could not grow. Did it not come home to them, the absurdity of the restrictions in old tenants' covenants, where it was forbidden to mow clovers two years in succession, as it was thought to exhaust the land, whereas the contrary was the fact, the fertility of the soil was increased by the increase of the roots which produced nitrogen chiefly, and this power was stopped by grazing the seeds the second year. That old restriction was now of course obsolete, and it would be interesting to look forward to the time when nitrogen would be valued unreservedly as the friend of cultivators, instead of being looked askance upon, as it often was at present. The plants which nature had specially given the power to absorb the free nitrogen of the air were the leguminosae, or the food bearing plants, such as clover lucerne, sanfoin, vetches, beans, and peas, and the means used are micro-organisms—parasites which attached themselves to the roots of these plants, and by their action, either by themselves or in combination with other forms, enabled these plants, to which they attached themselves, to absorb the free nitrogen of the air. If it happened that these organisms were not present in the soil, then the plants would present a dwarfed growth and eventually die. It was thought that clover sickness might be the result of the absence of these micro-organisms, but whether this was so or not, the fact that these special class of plants had this special power of absorbing nitrogen was a fact that was of untold value to the farmer who learned how to make use of it—which was to grow as much as possible of these leguminous plants; fortunately they were well known and commonly used on most farms, so there were no ancient prejudices to overcome by advocating the more extensive use of them. Where the soil was very much exhausted and out of condition, and where good farmyard manure was not available, the cheapest and best plan was to sow seeds that would remain for three or four years, and the composition should contain a larger proportion of clovers and lucerne; the mixing of grasses with clovers was undoubtedly an evil, a necessary evil perhaps, but nevertheless an evil to be avoided if possible, because grasses did not add to the fertility of the soil, in either the same way or in such a degree as the leguminous plants. Grasses required that the nitrogen should be supplied to them, whereas the clovers, etc., supplied themselves, and when nitrogen had to be supplied it became a serious outlay, as it was the most expensive manure to buy of all the fertilisers that were used. Then the seeds should be mown as often as possible, and not fed. The feeding by stock, in preventing the leaves forming, would also prevent the roots extending, as this case it resolved itself into a struggle for bare life, and no power of increasing was left to the plant when the mowing took place. Then it was necessary to apply phosphatic manures and potash, costing probably 15s. an acre. An incidental result from growing roots after vetches was that it had been found that they were not so liable to "finger and toe." This might be in consequence of the nitrogen stored up in the vetch roots, and which provided a sufficient supply of nitrogen to feed the turnip as well as the micro-organism which caused the disease. The addition of nitrate of soda to the phosphatic manure might also have the same effect. Turning to the question of manures, he said it seemed very extraordinary that after all that was now known about the necessity of supplying plants with certain foods, after the lessons that had been taught by the result of those valuable experiments that had been carried out at Rothampsted, that there should still exist men who thought themselves especially wise, and thought that they had absolutely settled the question when they declared there was "nothing like muck;" for no one who knew anything about it would ever think that the farmyard could possibly be compared to artificial manure. There was only one sense in which any comparison was possible, and that was in the plant food which each contained, and the result of the comparison was much in favour of the artificial, both from a fertilising and an economical point of view. It was a matter of common knowledge that the liquid drainings from a manure heap contained the essence of the fertilising matters in the manure, and yet often this was allowed to run to waste. It was plant food in the most available form, and yet if those substances were extracted from the liquid and presented to some farmers in the shape of salts, potash ammonia, or phoshate of lime, they would still stick to their text, "Nothing like muck." He proceeded to quote the statements of Messrs. Lawes and Gilbert and Mr. F. J Cooke on this subject, showing the value of artificial over farmyard manure. This brought him to the point of comparison between artificial manure and farmyard; neither of them could take the place of the other, but should supplement each other, the one supplying what the other lacked, the farmyard manure supplying the decaying vegetable matter which not only acted mechanically in keeping the soil open, but also enabled the soil to absorb and hold so much more moisture than it otherwise would do—a most important property during a dry summer. The experience of Mr. Cooke clearly pointed out what should be the object of manuring, namely: to manure for the crop they wish to grow. The crops that farmers grew naturally fall into groups, which require a certain kind of manure to be in excess of other kinds, and this was called the Dominant Manure. No man in his senses should buy manures simply because they were cheap, or because some oily-tongued vendor showed him a highly-coloured testimonial. One of the most expensive crops a farmer could grow was a half-crop, and unless he supplied the crop with the maximum quantity of food it required, he never could grow a full crop. It was as essential, not only to give the land sufficient food to grow maximum crops, as it was to give an animal sufficient food to grow fat. But it was equally essential that the food given should be in due and suitable proportions to each other. A well-balanced ratio was as essential in one case as in the other. It seemed to be evident that if one kind of manure was largely in excess of any other one, that their effect upon the growth of the plant was now different to what it was when the balance of each kind was properly made. The manure that was in excess seemed to over-power the weaker manure. It seemed to be a mistake to use manures in too large doses. Little and often was the principle upon which they should be applied, and care should be taken to properly incorporate them with the soil, and applied some time before the crop required to make use of them. These facts were brought out in the experiments that had been carried out for the last three years on grass lands with artificial manures. The commonly-accepted opinion that artificial manure had no effect in a dry season had been completely disproved. In conclusion, he should like to summarise the points he had tried to lay before them:—(1) That condition of land depends mainly on the amount of vegetable matter it may contain; (2) That that vegetable matter is most cheaply and easily obtained by the laying land down to temporary seeds for four or five years; (3) That these layers should be mown in preference to constant grazing, (4) That the growing of leguminous plants such as clovers, sanfoin, lucerne, and vetches was the most economical way of storing the land with nitrogen, which in an essential element for the growth of all crops; (5) That the judicious combination of artificial manures with farmyard manure was the most profitable system of manuring; (6) That it was necessary to group the crops according to the dominant manures they require to be supplied with; (7) That the correct system was to manure the crop and not the land; (8) That there should be a well balanced ration of manures for plants, as there was a well balanced ration of foods for animals; (9) And that all manures should be used in moderation, but that enough must be given to supply sufficient food to grow a full crop.

RICHARD'S SUBSOIL-PLOUGH.

This is hardly a new idea. In 1874, the late Duke of Sutherland, then engaged in converting a large tract of land, in the county whence he takes his title, from a barren more to good grain-and root-bearing farms, finding it necessary to do the work by steam, as horses could not go on the land without sinking, invented an attachment to the plough very similar to the CROCHET-FOUILLEUR of M. Richard. A full description of the whole system pursued by the Duke, under his "Chamberlain," as an agent on extensive estates in Scotland is called, may be found in the Magazine of the Royal Agricultural Society of England for the year 1876 or '77. Like a great many other noble operations, it did not pay the Duke, but it was greatly beneficial to the country at large. (v. p. 53.)

COMPTON MODEL-FARM.

Experiments on crops and manures—Creamery—Fermenting-cans—Refrigerator—Daily tests of skim-milk and butter-milk—Register of cows' milk.

The following notes are taken from a report by Mr. Gigault, Asst. Commissioner of Agriculture, to the Hon. F. G. M. Dechêne, Commissioner of Agriculture, on a visit paid on the 14th, and 15th of last June to the Compton Model-Farm.

EXPERIMENTS.

LUCERNE.—The lucerne grown on the farm here was almost entirely destroyed by the frost; only a small extent of it remains, in a spot where the snow protected it.

As this plant is highly approved of as green-meat, Mr le Moyne intends to sow some more in places where the snow generally lies intact all the winter.

POTASH.—Fourteen plots, of the tenth of an acre each, have been treated with potash manure, from the "German Kali works," the effect of which will be notified to the public in the fall.

LUPINS.—The lupins grown last year were ploughed in as manure on part of the land intended for mangels. Their effect will be reported upon next autumn.

ROOT-GRAFTS.—Mr. le Moyne has set out a hundred grafted apple-trees, from M. Dupuis' nursery, almost all of which have taken well.

This spring, almost the whole of the foliage of the orchards at Compton was killed by caterpillars; even the maples were attacked by them. Thanks to the use of insecticides, the small orchard on the Model-farm escaped scot-free from this scourge.

THE CREAMERY.

Mr. Parry, the butter-maker, is giving a weekly course to the two pupils who are at present studying butter-making: Messrs. Bayle and Turgeon.

Monsieur Thérien, a former pupil of the creamery, has started a factory at Waterville, where he seems to be giving perfect satisfaction to the patrons.

At present, the Compton creamery is receiving 8,000 lbs. of milk a day, whereas, last year, at the same season, it was receiving less then 6,000 lbs.

The new creamery (see p.—of this number) is finished, and will be in operation in a few days. Many people have been to look at it, and they seemed delighted with it.

Mr. Parry gave me the following account of the new factory:

"The interior walls are finished in spruce, well oiled and varnished, except the floor of the cream-room, which is black-birch, and the refrigerators which are floored with cement.

"The separator-room is a model of convenience: the engine-room is so situated that any excess of heat that may arise in it cannot possibly find its way into the other parts of the creamery. The churning-room is placed in such a position that it must be cool at all times, while the cream-room is so completely isolated from all the rest that no bad smell can possibly enter it.

"The machinery is of the best kind and perfect in finish. The separators are the best now made, and the churn and butter-worker are of the kind specially recommended by Prof. Robertson.

All the vats, etc., are firmly constructed and fit for good work.

"Among the newest and most improved implements used in this creamery may be mentioned a fermenting-can and a cream-refrigerator. The former is intended to be used in the preparation of ferments to improve the aroma of the cream; these are made from milk of fresh-calved cows in perfect health.

"The refrigerator is used to cool down the cream several degrees after it leaves the separator.

"Having already had to use the cylindrical refrigerator for keeping butter, I am happy to say that its work is quite satisfactory, keeping a temperature of 40o F. with very little ice.

"The ventilation of the building is perfect. Nothing remains to be done except to fit up the power-crane that is intended to facilitate the reception of the milk."

The syndics continue to sell their butter one or two cents a pound higher than most of the other creameries.

Mr. Parry makes a daily test of both skim-and butter-milk, to ascertain the percentage of fat they contain. By this system, he finds out if the separators do their work properly, and do their work thoroughly.

Mr. Parry thinks that every maker should make this test daily, to ensure the regular working of the separators. He feels convinced that, in many creameries, for want of attention on the part of the maker, the skimming is so imperfectly done, that a good deal of fat remains in the skim-milk, and this necessarily causes a considerable loss to the patrons.

MILCH-COWS.—A register is kept of every cow's performance. In this is shown, among other things, the quantity and value of the food given: grain, hay, cake, silage or roots, as well as the yield of milk and better, the value of the butter, of the skim-milk, and of the butter-milk.

Thus, "Peatrie," one of the herd, gave, in April last, 300 lbs. of milk, the butter and skim-milk from which were worth $4.26, the cost of the month's food being $3.60. "Dolly," another cow, gave, during last January, 1,178 lbs., in February, 840 lbs., in March 980 lbs., and, in April, 1080 lbs. This register serves to distinguish the good from the inferior cows of the herd; the latter should be drafted as soon as possible.

PRACTICAL FARMING.

(By James Dickson).

Green Oats.—Milk vs. Beef.

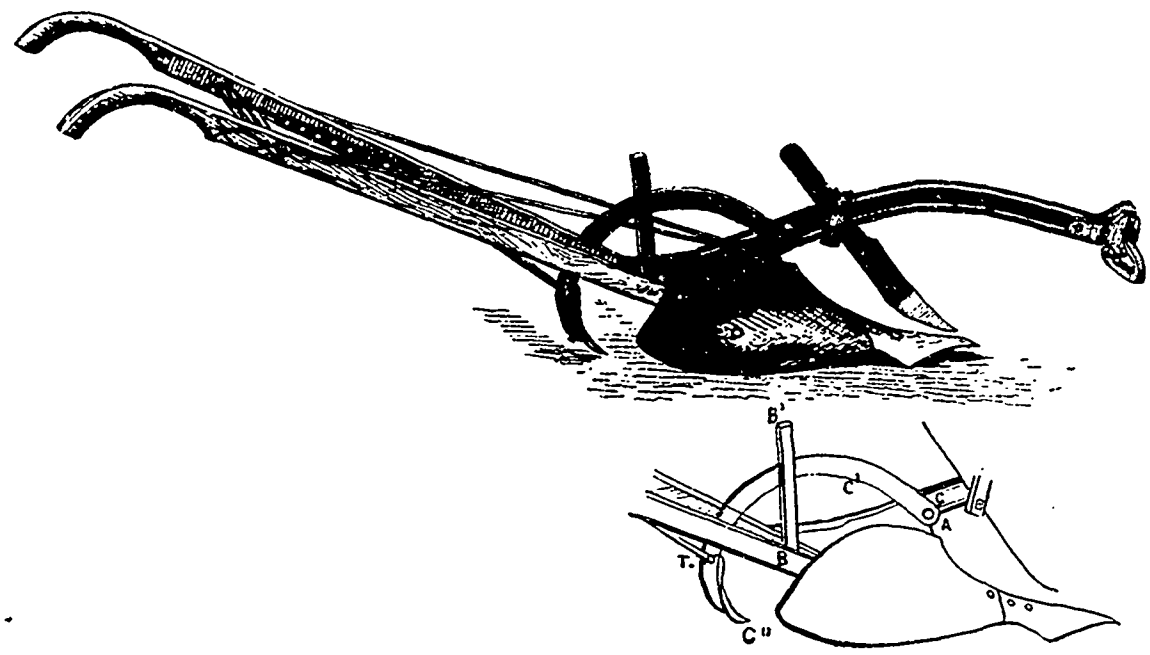
GREEN OATS.—I am very much gratified to find that so many writers are now advocating the feeding of oats in the straw. When I first wrote of it, I had fears of being able to induce a proper trial of the system. I have had no experience of its use with milch cows. Formerly, when I kept cows, I thrashed the grain, ground and fed it to them and fed the straw to young cattle. But the last 12 years, my object has been to keep only one milking-cow and convert the rest of the feed into beef. And I found there was money in feeding the younger cattle well, and that the way to make most money out of cattle was to keep them continually in good flesh. (I do not mean in beef). And by having good fodder there was no waste. And to get this, it was necessary to cut early. And a little thought led to the decision that the nutriment in the straw is preferable to being in the grain, the whole plant, straw and grain, being in a more digestible form. And I have no desire to return to the usual way of ripening, thrashing, and grinding for one lot of cattle and feeding the straw to another lot. With green oats and turnips, good beef can be made, and at much less cost than buying meal stuff to put the finish on cattle. I have had no experience in this way with milch-cows, but it is quite certain that is the best mode of feeding cows, as the same principle is involved, namely, obtaining the most digestible food at the least expense. There is one point here to which I will allude. In consequence of heavy rains, or over-rich land, very often the oat crop has to be hand-mowed, and I have known a great deterioration in the value of the crop from being cut at an improper time. When it is fine it may rain, and when it rains it is sure to be fine. Here weather wisdom comes in. When is it going to be fine? is sometimes a troublesome question. Oats are not hurt by being a few days on the ground if they have not been dried previously, but care must be taken that they do not sour, with that danger they must be turned over. Some seasons, fine weather spells are only of two or three days duration, and often it is advisable not to wait for fine weather to cut, but to cut as soon as fine weather can be anticipated. Where the straw is considered of little value, close calculation on this matter is not made, but in making good oat-hay, the greatest care is necessary, and cured in the cock as much as possible. The old style of hand-making hay is the correct method of making oat-hay.

I see some writers say that it is immaterial whether the green is in the fodder or not, as science shows that the colour is only sunlight, and is of no practical value as a food, and one writer in the Journal (I am glad I do not remember who) says, he has known cattle leave green hay, preferring that which was not. (1) It would be wasting space to discuss this matter, as every practical farmer knows better, and can tell from the appearance of the animal, and even by the excrement, whether it is fed with straw, ripe, bleached, thowburnt hay, or with good green fodder. Cut the oats green, keep them green, feed them green. I admit that science cannot extract it, and weigh it out by the pound as a food. But I claim that it conduces to the digestion and assimilation of the food. Neither can science convert water into a food, but it is necessary for the system of animals, and the assimilation of the food. And the green has medicinal virtues not possessed by water.

MILK vs. BEEF.—Here a question arises, in many cases worthy of consideration, and one which has often been put. Why do you not keep cows? Can you not make more money than in making beef? The answer is Yes. There is more money in milk than in beef. And here again I judge from my own experience. While the family was growing up, we kept cows, for many years made winter butter by contract at 30c. per lb., eggs at 40c. a dozen, skim milk cheese at 5c. a lb., and money rolled in. But the family were educated "off the farm," and with hired help the standard of the butter was lowered, eggs became cheaper as the proper system of producing them was understood. And as age creeps on, unless there is a direct necessity of the extra labour and money, there is certainly more leisure, and less dependence on the faithfulness of hired help, in beef than in milk. Many aged farmers make a mistake (perhaps). Farmers all their lives, without inclination or capacity for other business, looking forward to the times, when they may enjoy a well earned leisure, they often sell to disadvantage, are "on the road" the rest of their lives,—because the milk pail has lost its attraction while at the same time they could run a beef farm, have all the leisure they can expect, remain at the old home, among old associations, and in their own sphere. In running a beef farm however, it is necessary to have a wider range of knowledge of cattle, weight, size, value, etc., than in producing milk, and without some tact in this line, sometimes the margin is small. In a word, milk requires more constant attention and drudgery, while beef requires more judgment and speculative ability.

JAMES DICKSON.

(1) It was certainly no Englishman South of Trent!—Ed.



RICHARD'S SUBSOIL-HOOK, ATTACHED TO A PLOUGH.

C. C'. C".—The Richard-subsoiler.
A.—Pin fastening the hook to the beam of the plough.
B. B'.—The arrangement in which the hook is raised or lowered, when put to work, by means of the regulator-pin.

SOWING PASTURE SEEDS.

Drainage—Fallow—Deficient leys—Weeding.

Though it is, of course, impossible to spare the land best adapted for pasture in some cases, it is too generally assumed that soils, which are too exhausted to grow other crops, will produce profitable yields of grass; and we have known instances in which costly seeds have been practically thrown away under such circumstances. On the other hand, some agriculturists appear to expect good results from sowing inferior seeds, evidently being under the impression that anything green is desirable, while, as a matter of fact, no crop requires more careful preparation of the land than does pasture grass; and when the expense of this preparation is considered, it will be apparent how false economy is the plan of risking the success of the sowing for the sake of two or three additional shillings per acre. Assuming, then, that the land must be in as fertile a state as possible, and that the very finest seeds of the season only should be sown, we will pass to the question of cultural preparations.

Drainage is a most vital matter, but this is so universally recognised that it is almost unnecessary to touch upon it. The best preparation of all is undoubtedly a bare fallow, as it affords an opportunity of getting rid of weeds by dragging and scarifying. As a general rule, however, a bare fallow will be found too expensive, and the best substitute for it is a well-manured root crop. As soon as the roots are off the land it should be deeply ploughed, and shortly afterwards it must be laid up rough for the winter, to be harrowed and rolled down into a fine seed-bed directly it is possible to get on to it in spring. The great points are to get fine tilth, and to consolidate or firm down the soil. If time can be spared, it is well to let the land lie as it is for a week or two after the seed-bed is formed, so that the annual weeds may commence to grow. They can then easily be killed with the harrow. Besides a firm, fine bed, dry weather is required for sowing, or the roller will not work without clogging. Having run the harrow over the land, the seeds should be sown in two

operations, preferably with the seed-barrow. A bush-harrow is passed over the ground, and the whole should then be rolled twice in opposite directions. The time of sowing in spring varies from March to May, and of these months April will be found the most favourable. It is often possible to get the sowing done hastily in time for a shower of rain which seems to be impending, and to do so is worthy of a special effort. Late sowing is to be condemned, especially on those heavy soils which are liable to crack; and it is a good rule to get all the pasture seeds in well before the middle of May.

The question of a protecting crop of corn is one on which much difference of opinion exists; and it may be well to briefly discuss the arguments advanced for and against the practice of sowing with corn. Undoubtedly a thin crop of some cereal helps to keep weeds in check, and to prevent the young grasses from drought, when they might otherwise be scorched up; but it is equally true that annual weeds are kept down best by constant mowing, which is impracticable unless the seeds are sown alone. Then, too, a laid crop is apt to kill the grass out-right, though this danger can be obviated by sowing the corn very thinly indeed. It is just one of those questions which everyone must settle for himself, though we prefer to sow with a cereal, excepting in the case of parks or other ornamental grounds. On lighish lands only barley and oats are available, but wheat can be used on heavier soils. If it is intended to sow grass seeds, the corn is best broadcasted, as the young plants will cover more of the surface of the ground than if it were drilled; and the grass seeds may be got in when autumn sown corn is about two inches high, or spring has just been sown. The corn will naturally take a good deal out of the ground; and a liberal dressing of good, cake-fed manure must be given when it has been carried, by way of compensation.

There appears to be some doubt as to whether it is possible to convert deficient clover and sainfoin leys into permanent pastures by seeding them down with strong growing grasses, but we have repeatedly seen good results attained with proper mixtures. (1). To sow the smaller and more delicate grasses would be sheer waste of good seed. Severe harrowing in autumn, a heavy top-dressing of good manure or compost in winter, and the sowing of the strongest growing grasses only are the best means to ensure a profitable plant under such circumstances. If the pasture seed have been sown alone, the young grasses should be topped with a scythe when they are a few inches high; and a heavy roller should immediately afterwards be passed over the land. Generally speaking, the oftener a young pasture is mowed and rolled, so much the better will it succeed. Though mowing will keep annual weeds in check, it does not destroy thistles, docks, and similar weeds, which must be cut with a spud. By about the middle of May it will be seen whether the seeds have taken or not, and in the latter case the land must at once be lightly ploughed and resown. If only a few bare patches are to be found, they can easily be broken up with a hoe, preparatory to raking, sowing, and rolling. The same method must be adopted where corn is grown also, saving that, beyond spudding out thistles, etc., nothing can be done until the corn be carried. It not infrequently happens that a promising pasture is much injured by allowing stock to graze it too soon, with the result that they pick out those grasses and clovers which are most palatable, and leave the remainder to seed and grow into great tufts. This can to an extent be remedied with a scythe, but it is quite soon enough to put cattle or sheep on to a young pasture the year after sowing. Indeed we prefer to take a hay crop before doing so. (1).

As regards the selection of seeds, it is best in most cases to leave the choice to the seedsman, whose extended experience in laying down all kinds of land to pasture is almost indispensable for the best results. Under any circumstances nothing but the finest produce of the season should be sown; and those houses, which do not give guarantees of purity and germination, should be altogether avoided.

(1). We have tried it and never succeeded.—Ed.

CARE OF ESTABLISHED PASTURES.

EXTIRPATION OF WEEDS.

While annual weeds can be eradicated by frequent mowing, which prevents the maturing of seeds, and surface rooting perennials, such as creeping buttercup (Ranunculus repens), can be torn up with a short-tooth harrow, such deeply penetrating species as thistles, docks, etc., must if possible be removed with a spud or two-pronged lever. Hand-weeding is, however, only effectual if undertaken early and while the noxious plants are confined to local spots. When labour is not available for hand-pulling, the weeds must be cut when in full flower, the process being repeated two or three times until the plants are exhausted and destroyed; but in such cases the seeds of better grasses must be scattered over the pasture in early autumn. If a pasture has once become foul with the seeds and roots of perennial weeds, no remedy remains but that of breaking it up and taking a course of cleansing crops before returning the land to grass. The surest method of overcoming weeds is to ameliorate the physical condition of the land by thorough drainage, ploughing, and liberal applications of suitable fertilisers, especially of super-phosphate. It is, of course, imperatively necessary to collect and burn all fragments of couch and couch-like roots after ploughing. In many pastures the greater portion of the herbage consists of more or less inferior grasses, and it is obvious that these pastures would be still more valuable if these inferior species were replaced by others which would supply a larger amount of favourite food. To accomplish this the inferior grasses should be prevented from seeding by a scythe or mowing machine being passed over them when they are in flower. Seeds of the better varieties being sown afterwards in early autumn.

GRAZING.

Not only must the improvement of stock be considered, but it is most important to maintain or increase the fertility of the land by stocking it with cake-fed animals or otherwise manuring it. Waste can only be prevented by allowing sheep, as well as cattle or horses, to graze the pasture, because the first mentioned bite down the "bottom grass" more closely than horses, while horned stock chiefly gather the taller herbage. Thus, by properly proportioning the animals and regularly moving them, the pasture can be fed off evenly, and wholesome changes of diet may be provided. The date at which grazing can be safely commenced in spring varies with the season; but cattle should not be turned out until the grasses have made a fair start, and until the ground is sufficiently firm to prevent treading injuring the young shoots; though by too great delay a portion of the fodder, growing hard and unpalatable, may be rejected by stock. It is specially important to keep sheep off grass which is just starting into growth, since they eat some plants off so closely as to occasionally destroy them altogether; besides which, their peculiar snatching method of feeding is responsible for the uprooting of many young grasses. Of course those pastures in which early species predominate, will be for grazing first. Pastures should be eaten down before winter: but the time at which stock should be taken off land depends entirely upon the season, and should be so regulated that the autumn grazing does not interfere with the spring pasturage. If any of the larger grasses be permitted to grow into rank, unsightly tufts, by neglect in spreading droppings, animals usually reject the herbage, as they do the hard flower stems of various species. In either case copious seedlings can only be prevented by running the scythe or mower over the pasture, after which the young produce will be readily eaten. All coarse tufts must be cut in December. As the value of the droppings of stock will be discussed fully in our next issue, we need here merely point out the necessity of frequently spreading them evenly over the surface of the pasture to prevent the production of coarse tufts of herbage which are passed over by animals, and have consequently to be cut with the scythe.

(1). We prefer feeding off, not too close, with young cattle; but neither sheep nor horses should be admitted for, at any rate, the first year.—Ed.

HAY-MAKING.

Since the "bottom herbage" is always thicker than the top in a good meadow, it is most important to set the mowing machine as low as possible; and this can only be safely done when stones have been picked off the land early in spring. Not only do most pasture plants become hard and depreciate in nutritive value and digestibility with age, but the ripening of seed weakens them, and seriously lessens their aftermath. Indeed, if some of the less robust grasses be allowed to mature seedings while young, for several years in succession when thoroughly established, they disappear altogether from the land, leaving gaps to be filled with worthless and, possibly, noxious indigenous herbage. Hence the crop, especially in the case of young pastures, should be cut before the earliest species have formed seeds, even though the produce is liable to shrink proportionately slightly more than would that of older growth. The usual method of drying hay is to spread it out in the sun as soon as it is cut. On the following day it is turned once or more, and at night is made into cocks, to be spread out next morning when the dew has evaporated. As dew is most injurious, it is, however, a much better plan to make it into cocks the first night as well. In favourable weather the tedding-machine may be used freely the second day for ordinary meadow hay; and crops which are not very heavy, or do not contain large proportions of leguminous plants, can generally be carried during the evening of the third day. In period of continued wet, the grass must be left as cut unless it is made into silage. The leaves of clovers and other leguminous species are brittle, and break off very easily, and the produce of such plants should be carefully turned by hand in the swathe as little as absolutely necessary. There is always a risk of injurious heating in the rick if succulent grasses or clover be carried before sufficient moisture has evaporated. An excellent method of testing their dryness is to twist a few stems into a rope, when—if moisture exude—the crop is not yet fit to carry. As rain washes a large amount of nutriment out of the plants (Wolf states that cold water passed through clover-hay extracts from twenty-five to forty per cent. of the dry substance), partially dried hay should always be made into compact cocks if rain be feared, because less water has access to it thus. When heated cocks are spread out in fine weather, the hay dries very rapidly. While greenness is justly regarded as an indication of well-made hay, it is sometimes desirable to make clovers into brown hay to obviate the necessity of frequent turning and consequent loss of leaf. The plants, being turned only once during the period, are dried in the sun until about two-fifths of the contained water is evaporated; and are then made into large cocks, the heating of which completes the process of drying in five or six weeks. To prevent loss, red clover and lucerne are sometimes cut with a scythe; and, after drying for two or three days in the swathe, are made into small sheaves, the driest plants being placed in the centre. These sheaves are bound with strong flower-culms at the top, and are formed into stooks, the cut ends resting on the ground, so that free access of air beneath is possible. A few days complete the process of drying. If the stooks are overturned by wind, they must be set up again at once.

R. L. NICHOLAS.

THE COST OF ENGLISH COUNTRY HOUSES.

One of the most interesting articles I have read for a long time is that which Mr. Cornish contributes to the April "Cornhill," on "The Cost of Country Houses." He gives a mass of information which I heartily wish I had had at my fingers' ends when I was writing "The Splendid Paupers," a book which, by-the-bye, oddly enough, seems to have met with much greater vogue in Germany than in this country. Only the other day I received an intimation that it was appearing again as a feuilleton in several German newspapers under the title of "The Yellow Man." This, however, by the way.

THE NUMBER OF COUNTRY HOUSES.

Mr. Cornish calculates that there are 900 country houses, in addition to the royal palaces in England as well as in Scotland. Of these, 640 belong to the third category, which consists of those worked by a minimum staff of 50 men. There are 200 of the second magnitude employing from 90 to 170 men. There are 60 of the first magnitude who maintain from 200 to more than 600 men in the performance of work other than industrial or agricultural, in the employ-

ment of the owner. Mr. Cornish then enters into particulars as to the persons employed in certain country houses.

THE PERMANENT STAFF.

Here, for instance, are the particulars of a staff maintained at a house in Suffolk, of whom 156 were employed outside the house and only seventeen indoors :—

Indoors	17
Stable	16
Keepers and night men	16
Warreners	4
Parks and lakes	10
Gardeners	40
Lodgekeepers	3
Blacksmiths	2
Carpenters	7
Painters	3
Engineers	2
Home farm	38
Brick kilns	9
Bricklayers	4
Wheelwrights	2
Total	173

This list does not include any of the women servants. The total wages fund for men alone was £8,000 per annum. Mr. Cornish then takes us in rotation through the various items of expense connected with a country house.

DEER PARKS AND GARDENS.

The deer park, he says, is very expensive, chiefly on account of the high walls necessary to keep the deer within bounds. The cost of making roads is very heavy, the trees require careful fencing, and a small deer park with 300 deer will cost at least £750 per annum to keep up. The gardens are much more expensive. The minimum staff is five men for the glass houses and fifteen in gardens, but it would not be difficult to name 200 houses in which the garden staff varies from twenty-five to forty. The minimum cost of a staff of fifteen would be over £1,100 a year. Of course it costs much more when you come to glass houses, such as those at Welbeck.—where, by-the-bye, the kitchen gardens cover thirty-two acres—and there are glass houses for tropical fruits, vines, figs, palms, roses, rhododendrons, carnations, etc., and a peach house 240 yards long, and an apricot house still larger. The stables, too, are always wanting repairs.

HOW THE STAFF ARE EMPLOYED.

Here is another table giving the number of persons employed, including women, in what Mr. Cornish regards as a second-class house :—

Gardens.—1 head gardener and 25 men. Total men, 26.

Parks, lakes, and woods.—1 forester and 11 men. Total men, 12.

Roads, walls, and quarries. Total men, 9

Stables.—Stud groom, 2 coachmen, 4 grooms, 4 helpers, and pad groom. Total men, 12.

Laundry.—5 women and 1 man. Total man, 1, Women, 5.

Home farm.—1 bailiff, 3 cowmen, 1 shepherd, 2 carters, 8 labourers. Total men, 15.

Workmen (these also do repairs on the estate).—6 carpenters, 3 masons, 3 painters, 2 tilers, 3 plumbers, 2 engineers, 1 time-keeper, 1 clerk of the works. Total men, 21.

Game.—1 head-keeper and 8 keepers. Total men, 9.

House.—Men, all departments. Total men, 13.

Women, all departments. Total women, 21.

Grand totals, 118 men, and 26 women.

When you come to the house itself, there are endless repairs To repaint a single large room costs sometimes £50, while the roofs are a never ending source of expenditure.

HOW THE PUBLIC BENEFIT.

After going through all these particulars, which certainly render it easy to understand both the splendour and the pauperism of our landed classes, he sums up the advantages in which the public share in having a great country house in their vicinity.

A park.—Open usually, sometimes on certain days only.

Woods.—To walk and picnic in, and in return plenty of mischief and orange peel.

Flower gardens.—"Grounds," walks, terraces, and lawns open on stated days.

A golf ground.

One or two cricket grounds.

A parish club (for the village).

Five or six football grounds at nominal rents. (These near big towns in the North.)

A skating rink.

A curling pond (in the North).

A rifle range.

One or two churches restored.

One or more schools maintained.

Old castels and abbeys in the grounds kept from further ruin and open for visitors.

A picture gallery.

A collection of furniture good enough for South Kensington. Bric-a-brac (ditto).

One proprietor maintains a race course for his tenants and neighbours to run their horses ; others a natural history museum ; Colonel Pitt Rivers a reconstructed British village. Lord Craven keeps the great White Horse in order, and the whole of the hill is at the visitors' disposal. The list could be extended to any length.

The historical monuments kept in order gratis by the owners of the big houses must number many hundreds. Probably the finest and most costly is Haddon Hall. This, perhaps the finest Tudor house in England, which would let for £3,000 per annum, is maintained in perfect repair and kept furnished, though never occupied, for other people to go and look at, by the Duke of Rutland, who also maintains a house of the first magnitude—Belvoir Castle. These are among the more obvious advantages of our "country houses" to the public.

(Review of Reviews).

DRAINING.

(Continued.)

I have not laid down any hard and fast rules for the distance between the drains. It would be absurd to attempt it, without a trial, or experimental drain in each field to be drained. I have never seen, however, any land here where I should fear to allow 40 feet between the drains if they are to be 4 feet, or so, deep. Our heaviest clays in England were dried at 33 feet intervals, and there is nothing like them here. If "pockets" of gravel or sand occur, the distance may be safely 50 feet ; and where the whole subsoil is broken, drains sunk 5 feet, or perhaps 6 feet, in the last few rods at the top of the incline, may be expected to answer well at from 60 to 90 feet. Remember that, as I said before, the wet spots on a slope are not the sites of the springs. They lie higher up ; so there is no good in wasting money by placing the drains deep at their lower end ; out of the reach of frost, is all that is necessary. Fig. 6 is an engraving of a field, all in one plane, with a fall from "a" "b" to "c" "d." The outburst of the springs is along the lines "r" "s," "t" "u ;" and "e" "f," "g" "h," are the main drains emptying into the ditches "a" "c" and "b" "d ;" "j" "k," "l" "m," etc., are the drains running deeply into the ground above the outburst. A really deep cut here may drain acres, but of course a large conduit will be required to carry off the water. Any one can see with half an eye, that in this harp-fashion of placing the drains they must cut into the site of the springs—they can't avoid it.

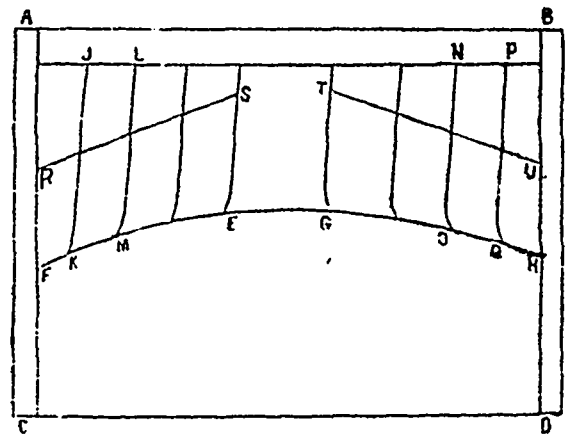


Fig. 6.

In the case of a hollow spot with a fall in the upper part inclining on each side to the centre of the hollow, the main should run up the hollow, and the small drains still down the greatest fall—like what is called by ladies "herringbone" fashion—see fig. 7, where "a" "c" is the open ditch, into which the main "a" "b" empties, and "e" "d," "e" "f" etc., the small drains running up and down the greatest fall in the direction of "e" "d," "g" "h." The part of the main next the ditch being the recipient of all the water should be of a safe size, the higher up we go the smaller may be the conduit. As drains should never be more than 200 yards long, if the small drain pipes be 1¼ inches the main should be 2½ inches, for ordinary work. at the ditch and 2 inches for the upper part—"i." "e." in fig. 1, "m" to "f" 2½ inches, and from "e" to "m" 2 inches—but the economy is hardly worth the trouble, except on a large scale.

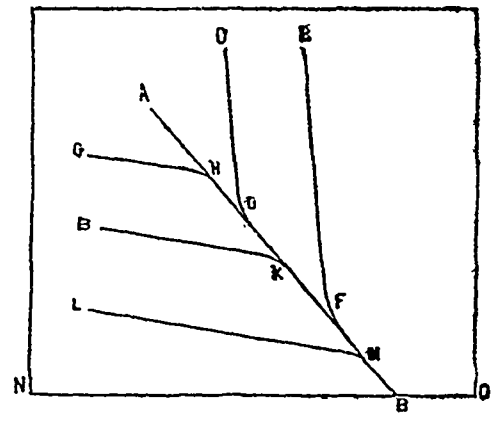


Fig. 7.

And now we come to the cost of the work : and a difficult thing to calculate it is. If it is to be done by the rod, there is no fear of the men opening the top spit too wide ; but if by the day, they will, for the sake of a trifling convenience, move many an unnecessary cubic yard of earth.

What adds so much to the expense here is, that we have no gangs accustomed to the work. Good spademen there are, I dare say, here and there, but draining tools of the proper sort are unknown to them, and without these, no economical operations can be conducted. I recollect perfectly the cost in England, and the number of rods (16½ feet) a gang of four men did in a day. From these data we may arrive at something like a conclusion, as to what the cost should be in this country. Day wages being 14s, or $3 50, a week, the men expected to earn 18s, or $4.50, in the same time at draining. Season of the year, winter,—8 hours a day. In clay soil, with little pick-work required, they dug, laid the pipes, and filled in 6 rods of drains, each, per day. This at 6d. (12cts), gave them just the 3s. that satisfied them. Such land required 4 feet drains, 40 feet apart, and 1100 inch and a quarter pipes served for the 64 rods of drains wanted—some are sure to be broken. So we have :

64 rods of drains at 6d. (12cts) per rod	$7 68
1100 pipes at 16s. ($4) per thousand	4 40
	$12 08

as the whole expense of draining an acre of land except the carriage of the pipes, which, as the kiln was with 1½ miles of my farm, was a mere trifle. Where the land was stony, or rather, gravelly, the price for digging was higher, but the distance between the drains, which was sometimes 60 feet, made up for the extra cost per rod. I have paid as much as 20 cts, where the pick was much used.

Here, taking one soil with another, when the men get accustomed to the work, I think 20 cts a rod should do it, and 60 rods ought to be enough, per acre. Thus, we have :

60 rods of drains at 20 cts $12 00
350 pipes (13 inches in length here) at $8 per thousand, and breakage 7 60

$19 60

Cartage, of course, additional: a heavy charge, as 1000 of these pipes would be a two horse load—to say nothing of railroad charges. But make the total 22, and it is not much for an acre of land well drained. If this promising French company really lends money on mortgage at 6 per cent., I cannot conceive any so profitable investment for a farmer as borrowing enough to drain all the land on his farm that wants it. The yearly interest will be only $1.32 an acre—as to the profit, it may safely be put down as thrice that sum.

If my experience be thought worth anything, I shall always be happy to give any advice, or to answer any questions, either in the Journal or by letter as may be preferred: gratuitously of course. I saw so many thousand acres of land, during my tour through the Townships this summer, and in the French country at other times, perishing for want of draining, that I could not help thinking that for the neglect of this, the most profitable of all improvements, the educated part of the community were sorely to blame; since it is to them that our less enlightened population look to lead them into new ways, and shew them how to unite "theory with practice."

That drainage does actually raise the temperature of the soil, may be shewn by the following experiments made at Clarendon Park, Hampshire, England. The soil is a heavy clay—"impervious" they used to call it, before drainage proved the contrary. Here, the temperature was raised 10.5 F. by drains 4½ feet deep. The register seems to have been kept very accurately: and it proves that not only was the summer and autumn heat of the soil greater, but the increased temperature was preserved for a long time through the winter, in fact, March, 1850, was a peculiar month for the South of England: for seven nights out of the first eighteen, the mercury sank to 26o F. yet the following table shows a greater degree of heat, at one and two feet under the surface, than for several years previously in the same month, by 1.17 degrees at one foot, and 1.44 at two feet:

	1 foot deep	2 feet deep.
Mean of March, 1838.....	41°.48	41°.06
" " 1839.....	41°.06	41°.95
" " 1840.....	39°.24	41°.71
" " 1844.....	4 °.55	4 °.14
" " 1845.....	37°.79	38°.37
" " 1846.....	44°.47	45°.55
" " 1847.....	40°.22	41°.03
" of these years.....	41°.16	41°.74
" of first 18 days March 1850.	42°.33	42°.18

The land was drained in the autumn of 1848.

LUCERNE and OTHER FODDERS.

Loss of plant—Lucerne-hay—Hungarian grass—Carrots for horses.

In my seed catalogue for this year, which Mr. Ewing kindly sent me as usual this Spring, there were some very eulogistic remarks about my favorite forage crop lucerne, to the effect that it had long since passed the initial stage of the "Gentleman farmer's" fad and was being exclusively or, at any rate, increasingly patronised by practical farmers.

Poor Gentleman farmer!" he does not I am afraid enjoy any much higher reputation here than it does at home. In the lay of the Three Jovial Huntsmen," one of Caldecott's charming nursery books for children, we read of how

"They hunted an' they hollo'd, an' the first thing they did find,
Was a tatter'd boggart in a field, an' that they left behind
Look ye there.

One said it was a boggart, an' another said nay,
Its just a gen'man farmer that has gone an' lost his way
Look ye there."

As nothing succeeds like success, and nothing is more deplorable and discouraging than failure, however undeserved, or attributable to unforeseen circumstances beyond control, on my intruding into Mr. Ewing sanctum, towards the end of April, on seed purchasing intent, and informing him in response to enquiries about my lucerne, that it had been frozen down to the ends of its long roots, quite 4 feet (1) his genial countenance was overspread, by a somewhat downcast expression. It was but momentary, however, as he remarked very truly indeed, that as pretty nearly all the clover in the country had been killed, and that even the chicory was nearly all done for, one could hardly expect that lucerne would prove an exception.

Quite so, and, one might just as well never sow clover again as give up growing lucerne because it was killed last winter. (2)

It is of course unfortunate, that for two very intelligible reasons, I have not yet been able to ascertain for how many years this crop will grow in this country without reseeding. Knowing absolutely nothing about lucerne, when I first tried it, I put it in a field, where there is always water, at a depth of four feet, and in the third year, after giving splendid crops, cuttings for soiling, every year it died out like a flash, as soon as its roots reached the water. This it will always do, and must be avoided, although it likes lots of water at top. I can easily understand, that, with irrigation its possibilities are enormous.

Dry cold, and a high degree of cold, will not injure it, even in an exposed situation, and without being mulched, or protected by any great quantity of snow.

Lucerne is quite good enough for me, to keep sowing it every year, to the extent of at least 5 acres, whenever I have that extent of available land close enough to the stables. I can sow it on the worst land I have, with less trouble and expense, than anything else I have ever tried.

In its second and third year, I have cut it for soiling, 6 or 7 times a year.

I have not so far tried to make hay of it, but shall endeavour to do so this year. I have sowed it both alone and with oats. As far as I can see, the lucerne sowed alone, is longer, and more luxuriant, but there are more weeds, amongst it, there are fewer weeds where sowed with oats. The lucerne sowed alone, this Spring, on the 26th and 28th of April last, in the same field where it was killed by frost last year, as well as in another additional one, which I have put it in, this year, has been quite long enough to cut for soiling for some time. Most of the stems measured, on the 10th of this month, from a foot to 19 inches in length.

A friend of mine, who has made alfalfa hay, for 12 years on a ranch in Colorado, tells me that it makes beautiful hay, out there, curing quite green, as soon as it is in bloom, (1) and that they cut three crops for hay in the year. Of course it is very easy to cure, there, one day being often quite sufficient, and, I presume, although I forgot to ask him about it, that it is kept in stacks. I shall try and make hay of the lucerne alone, and of the lucerne and oats mixed.

If I find I can make good hay from lucerne, it will pay me to grow some 10 acres of it next year, on the best land I have on the farm, and at some distance from the farm buildings.

If good hay can be made from it, it certainly deserves the very best treatment it can get and a very liberal top-dressing of wood ashes, in the autumn.

At the risk of repetition, I must say again that I have read most misleading and erroneous directions given about the cultivation of lucerne, in some of the Eastern States, in some of the American Agricultural papers. I have seen it recommended to be sowed in drills, and cultivated afterwards to keep it free from weeds. This would be needlessly troublesome and expensive. Lucerne should be sowed on clean, well manured land, a nice sandy loam, naturally or artificially drained as far away from any water in the subsoil as possible, either alone, or with oats, (2) in a naturally protected situation, if you can get it. I should prefer growing it alone, for the following reasons. I think that it will grow more luxuriantly, and stand the heat better if grown alone and, as it should be cut early for soiling, so as to get rid of the weeds, it is not much use growing the oats, unless you cut them green also. After the weeds—there will always be a certain amount, although there will be fewer, when sown with oats—have been mowed, with the first cut of lucerne for soiling, the lucerne will grow more quickly than the weeds, and with each cutting there will be fewer each year. In sowing lucerne, especially alone, I should sow it as thickly as possible, quite up to 30 lbs. per arpent if possible.

Lucerne does not spread at all, and wherever there is a vacant space, with little or no seed, there will be weeds, or at any rate, there will be a small vacant patch, where, although the shade from the lucerne may have prevented the weeds from growing, there will be no lucerne. Lucerne seed, in this country, for whatever reason it may be, is not very reliable, and you must make allowance for a good deal of seed that won't come up. (3)

In a second or third year crop of lucerne, you will see very few weeds, and the well furnished plants present a beautiful sight, covering the ground well, from fence to fence, if lacking somewhat of the gorgeousness of *Big Rawdon, or other red clovers.*

Although, of course, lucerne, will grow better than any other clover on sand, (I have not, so far, grown it anywhere else), a long spell of heat, on burning sand, does try it considerably, and the leaves shrivel up, and the stems get woody: still, an occasional shower does it a wonderful amount of good and enables it to recuperate wonderfully.

In common with a great many farmers on the Island of Montreal, I have put in some corn and Hungarian grass, in anticipation of a very scanty hay-crop. Of Hungarian grass, I know absolutely *nothing myself beyond the answers to* some enquiries made to fellow-farmers on the Island of Montreal, and elsewhere, who have tried it.

Mr. Archie Rolland, of Ste-Marie de Monnoir, informs me that he has got an enormous crop from it one year, and a very poor one, on clay, another.

Mr. Johnson, of Como, seems to have *been very successful with it.*

There seems to be no trouble at all about it being relished by both horses and cattle, and I am told that you can make hay from it in two months from date of sowing. It seems to be a little difficult to cure properly so as not to have it dusty. If any kind correspondent would give some directions for the curing of Hungarian grass, I should, in common with a good many others, be very much obliged for the information.

The July No. of the Journal, is particularly good. The articles are full of plainly expressed, useful directions, that any one can understand, singularly free from scientific verbiage, and endless repetition of chemical formula, which are not so important, or so reliable, as some people would fain have you believe. Mr. McLachlan's directions for the cultivation of carrots is just the thing one wants for handy reference.

There are only two roots that seem suited to the regimen of the horse, and these are parsnips and carrots, although I am aware that turnips are fed occasionally to farm horses in England. Three meals of carrots per week are very good for horses, but not much more than that. Too many carrots act like a diuretic, and like too much nitre, are not good. Linseed meal, with a little grooming and a blanket, will do more for the coat than carrots. One requires a good place to store carrots, half-frozen carrots are very bad for brood-mares, and not very good for anything. The dealers, in Ireland, feed boiled potatoes, mixed with bran and cabbage leaves, to horses, and this diet get horses very round and fat, which condition covers of course a multitude of defects, but does not produce hard flesh. There is very great economy in the chaffing of hay and straw, (1) for the feeding of horses, and it is well worth the extra time and trouble involved.

One thing is absolutely necessary: scrupulous cleanliness in the feed-boxes, in which this cut hay, and crushed oats, or bran, is fed to horses. If this is practised, they will feed all right and remain in the best of condition, otherwise they will not do well. It is some trouble to get horses accustomed to long hay, to eat this chaff and, no doubt, the long hay is better when you have plenty of it, where economy is an object: and it will be worth most farmers' while this year; there is an immense saving in feeding chaffed hay.

C. F BOUTHILLIER.

(1) Immediately it shows for bloom. The flowers should not be allowed to expand.—Ed.

(2) Barley is better for all grass- or clover-seeds.—Ed.

(3) Or else, 18 lbs. to the arpent would be an ample seeding.—Ed.

(1) M. Bouthillier and the editor traced roots down still lower, and then they went deeper still.

(2) Excellent! And so with "permanent grasses." Ed.

(1) Mixed 2-3 hay 1-3 straw.—Ed.

THE CONTRASTS OF ONTARIO AND QUEBEC.

To the Editor of the Journal of Agriculture.

Sir,

During the past month I have been travelling altogether in the Province of Ontario, and in districts that I have never previously visited. I see many striking differences in the mode of gaining a living. I should say that, on the average, Ontario has much better soil than we have in Quebec, but for scenery, she is not "in it" as the slang phrase goes. Ontario has this year a bountiful crop of everything but apples. I have seen few orchards that had many apples to speak of. I firmly believe that our own province grows more corn for ensilage purposes than Ontario. One reason is that the soil has been so good that dairying has not been followed as much as here. If Ontario was a dairying province like ours, we not only could supply the British markets with all the cheese they need, but could go a long way in supplying that immense market with butter, instead of the few paltry dollars' worth of butter we have been sending over yearly.

Mr. Editor you would have been pleased no doubt to have seen the fields of rape: I have to admit that I never saw any of it before, but I believe you are a rape enthusiast. (1) I was passing along the road to West Essex from Allis ton,—I may here say that I believe the soil in that part of Ontario is the best I have seen yet, (I have not yet covered the whole province)—when I beheld what I thought was a fine large field of turnips, some 15 acres in extent. I was delighted. I stopped and asked who owned that fine field of turnips I was informed that it was not turnips but rape, the man's name was Fisher. I made up my mind that on my return I would make some enquiries regarding the crop. I did so and found that they had always bought about 100 lambs, sometimes more or less, and pastured them on rape, that the lambs would have all they could do to keep it down, and it would last right up to winter, that it was good also for beef cattle, some even fed it to the cows, but if given a full feed of it, that it would taint the milk, that very often they have made from the rape field as high as $200, and once over $300. (2) I have read before about rape, but never, as I said before, saw it cultivated, since then I have seen many fields; some were even sowing it the last days of July. There is much fall-wheat sown here,—this year the best crop for many years. I saw one field of 16 acres and the owner estimated he would at least have 35 bushels to the acre. I had a little incident with the wheat man: I happened to be talking with him as his dairy came past us—consisting of 5 cows. I asked him how much land have you here?—200 acres was his reply. And you only keep 5 cows?—Yes. Why have you not got 50?—Do you suppose you could raise enough on your farm to feed 50 cows?—Yes, he replied, and more too? where would my profit come in? he asked me. I said it has been demonstrated that, from a bushel of oats properly fed to good cows, you would get 2 lbs. of butter and from a bushel of barley, 3 lbs. Now instead of selling your oats and barley, the one for 19c and the other for 30c. sell them to your cows, for at least 25c p. c. better prices than to your grain merchant, and be sure that your cows will never become bankrupts as many of the grain and hay merchants have done.

I tell you he was somewhat surprised. Do you make your butter at home, I said?—No, he replied, I sell my cream to a creamery at Barrie, 20 miles distant—You should have one here in this section and not need to send it so far. The reason of course was the soil was so good that they were able to sell crop after crop without returning very much back to the soil, but they will learn very soon now, that take everything and give nothing in return, cannot last for ever.

Take many sections of Ontario for instance with regard to cheese, and they have no doubt taken the best means to arrive at the best possible results. They charge a certain price for manufacturing and drawing the milk, say 2c per lb., others 1¾, and the man who lives next door to the factory pays the same as the one who lives, say, 4 or 5 miles away; in that way, there is not the same craze for having a factory at every man's door as in this province. I have visited factories where there were made as many as 34 cheeses a day. A first class man is engaged to superintend the whole, and then ordinary help is employed; sometimes as many as 3 or 4 helpers are engaged. You cannot find small cheeses in a factory like that; all are uniform, in height, quality, etc., etc.; good strong boxes are used under all circumstances. I tell you these fellows have the science of cheese-making down fine, but they have a wrinkle or two to learn in the butter business.

But I assure you these Ontario farmer have something to learn yet, and that is, economy. They have, as I said before, a bountiful harvest, and by the way they are saving it you would hardly think they had been paying from $14 to $18 per ton for hay only 2 years ago. I have only seen a few who cut around the fences or ditch sides with a scythe: they go with the mower into a field and cut what they can, the rest is left, and in the same way I have seen wheat and barley treated: cut what you can with the reaper, the rest: well we do not need it, in fact we have not got the time tobother with it. I have also seen more fruit wasted than I ever did in all my life: bushels and bushels of gooseberries going to waste, rotting on the ground. I asked one man, who had an acre or two of gooseberries, why he had not sold them? I could have sold them when they were green, he replied, but I thought I would wait until they were ripe: now, I cannot sell. I told him you ought to sell when people are ready to buy, if they want trash as you say (!).

Let them have trash as long you get your money: if a man enters a store to buy a white-handled knife do you think the shop-keeper would try and sell him a knife with a black handle, even if it was just as good? a white handle or none,—then in order to make a trade you would have to give him what he wanted, and, if you did not, the chances are he would go where he could get served with just what he wanted.

In the last reports I sent you, Mr. Editor, I thought perhaps I may have had rather a brighter view than I ought to have had: but I have seen reports where people were most agreeably surprised at the way, the hay especially, turned out. I do not think the sort of spell that seemed to hover round Toronto did much damage in my native province.

Pardon me, Mr. Editor, for making my letter so long (1) but I have not written you half that I have seen.

PETER MACFARLANE.

Listowell, Ont., 9th Aug, 1897.

P. S.—I forgot to mention that I visited the factory where the famous 11 ton cheese was made at Perth.

(1) Rather!—Ed.

(2) And the following grain-and hay-crops; how about them?—Ed.

(1) Oh! green gooseberries, when no larger than a marrow-fat pea are far from being trash, Mr. Macfarlane!—Ed.

(1) Not a bit too long, but just the right, chatty style of letter wanted.—Ed.

WHEN TO HARVEST THE CORN CROP.

by

Frank T. Shutt, M.A., Chemist,
Dominion Experimental Farms.

Science and experience have been teaching us, during the past ten years the great value of the corn-crop. Farmers and dairymen throughout the Dominion are now agreed that for producing cheaply a large amount of palatable, succulent fodder suitable for keeping of the milk flow during the winter months, the Indian corn-plant has no equal. Recent chemical data assure us that we can obtain from it, when properly saved, a fodder rich in food constituents and digestible. Not that corn-silage, no matter how well preserved, is sufficient in itself for the needs of a dairy cow. The ration must be balanced by the addition of substances containing larger amounts of the flesh-forming constituents. The point to be made is this: in feeding milch cows we want besides hay and meal a bulky, coarse (that is, not concentrated) fodder that shall be succulent and nutritious and at the same time cheap of production. Such a fodder, we have no hesitation in saying, is furnished by Indian corn. It is therefore desirable that our farmers should have brought before them all the known facts regarding the growth and harvesting of this important crop.

Though information respecting the planting and tillage rather than the harvesting of this crop should naturally and rightly form the substance of our first article, we shall reverse the order owing to the near approach of autumn and consider now what the deductions are that may be made from the chemical and other data at hand regarding the best time to cut the corn, whether for the silo or for preservation in dry condition.

The careful analysis of several varieties of fodder corn taken at different stages of growth, viz., tasselling, silking, early milk, late milking and glazing, has revealed the fact that important changes in the composition (in other words, in the food-value) take place as the plant matures.

The data of this investigation at the Central Experimental Farm are very voluminous and we shall, therefore, only present such as will be necessary to substantiate our argument, which is that the corn should be allowed to come to the glazing condition before harvesting. It will then contain the largest amount of digestible food constituents.

Taking the average composition of the five varieties experimented with, and the weight of crop as ascertained at the periods already mentioned, we have constructed the following interesting table:—

Stage of growth.	Dry matter. Pounds per ton.	Total weight of green crop per acre.		Total weight of dry matter per acre.	
		tons	lbs	tons	lbs.
Tasselling	285.	22	1318	3	466
Silking	324.	24	52	3	1766
Early milk	389.	22	1806	4	909
Late milk	443.	21	798	4	1467
Glazing.	523.	21	1154	5	1297

The prominent fact brought out by these results is that there is a steady increase in the amount of "Dry Matter" (which constitutes the real cattle food) during the weeks between the tasselling and glazing periods. This increase is largely in carbo-hydrates, the heat-producing elements so necessary for animals. We observe from the data that a ton of corn-fodder at the later period contains nearly twice as much food material as does a ton of the crop harvested at the tasselling stage. The folly, therefore, of cutting the corn before the kernel glazes—a practice quite common a few years ago, and still prevalent in many parts—is evident. We may mention that an additional sign of the right time to cut is that the lower leaves on the stalk begin to turn yellow.

The next enquiry to be made is, has the corn deteriorated or lost in digestibility by being allowed to come to the glazing condition? This is an important question, for we are well aware that it is the digestible portion of a fodder only that is of service to the animal in keeping up the vital heat, in producing energy and in the formation of tissues. In answer to that, we may say that carefully conducted experiments go to show that there is no marked decrease in digestibility until the corn has passed the glazing period. No deterioration, therefore, in food value is to be feared by allowing the crop to come to this stage. To illustrate the large increase in digestible food constituents during the period referred to, we may insert the following table, the figures of which have been deduced from the analyses and weights of crop per acre obtained on the Experimental Farm, taking the usually accepted coefficient of digestibility:—

DIGESTIBLE MATTER IN CORN FODDER AT DIFFERENT STAGES OF GROWTH.

Stage of growth. (Average of five varieties	Per ton. Pounds	Per acre. Pounds.
Tasselling	186	4220
Silking	211	5069
Early Milk	256	5873
Late Milk	286	6012
Glazing	339	7308

These results, in a word, show that there is an increase of 153 pounds per ton—and, taking an average crop, of about 3,000 lbs. per acre—of digestible food constituents stored up within the five weeks that elapse between the tasselling and glazing periods.

(To be continued.)

Manures.

GREEN-MANURING.

Though we hold tenaciously to the proposition that, in a county like this, where cattle have to be kept "at rack and manger" for from 6 to 7 months out of the 12, it is the height of extravagance to plough in any crop that constitutes food for stock; still, as many people seem to take a deep interest in the plans for green-manuring, so earnestly advocated by the German scientists, we think it advisable to lay before our readers a concise account of the principles on which the theory is founded; premising that, as in the case of the use of bonedust, the practice of following clover, a leguminous plant, with a grain-crop was almost universal in England, at least a hundred years before it was discovered that its manurial efficiency is due to the power it possesses of accumulating nitrogen from the atmosphere by means of the bacteria of the nodules on its roots

Every one knows that the late lamented M. Pasteur discovered and demonstrated the incessant and enormous activity of bacteria, an activity that, previous to his work, was attributed to chemical action Incited to action by Pasteur's lectures, a German chemist, Herr Hellriegel, cultivated for some years various cereal and leguminous crops in sterilised soil, and added their necessary alimentation in the shape of nutritive solutions of phosphoric acid, potash, and nitrates. In the case of the cereals the resulting crop was distinctly in proportion to the quantity of ammonia placed at its disposition, and in no case did the cereals develope when supplied with nutritive solution in which nitrogen was absent. On the other hand, the leguminous plants differed extremely in their growth. In some pots the plants flourished, in others they barely existed, though the conditions were exactly similar. Upon examination, it was found that in the former case there were numerous nodules composed of microorganisms upon the roots, while in the case of the weakly plants the nodules were absent. In 1886, Hellriegel, after a long series of experiments, announced to the scientific world the fact of the fixation of nitrogen by the bacteria of the nodules on the roots of leguminous plants, and he held that this was the source whence these plants drew their supply of nitrogen.

It had been shown that plants of this kind could not exist in sterilised soil and absolutely cut off from nitrogen, and, from experiments made by Dr Noble, it was ascertained that the bacteria in the nodules of different species of leguminous plants differ essentially in their physiological properties, in that they form nodules easily on the roots of plants of the same species as those from which they originated, while they have not nearly so much influence upon allied species, and hardly any influence on the roots of leguminous plants of a widely-removed species

Further knowledge is required as to the degree in which the bacteria of species of leguminous plants, more or less closely allied, are active in respect of the different species of the same family, and it is especially important to have more precise information on this point, as a French chemist, M Grandeau, remarks that, henceforth, inoculation by means of soil containing bacteria should be adopted in the culture of leguminous plants; but this factor, in the opinion of Dr. Nobbe, does not yield in importance to the proper selection of mineral manures.

The quantity of nitrogen obtained from the atmosphere by a crop of leguminous plants, varies greatly with the species from 53 to 134 lbs. per acre. Now, a fair dressing of nitrate of soda, i. e., 200 lbs., only conveys to the soil, at most, 33 lbs. It is calculated, by the before mentioned M. Grandeau, that if the foliage of the plants is utilised for cattle, the stems and roots, remaining in the ground contain enough nitrogen to ensure a full yield of cereals, which is exactly what follows from a crop of wheat after clover mown twice, the usual practice in England, by which the best quality and largest yield per acre of that grain are obtained.

Inoculation of the soil with bacteria adapted to the different leguminous plants increases vastly the assimilating power of these plants: the process of inoculation is this: varying quantities of finely pulverised soil are taken from a field that has borne a crop of the same leguminous plants intended to be grown; i. e., when pease are the crop to be grown, the inoculating soil is to be taken from a pea-field, when clover, from a clover-field, etc.

For an instance of the effect of this procedure, we may cite the experiments of Prof. Freichwch with serradella, in which, of two plots sown with that plant, one was treated with a small quantity of earth impregnated with bacteria from previous cultures, and the other was not so treated. To make a long story short, the weight of the treated plot was thrice that of the untreated plot, and in the former case, the roots of the serradella were covered with the nodules mentioned above, while there were absolutely none in the latter.

We mentioned, the other day, that a preparation named "Nitragin," a term derived of course from nitrogen, had been brought out in Germany, by means of which this peculiar method of fixing the nitrogen of the atmosphere may be carried out still more economically. Nitragin is the pure culture of the nodular organisms found on the roots of leguminous plants.

The culture is placed in a bottle containing a nutrient solution, as agar gelatine, upon which it grows, and the bottle is hermetically sealed and kept from the light. Nitragin, can be obtained in this condensed bottled form, derived from the nodules of several species of clover, lupins, beans and peas, tares, lucerne, sainfoin, and other leguminous plants, and suitable for application in order to promote and stimulate the growth of crops of the same species as that from which it was evolved If this new and direct mode of inoculation should prove satisfactory, it will be a distinct advantage over the methods described above, as the application is simple and inexpensive, and the inoculation of each kind of leguminous plant with its own peculiar organism can be easily ensured.

At the farm of Herr Schultz, at Lupitz, Saxony, 600 acres in extent, the system appears to have been largely carried out and to have been highly beneficial.

At a conference held in Dresden in 1891, M. Schultz summed up the results of his experiments succinctly in the following terms:—"With a limited stock of fatting cattle without buying any nitrogenous manures, by adding potash, phosphoric acid, and lime, I have succeeded in fixing, at the expense of the atmosphere, a considerable quantity of nitrogen, by which I have been enabled to diminish by 50 per cent. the expense of the production of cereals grown at Lupitz, or, which comes to the same thing, to raise the average profit to 30s. per acre, notwithstanding the unfavourable state of the markets."

Details are given by M. Grandeau of M. Schultz's experiments with no less than thirty species of leguminous plants, with the object of discovering the most suitable for his purpose. Among these were "Lathyrus clymenum," pease, white, blue, and yellow lupins, mixed, in some cases, with other plants, as rape, mustard, and winter turnips. These being cut when in flower—the flowering period, or soon after, being the proper time for ploughing in the green manure—were severally analysed.

Taking together the leaves and roots of six different leguminous plants, the results of the analysis are given below:—

Name of Plant.	Dry Substance per Acre.	Fixed Nitrogen per Acre.	Equal to Nitrate of Soda (1) per Acre.
	Lbs	Lbs.	Lbs
Lathyrus clymenum	5,100	154	1,060
Pease	7,140	198	1 367
Mixed leguminous plants	5,998	165	1,028
Lupins, white.....	6,273	163	1,039
Lupins, blue.....	7,020	171	1,081
Lupins, yellow.	5,090	130	947

The Dairy.

LECTURE BY M. J. DE L. TACHE ON MOTTLED BUTTER.

Importance of the subject—Competition between experts and makers—Definition—Causes.—1. Want of uniformity in the cream.—2. Discolouration of the butter.—3. Imperfect mixture, and imperfectly dissolved salt.—Conditions under which these causes are produced.—Remedies.—A maker who studies his work - General way of proceeding.

Mr. President and Gentlemen,

At our Waterloo meeting, last year, there was a discussion about the "mottles" and "white spots" that are sometimes found in our creamery butter.

Our makers often discuss this fault among themselves; M. Chapais spoke of it in a late number of the "Journal d'Agriculture."

And I know a good many dealers who would by no means be sorry to get all the information possible about this defect, which compels them frequently to make "cuts" in the prices agreed upon.

So, I have undertaken the task of compiling the following considerations on the subject.

A very excellent dairy-paper, the "Chicago Produce," fairly put the point that we are engaged with by offering a prize for the best essay on "mottles and spots in butter.

Ninety-two replies were sent in, by experts of all kinds; by scientific, as well as by practical men. The entirety of these replies is of great value; hardly any of them are complete in themselves; but the ideas that are evolved in the combined contributions to the competition elucidate the question most satisfactorily.

I am obliged to our secretary, M. Castel, for having drawn my attention to this competition, and for having proposed it to me as the subject of this address. I wil only make an abstract of the replies sent in, arranging them as it seems to me they apply to the circumstances in which we are placed.

First, let us define the various forms under which the want of uniformity of colour in any box or tub of butter manifests itself in common practice.

The terms "mottles, streaks, rowiness" apply to those shades that are produced in "rows" more or less parallel to each other, or superincumbent, an order arising from the manner of arranging the butter in rolls or in sheets under the kneader or butter-worker.

The term "spots" applies to the spots that appear in no definite order in the mass of butter, in flakes or plates (plaques) larger than the white points (dappled butter); this defect is the least common.

The term "white points" applies to small white spots enclosed in the mass of butter and which are either bits of curd, generally very finely divided by the churning, or bits of dried cream that the churn has not broken up. Unlike the mottles and spots, these points can be recognised by the touch, since they are of a texture differing from the mass of the butter, being generally harder.

All the causes that produce these imperfections may be grouped in three divisions:

1. Want of uniformity in the cream.
2. Legitimate discolouration of the butter in the presence of air or water.
3. Imperfect mixture of, or imperfectly dissolved, salt in the butter.

I propose to go over each of these divisions, pointing out how the different defects are produced, and what are the remedies to be applied to their prevention.

1. WANT OF UNIFORMITY IN THE CREAM.—There are different modes in which this want of uniformity manifests itself.

1. The curtage of the cream may cause a partial churning of it, and the bits of butter thereby formed can never be mixed in again; for want of stirring, the bits will dry on to the sides of the vat; and even after stirring, the butter made, not being in the same condition as that made in the churn, will be neither of the same texture nor of the same colour.

2. If the cream is frothy or partly churned by the working in the separator, it also will dry on to the sides of the vat and the dried bits not mix in.

3. If the cream be skimmed off the milk too thin, the excess of milk in it will separate while standing, the milk will curdle, and the churning will produce an infinity of tiny bits of curd, which will be enclosed in the small lumps or grains of butter gathered in churning.

All these defects will produce more especially the small "white specks," and in some instances a few "spots."

(1) At present prices, a thousand pounds of nitrate of soda cannot be bought here for less than $25.00; in England, the cost would be $19.00.

As a remedy, we must: 1. Avoid the churning of the cream in transit by cooling it well and using proper vessels, with a second cover inside on the very surface of the cream, to prevent its being shaken about in the can.

2. Never skim the cream too thin; 12 or 14 p. c. in summer to from 14 to 17 p. c. in autumn, is about the right proportion. In other words, the cream should be of such thickness that from 3 to 3¼ pounds of it would give a pound of butter.

3. The frequent stirring of the cream in the vat, especially when it is first thin, is advised, and should be done until every irregularity on the surface is well mixed with the rest.

4. Strain the cream when skimming, or when pouring it into the vat, and also when pouring it into the churn.

Before passing on to the defects of the second division, it may be observed that these small white specks are almost invariably the result of culpable negligence, since their occurrence may be obviated by stirring and straining the cream.

2.—DISCOLOURATION OF THE BUTTER.—The self-discolouration of the butter in the sense I attach to it may be caused:

1. By being left too long in the washing water.

2. By allowing the water to run too long on the same point in the mass of butter, as happens when the water is let fall from a pipe or tap fixed directly in the churn.

3. By exposing the butter too long in the air.

4. By letting the butter stay too long in the butter-milk, or, when churning at too high temperatures, by the presence of too much butter-milk which the maker, on account of the difficulty of working butter in too warm a state, will perhaps not take pains to expel.

In the first of these cases, the surface of the butter becomes white, and if the working is not carefully done, the mottles or the white spots will appear.

The remedy is to avoid leaving the butter too long in the water, and the more should this be avoided, since by that practice the aroma of the butter is greatly injured.

Next, the washing must be so managed that the water may reach the butter in the churn from below: then, the butter will float as the water rises, and every additional suply of water will fall, not on butter, but on water.

As to exposure to the air, it is only necessary when the butter is worked at twice: but I hold now that this intermission is not essential, if the precautions be taken that will presently be explained.

If the working of the butter cannot be finished at once, nothing is easier than to throw over it a cloth soaked in brine to keep the air out and thereby prevent the loss of colour.

To expel the excess of butter-milk, the whole mass of butter must be cooled to 55o before working it, and this operation must be done with the greatest care.

3.—NOT THOROUGHLY MIXING, AND IMPERFECT DISSOLVING OF THE SALT.—To this I would draw the attention of all makers. Nine times out of ten, "the salt will be found to be the cause of mottled butter." It is therefore very necessary to examine this point thoroughly.

The working of butter is for the purpose of expelling the butter-milk and not only the water, but also for the mixing in of the salt.

Several conjoined conditions are needed to ensure that the same amount of working fulfil this two fold object, so as to escape all danger of the salt destroying the uniformity of the shade of colour natural to well made butter.

1. "Good salt" is necessary, fine, or, if in lumps, well sifted. Our salt is usually good; use, preferentially, salt in barrels lined with paper and keep it in a dry place. Never use coarse salt..

2. Both the butter an the room in which the working is done must be kept at a proper temperature. As regards the "mottles," cold is more to be feared than heat. The colder the air the less easily will the salt dissolve.

Experts agree in saying that butter is, in summer, best manipulated when the temperature of the room is about 55o: but in winter and in the cooler part of autumn, it should approach 70o, as will be shown further on. The whole mass of butter should be of the same temperature. It often happens that the washing water cools the butter unequally (i. e., more in one part than in another): or, again, that in a cold room the surface of the butter is too much cooled.

3. Lastly, there must be in the butter a "*proper quantity of water with the* salt." Here, once more, the less water the less quickly does the salt dissolve. You will generally find mottled butter dry, and the more so, since we rarely find over-moist butter with mottles. In sharp weather, milk is frozen or at least very cold; the fat is more solid, the butter more grained, the churning and washing turn out a drier butter, and these things unite with the usual low temperature to hinder the dissolving of the salt.

But, you will ask, with all that, how do the mottles form themselves? Here, gentlemen, I cannot resist the pleasure *of quoting to you a passage from one* of the letters in the "Chicago Produce," written by a Mr. Nussbaumer, of Texas, who sets before us a good instance of the way in which a maker should examine the pros and cons of his work, when he finds himself in a quandary.

"One fine day, three years ago, I found myself in trouble with a lot of mottled butter, that lost me 2 to 3 cents a pound.....

"The first question that I put to myself was this: What are these mottles? Two shades of colour—that is evident. —The greater part of the butter was of the required colour-shade, but the veins or mottles were paler. On comparing them with "unsalted" butter, I found that they and it had exactly the same tint, both being pale.—What then can cause this deepening of the colour? In the churn I found no difference at all in the tints of the mass.—I put aside one or two tubs of finished unsalted butter, and in them there were no mottles: packed in tubs "but salted," turned andpacked in tubs "but salted," turned out to be mottled: this fact led me to the solution at once: "Uneven brining" in the mass of the butter.... How this inequality of brinning came about, I discovered by the sequel.....

"One day, in the fall, on the eve of cold weather, I saw my maker at work: I remained till his work was done, and examined the butter the next day: colour fine and uniform. I had remarked some difference between the method of working at that time and the usual method previously pursued: to this when his attention was called, he admitted that, instead of dividing his work, and leaving the butter at rest for an hour, as he used to do, he had worked during the past summer and autumn without any resting time,—saying that, as there were no mottles, and as it was a saving of time, he saw no harm in the change.—The next day, the same method was practised, and the mottles reappeared! This settled the point. I ordered the working to be done at twice, with an hour's intermission, and the mottles vanished.

(To be continued)

HISTORY OF CHEDDAR CHEESE.

Archdeacon Denison- Old Cheddar—Dunlop dairy-men.

How, why, or when this particular make of cheese came to be called "Cheddar" cheese is not clearly definable. In an old Britannica published more than 300 years ago, we find something like the following:—"Just under the Mendip Hills lies Cheddar, famous for the excellent and prodigious great cheeses made there, some of which require more than one man's strength to set them on the table. Above this place is a gap, as it were, cut into the hill, which affords a narrow passage for travellers between, and has stupendous high rocks on both sides famous in this country under the name of "Cheddar Cliffs." We find Cheddar cheese spoken of in the annals of the mouks of Glastonbury, but, as the low lying lands of the vale would be a swampy morass at that time, it is likely that Cheddar represented the depot of collection, rather than the place of actual production, and particularly as we find the term "Somerset cheese" more generally used in the agricultural publications of the last century.

That rare old churchman, the late Archdeacon Denison, would have very well liked to have established "Cheddar cheese" as a specialty singular to the Brent pastures, and even only to some of them.

It was one day in 1884, while having a crust of bread and a bit of what he said was the only genuine Cheddar, that the loyal old gentleman mentioned how he was aroused into that fit of indignation, which caused him to write to the "Times" on the Cheddar cheese question, by seeing a lot of rotten American stuff that was branded "Fine Cheddar," being unloaded at the wharf docks. It was suggested to him, that circumstances had shown that the production of the variety of cheese known as "Cheddar" was more a question of manipulation in manufacture, than of locality, but the venerable Churchman came down with such an onslaught upon the scepticism of the age, that the suggestor had a guilty consciousness of not having proved equal to maintaining his faith. It was on this occasion that was shown that "oldest piece of Cheddar cheese in the world" which was kept under a glass shade on the Archdeacon's hall table. This is supposed to have been made in 1845, and the reverend gentleman was very proud of the trophy, believing it to bear unimpeachable testimony to the sound properties of the true Cheddar! The Archdeacon was a good deal disgusted at that time, because he had offered the relic for exhibition at the county show, and the authorities had failed to appreciate it. It was on that account that the guardianship of that product of ancient days eventually devolved on a friend of the writer's, who hears that the piece has unfortunately been greatly reduced by mites, of late years; another piece of cheese ten or twelve years old, having been placed under the glass with this "Methuselah," and the mischief not perceived. *It may yet see another* generation or so for a' that.

It was not till after the making (1845) and partial consumption of the above mentioned cheese, that the chief of those mighty social changes, which made the name of Cheddar famous throughout the world, took place. In 1845 railways and steamships were certainly known, but only slightly developed; that enormous traffic round the world, and centralization of mankind in cities, making Cheddar cheese a necessity, and an universal household word, were yet barely anticipated.

The Scotch dairy-farmers presently realized that an increasing demand for cheese was setting in and also that their local manufacture, "The Dunlop," was not well adopted to the requirements of travel, or town storage. So, somewhere about 1854, the Ayrshire Agricultural Society sent a deputation of enquiry into the cheese-making districts of England. These gentlemen presently found themselves in Somersetshire, and were directed to Mrs. Harding and her nephew, the latter was then farming at Compton Dundon, as people likely to give them useful information, they having gained considerable distinction in cheese-making. The deputation found in Mr. Harding an exceptionally shrewed and intelligent man. In fact the visitors said that he was the only cheese-maker they had met in England who was competent to give a completely satisfactory reason for his particular "*modus operandi.*"

On their return to Scotland, the deputation reported officially somewhat as follows:—"We were fortunate in meeting with people who make first rate cheese, and were ready to give clear explanations of the various processes, and excellent reasons for what they were doing. There is an appearance of ease and simplicity about the method of making Cheddar cheese, as we saw it practised in Somersetshire. In the dairy of Mr. Harding a regular system is followed, and these undeviating guides, the thermometer and clock, are frequently referred to in the different stages of the process. The more that a regular system is introduced into the manufacture of cheese, the greater is the probability of obtaining uniform results. The points of excellence aimed at in this dairy, are the manufacture of the best quality of cheese in the most cleanly manner, and with the smallest amount of labour."

In consequence of this satisfactory report, it was decided to invite Mr Harding *to Scotland, to give a course of in*struction. This call being accepted by the Somerset farmer, was the first stage in the extension of the Somersetshire system of cheese-making which now forms such a prominent feature not only in Scotland but also in Canada, Australia and New-Zealand. With all due respect to the prejudices of the late Archdeacon at Brent, it was speedily proved that it was the system of manufacture, and not the locality, which determined the character of the cheese. Of course locality has influence but is not the governing power.

As soon as the Scottish dairymen *found the new introduction so extre*mely well adapted to their circumstances, of trade, land, breed of cows etc., they applied themselves to the cultivation of the dairying business, with the

energy common to that northern nationality when in pursuit of the bawbees, and thus so speedily developed the industry as to feel themselves competent to challenge the southern progenitor to a contest for £1000 ($5000). Nothing came of this bet of braggadocio, but the northern "debutants" were pleased to flatter themselves, by fancying they had humiliated the mother-shire. The truth was that no one was interested in making such a bet in Somersetshire. Dairying and cheese-making were here a well-proven ancient industry, not requiring the stimulus of a bet or any other special excitement, or, anyway, the people were not generally conscious of any such need. The aspect in Scotland was very different. They there had entered on a new arena. The dairy farming which had formerly occupied but a limited district in Ayrshire, was now rapidly over-running the whole of Galloway, (1) and occupying attention in several other counties: there was considerable general excitement in the yet young, but enormously increasing industry: and these northern counties were fairly out for blood. They had not succeeded in getting so satisfactory a hold on the London and other English markets, as they had aspired to, and, being somewhat riled in consequence, would have been pleased to snub poor innocent Somerset: anyway the shot would have been worth the powder for the free advertisement. It is not unlikely they would have won, could the contest have been based on their own regulations, for they had many well equipped dairies: but such victory would not have proved Scotch supremacy, nor established equality in the English market.

But at this time, there had grown up an enormous tail, or residuum of inferiority, in the Scottish cheese-making, which was for a time saleable at such prices as did not prohibit its manufacture, but as the American factory system was developed, the sale for this Scotch rubbish was blocked, and the whole position was so precarious as to demand immediate reconsideration. Certainly there is a good deal of "tail" in Somerset, but never to the extent, as was the case in the teens of years ago in Scotland.

It was when things had reached this crisis or deadlock, that Somerset's quondam pupils entered about 1884 on that new educational scheme, which has culminated in one of Glasgow's largest cheese merchants asserting that "last year's make of home-cheese displayed a larger proportion of secondary cheese than had ever been seen before in any one season". This is a startling assertion to have to hear, after the expenditure of vast sums in teaching something that was supposedly putting Somersetshire, the home of the Cheddar, to shame.

W. R. GILBERT.

COLD STORAGE ON STEAMSHIPS.

(Continued.)

We come now to the cold storage on the ocean steamships, perhaps the most important link in the chain. Arrangements have been made for accommodation on seventeen steamships leaving Montreal this summer, all thoroughly fitted with mechanical refrigerating plant and insulated compartments. The agreement provides that the steamship companies shall charge for the cold storage service not more than ten shillings per ton extra, equal to rather less than 10 cents per 100 pounds. This is a low figure compared to the prices charged at the Atlantic ports of the United States, and these favorable terms have been secured by the Government by paying a considerable part of the initial cost of fitting the steamers with cold storage. The freight charged for all cold storage chambers is based upon the current rate for butter and cheese. Other products are carried in the cold storage chambers at a rate of freight based upon what the space they occupy would have earned at the freight rate on butter and cheese.

The service arranged for is as follows:

1. A weekly service from Montreal to London jointly by the Allan and Thomson lines of steamers. The agents in Montreal are: For the Allan line, Messrs. H. & A. Allan, for the Thomson line Messrs. Robert Reford & Co.

2. A weekly service from Montreal to Avonmouth for Bristol by the new Dominion line. The agents in Montreal are Messrs. Elder, Dempster & Co.

3. A nearly weekly service jointly by the Allan and Dominion lines from Montreal to Liverpool. The agents in Montreal for the Dominion line are Messrs. D. Torrance and Co.

4. A nearly fortnight service from Montreal to Glasgow jointly by the Allan and Donaldson lines. The agents in Montreal for the Donaldson line, are Messrs. R. Reford and Co.

Intending shippers may learn the names of the steamships, the exact dates of sailings and other particulars on enquiry from the agents of the several lines. Negotiations are in progress to provide a fortnightly service from St. John and Halifax to London, and a monthly service from Prince Edward Island to some port in Great Britain. If required by the Government, steamers from Montreal with cold storage accommodation are to call at Quebec to take on board not less than 500 packages of butter.

THE SYSTEM IN USE.

The system of refrigeration employed on the steamships is that known as the Linde system, so called after the originator, Professor Linde, who, when a member of the staff of Munich University, introduced it in Germany, in 1875. The system, which is exceedingly simple, is based on the evaporation at a low temperature of liquid anhydrous ammonia—that is, ammonia gas in liquid state, but containing no water—the heat necessary for this evaporation being abstracted from surrounding bodies, which are thus reduced in temperature or refrigerated. The ammonia vapor having served this purpose, is then, by means of compression and cooling, again brought into the liquid state, and the liquified ammonia thus recovered is again evaporated, so that the small quantity of ammonia forming the charge of the machine is continually subjected to the same round of operations. The apparatus used in the Linde process consists mainly of three parts—the refrigerator, the compression pump and the condenser. The refrigerator or evaporator is the apparatus in which the cooling process is performed, that is to say in which the liquid ammonia evaporates, and in so doing abstracts the heat from the surrounding bodies. It consists of a series of wrought iron coils tested to a pressure of 2000 lbs. per square inch. The compression pump continually draws in from the refrigerator the vapor which has been generated by the vaporization of the ammonia, and compresses it into the condenser, where by the constant circulation of cold water, the heat which has been abstracted by the ammonia in the refrigerator is absorbed, and the ammonia vapor is condensed. The condenser is constructed generally on the same lines as the refrigerator, and the two are connected by a pipe through which the liquid ammonia passes from the former to the latter, the quantity passing being controlled by a regulating valve.

The cold generated by the refrigerating machinery is transmitted to the chambers requiring to be cooled by means of a solution of brine circulating in coils of pipes. The refrigerator is enclosed in a tank containing brine, which remains liquid at a very low temperature. From this tank coils of pipes are led to the cold storage room, where they extend over head and along the sides. The brine is pumped continuously through these pipes, and returns to the tank after having abstracted heat from the cold storage room and also a large degree of moisture which may be present in them, the moisture being condensed on the exterior of the pipes either in the form of condensed water or hoar frost. The air in the chamber is thus perfectly dry—a most important point in the preservation of food products—and the machines work uninterruptedly night and day, thus preserving a steady temperature for any desired length of time.

THE MATTER OF TEMPERATURES.

The steamships are all fitted with duplex machines, working independently of each other, and each of sufficient power to provide the necessary refrigeration, so that, even if one breaks down there is no danger of rise in temperature in the cold storage chamber. The perfection of the system can be appreciated when it is stated that by running the machines to their fullest capacity a temperature of zero or even lower can be secured. This, of course, is never done in a refrigerator chamber, for the object is rather to chill its contents than to freeze them. The average temperature at which butter is kept during the voyage is twenty degrees. Cheese is kept at 38 to 40 degrees, and fruit the same, while eggs and meats are kept just at freezing point, 32 degrees. The cold storage space, which varies from 10,000 to 25,000 cubic feet according to the steamer; is divided up by means of movable partitions into several compartments for various classes of products and the temperature in each compartment is regulated to suit the kind of goods stored in it. By means of an ingenious arrangement of thermometers, the engineer in attendance can see at a glance without leaving the engine room what the temperature is at any part of the chamber, so that in case of anything going wrong he can at once detect it. As a further precaution against accidents a number of test tubes are provided, by means of which the temperature can be taken independently. These tubes extend from the deck down to the cold storage room, and a thermometer suspended in each enables an attendant on deck to ascertain if the temperature is all right. An examination is made every four hours to insure that the temperature never rises above the proper point, thereby endangering the cargo.

The Dominion Government has taken no action towards providing cold storage in Great Britain, but suitable accommodation can be obtained there at reasonable rates. At Avonmouth, for Inmouth, for instance, to which port the Elder Dempster steamers run, there is a cold storage warehouse at the edge of the wharf, with a covered railway track on the other side. The steamer will discharge her cargo into the warehouse, and when the goods are wanted they will be transferred into a refrigerator railway car and run through to the London market, or whether else they may be disposed of. There is at present no regular system of cold storage cars in England as in Canada, but individual enterprise makes up for this to a large extent.

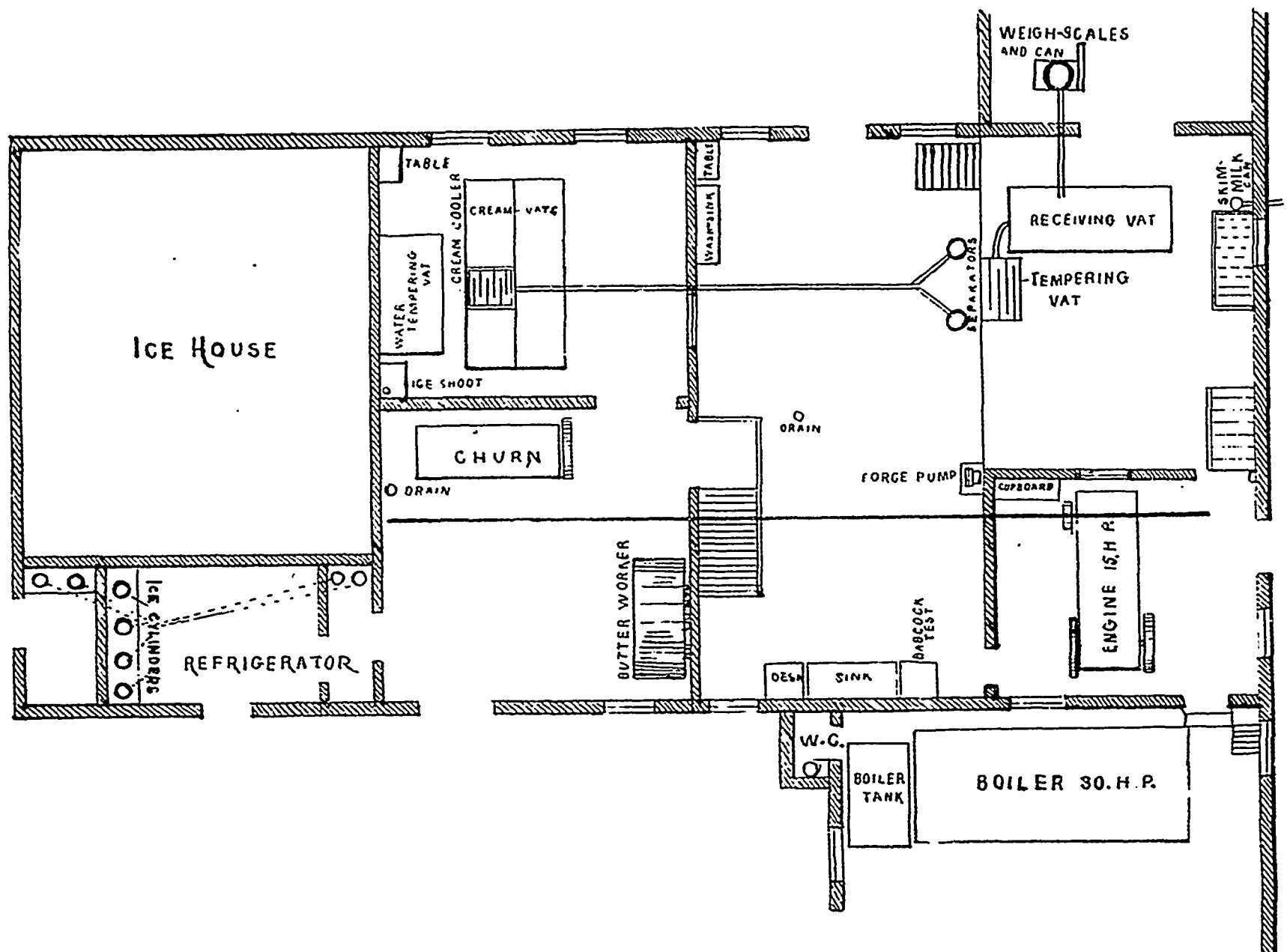
OTHER PRODUCTS TO BE CARRIED.

Provision has been made in the cold storage arrangements for other products besides butter. Accommodation is provided for cheese, eggs, poultry, dressed meats, and fruit. The demand in Great Britain has been growing for years for a soft cheese, a cheese that is rich in body, apart from having a large percentage of butter fat in it. It was quite impracticable to send such cheese to England and have it arrive in good condition by the old carrying methods, but with the aid of cold storage this is quite possible. Soft cheese will fetch a relatively higher price in England and will also cause a larger consumptive demand.

With regard to eggs it is expected that an immense business will be done in this product. The Minister of Agriculture and Professor Robertson, Dairy and Agricultural Commissioner, were present at a conference of egg men in Western Ontario last winter, when they were informed that it was expected that in July, 35 car loads of eggs would be going forward requiring cold storage on steamships, 50 car loads in August, and 60 car loads in September. It was assumed that probably one quarter more would be sent by other shippers from Western Ontario, who were not represented at the meeting. Since then by reason of the prospect of an almost prohibitive tariff in the United States, a very much larger proportion of eggs from Canada must necessarily find another outlet, so that the shipment of eggs to Great Britain will be very largely increased. The shippers desire that a standard of weight for a dozen of eggs be established at 1½ lbs. per dozen. Large eggs, they say, will keep longer as a rule than small eggs, because the albumen or white is thicker in the former than in the latter. The thinner the albumen the more quickly the yolk rises to the top, giving the egg a stale and undesirable appearance. In shipping eggs to Great Britain, they should as a rule be packed in 30-dozen cases, which can be bought, complete with paste board frames, for about 22 cents each. About fourteen or fifteen of these cases can be carried in what is called a ship's ton of 40 cubic feet.

With a view to improving the egg export trade, Professor Robertson makes several important recommendations. One is that the eggs should be frequently and regularly collected from the farmers, brought together and kept in a place were there will be no chance of spoiling. Another point is that all the eggs should be clean in appearance. Clean eggs bring from one cent to three cents a dozen more in England than eggs that are daubed and soiled, and three cents a dozen, when the farmer gets only nine cents a dozen, means 33 1-3 per cent. Another point, and a most important one, is that every producer of eggs should leave out all the doubtful and small ones from those he sells for export. In the matter of pickling

(1) Galloway is a district, including the two counties of Wigton and Kirkcudbright.—Ed.



eggs it is desirable that they should be pickled in cold storage rooms where the pickle itself will be cold. Picklings protects the eggs against bacteria and other active agents that cause decay by acting through the pores of the eggs. Eggs, especially when not in pickle, should not be stored near any odorous commodity, as they absorb odors with almost as great a facility as butter.

HINTS ABOUT POULTRY.

With regard to poultry, it is recommended by dealers in Great Britain that the killing should be done by cutting in the roof of the mouth, while the fowl is suspended by the legs, making it impossible for any mutilation to be seen on the outside, or for feathers to be soiled by blood. This is said to be a painless method of killing, and it bleeds the fowl completely if the cuttings are made lengthwise and across, and deep. In every case the bird should be fasted for twenty-four hours or longer before killing. Cases have occured where poultry have arrived in England in a badly damaged condition, caused by the fermentation of food in the crops and intestines, spoiling the whole of the birds and making them unfit for human food. The English buyers prefer to receive the poultry in the feathers, and not drawn, and special care should be taken to keep the feathers clean. A bulletin on the producing, dressing, packing and shipping of poultry is being prepared by the Department of Agriculture and will shortly be issued to those interested.

(To be continued)

COMPTON MODEL CREAMERY

Not many farmers are so fortunate as those of Compton and vicinity, in whose pretty little village the Provincial Government have just completed a fine new Model Creamery.

Contrary to the usual practice, outside appearances have not been sacrificed for mistaken economy's sake, and the building standing back from the road fully eighty yards, in the shade of the maples, presents an imposing and pleasing object-lesson to the passers-by

The plan of the building, the business floor of which I present herewith, was prepared by Mons. Henri, the Government architect, and Mr. Parry, the butter-maker, and combines all the many little items which tend to facilitate operations and perfect the product.

At the present time, there are scores of creameries and cheese-factories constructed in such a manner that a really first class article cannot possibly be manufactured in them. Rarely is it necessary to look far for the cause, it may be bad drainage, or imperfect ventilation, the walls may be so constructed that they are but little protection against heat in summer and cold in winter, the engine-or boiler-room being situated too near the churning-and cream-rooms is frequently a cause of trouble, whilst very often the building is located in a continually obnoxious and impure atmosphere.

All these ,and many other items of equal importance, have been taken into consideration and carefully guarded against, as will be seen by a close study of the plan and the following specifications:

Dimensions 71 x 32 ft. with boiler-room attached 18 x 25 ft.

Foundations. Trenches excavated 2' 8" deep and 3 ft. in spongey places and 2 ft. wide, filled to the surface with dry stone, and on this, a good substantial mortar and stone wall 22 in. thick. Sills 8 x 8 in.; flooring joist for bottom floor 2½ x 8 in., for second floor 2 x 8 in. Wall studding for principle building, 2 x 6 in., 16 in. apart, rafters, 2 x 6 in. on second story 2 x 7 in., all flooring joists laid from 2 ft. centres, for boiler-room, ice-house and refrigerators wall studding, 2 x 4 in. placed 2 ft. apart. Partitions on first floor, 2 x 4 in. studding, second floor 2 x 3 in. set 16 in. apart.

Balloon-frame construction. Height of first story as shown on plan, height of second story 9 ft. Outside or exterior finish one layer of 1 in. boards well nailed and one layer of builder's felt; and then rustic siding, not over 4 in. wide.

Cornice is composed of five member plancier frieze facier and crown and bed mouldings.

Windows are four lighted, 15 x 30 in. glass, lift sash.

Interior finish. Walls are sheathed with one inch boards and one layer of builder's felt and then a layer of narrow tongued and grooved spruce, ceilings same. Partitions same as outside walls on first floor on either side.

On second floor, outside walls are sheathed with 1 in. boards, furrowed with laths 16 in. apart, ceiling furrowed with 1 x 2 in., 16 in. apart, partitions studding 16 in. apart, lathed and two coats plaster, and the passage is wainscoted 3 ft. high in spruce.

Floors.—Engine room floor of 2 in. plank; receiving platform, 1½ in. tongued and grooved narrow spruce well nailed, with two coats of oil applied hot, in separating-room floors are of 2 in. spruce finished same as receiving platform, floor of cream-room is of one inch inch narrow, tongued and grooved, with two coats of oil, churn-room floor is of spruce same as separating-room, the refrigerator-or cold-storage-rooms and ice-house have cement floors and the boiler-room floor is of earth.

Floors on second story are double of 1 in. spruce, kiln dried, and finished tongued and grooved.

A matched floor has been laid in the attic.

The stairs leading up from outside to butter-maker's quarters are enclosed.

The building outside has two coats of paint in two colors, matching the farm buildings and house.

All the inside wood-work of the creamery has one coat of oil and two coats of orange shelac.

The ice-house and cold-storage-rooms are finished on the inside as follows:—one layer of inch boards, one layer of building felt, and then strips, 2 x 2 in. are nailed on face of each stud and again one layer of boards, one of felt and one of tongued and grooved narrow spruce, the vacuum being filled 8 in. high with coal ashes. A double floor is laid over the cold-storage-rooms and filled with sawdust between ceiling and floor above. The under side of rafters of ice-house are lined and filled with sawdust before roof boards were layed.

The roofs are boarded with one inch boards well nailed to every rafter, and shingled with X X cedar shingles layed 5 in. to the weather and the hips of the roof are covered with galvanized iron cut to every course.

The general plan of all the rooms is on the gravitation system, being so arranged that the cream can be conveyed from the separator to the cream-vats and from thence to the churn without any manual assistance.

The boiler which is 30 horse power and the engine 15 horse power were both manufactured by Jenckes, Sons & Co. of Sherbrooke, whilst all the creamery apparatus was manufactured by Nelson Buzzell Bros., Cowansville, P. Q., especially for the Model Creamery.

The building was erected by D Saultry, contractor and builder, Compton, P. Q., and shows fine workmanship.

The milk is raised to the weigh-can a distance of twelve feet, by means of a power-hoist and an immense amount of labour is saved by this device. From the weigh-can the milk runs into a large round-bottomed receiving-vat, then through the tempering-vat into two No. 1 "Alpha" De Laval turbine separators ("steamflyer" style). These machines are set on a solid foundation of stone and mortar, built up to a few inches of the floor, at which point a frame of 6 x 6 in. timber is let into the stone foundation, and filled in level with cement. Through this wooden frame are placed the lag screws which hold the separators in position. The skim-milk runs into a small can from whence it is pumped upstairs into the vats by the improved power rotary force pump.

The cream falls into a shallow spout which slants sufficiently to convey it through a small aperture 2 x 4 in. in the wall into the cream-vats, or rather first into a cream-cooler and from thence into the vats. The floor of the cream-room is sufficiently elevated above that in the churn-room to allow the cream to run by gravity into the churn.

The skim-milk and butter-milk tanks on the second storey, are arranged so that the operator at the weigh-can, simply by pulling a rope, can deal out to the patrons either skim-or butter-milk without moving off the platform. The spout conducting the milk to the patrons' cans is so made that it is impossible for much or any milk milk to be spilt.

One force pump is used for both butter-milk and skim-milk, but separate vats are provided. The tester, a 24 bottle machine, is set in the separating-room, with all appliances handy.

From the separating-room, steps run down into the churn-room; in this room, besides the Key City Churn is the National butter worker, and also here steps run up the side of the wall leading to the ice smashing room (over the refrigerators) from which access is gained to the ice house.

The cream-room opens out of the churn-room, and is so constructed that it is perfectly heat-proof and is situated so that it is practically isolated from all atmospheric impurities which might arise from oil, machinery, or any other cause throughout the rest of the building. A covered slide conveys the ice from the ice-house on to the cream-room floor. In this room is also the cooler over which the cream passes on its way from the separators to the vats; the water tempering-vat too, for use in washing the butter in the churn; and last but not least a ferment-can which will be used in preparing a starter from the milk of healthy new milch-cows. In looking over the plans it will be seen that the engine-room is situated where its extra heat will least affect the rest of the building; and that the churn-room is where it will feel the influence of internal or external heat least.

The drainage and ventilation are perfect. The refrigerators, which have been in use for over a fortnight now, give good satisfaction, a temperature of 40o. has been maintained continuously and still lower is expected.

H. WESTON PARRY.

July, 16th 1897.

Model Farm.

Compton, P. Q.

CONSUMPTION OF CHEESE IN GERMANY.

An American Consul in Germany reports that the consumption of Cheddar cheese, in that country, is very great. He advises the Americains to export cheese to that country, and proposes that several cheese-makers should send an agent thither to attend to the sale of their goods. The duty on cheese is 7 1-5 cents a pound.

Canadians, too, might take advantage of this opportunity.—Do.

COMPETITION OF DAIRY PRODUCTS.

The second competition of dairy-products took place on the 31st of July.

The cheese was examined at St-Hyacinthe, at the Dairy-school, and the butter, at the Cold-Storage," Quebec.

MM. J. A. Vaillancourt, Montreal, and Elie Bourbeau, Inspector-General of Syndicated factories of the Province, judged the cheese, and Messrs. McLagan and Scott, of Montreal, the butter.

The following exhibitors won a prize or a mention.

FOR CHEESE:

Mr. James Dowd, South-Durham (Drummond), a bronze medal, with 96 points;

Mr. Martin Connell, Dewittville, (Huntingdon), an award of ten dollars, with 95½ points;

Mr. Joseph Ross, Ste-Angèle, (Rimouski), an award of eight dollars, with 95 points;

Mr. Ephrem Tardif, St-Joseph (Beauce), an award of eight dollars, with 95 points;

Mr. Arthur Marmett (?), St Anaclet (Rimouski), an award of six dollars, with 94 points;

Mr. James Howke, North-Stanbridge, an award of four dollars, with 93½ points;

Mr. Arthur Crittenden, West-Brome, an award of two dollars, with 93 points;

Mr. Thomas A. Stevenson, Wakefield, (Ottawa), and Edwin C. Wells, Lodd's Mills, (Stanstead), honorable mention each, with 91 points.

FOR BUTTER:

Mr Auguste Gagnon, St-Honoré de Stanley (Beauce), a bronze medal, with 96 points;

Mr. Isaïe Renaud, St-Arsène (Temiscouata), an award of ten dollars, with 95½ points;

Mr. Auguste Breton, St-Epiphane (Temiscouata), an award of eight dollars, with 93½ points;

Mr. J. B. Paquet, St-Gervais (Bellechasse), an award of six dollars, with 91½ points;

Mr. Joseph Poupart, St-Isidore (Laprairie), an award of four dollars, with 91 points;

Mr. Etienne Côté, Rimouski, an award of two dollars, with 90½ points;

The improvement of the general appearance of the exhibits was noteworthy; their average quality, too, is better. The following are the principal defects worth noticing:

1. As to butter: too salt, and the flavour too strong. Export-butter should not have more than 2½ to 3 per cent. of salt. For the English market, the colour should be pale straw-colour. (1) The butter-milk must be thoroughly got out, and the parchment-paper should not be too light.

2. As to cheese: the makers must do their best to put the bands on properly. they must not overlap more than an inch above and below the cheese. The caps must be put on with very hot pure water. The chief fault in the making is to use too forward milk, or to let it ripen too much before renneting which procedure prevents the curd from hardening sufficiently in the whey.

Another fault is allowing the ends of the lumps (blocs) to get cool when they are heaped: this injures the body of the cheese. And, both as to butter and cheese, great stress must be again laid on the necessity of looking after the quality of the milk and the cleanliness of factories, as well as of the implements used in the manufacture.

Makers should invariably insist on the careful aeration of the milk by the patrons, for it is certain that this operations dispels an enormous amount of bad smells that would, if left alone, be injurious to the quality of the products.

We must, lastly, draw attention to the fact that, in some factories, the water is not too pure, and the chemical analysis of the products proves that the greatest care must be taken to use no water that is not of the purest kind. Impure water introduces into butter and cheese injurious germs that are capable of developing in them both bad aroma and bad flavour.

BUTTER FOR ENGLAND.

Butter is low in the United States: the production more than can be consumed at home: we wish to sell some of it to England, for she buys a great deal of her butter. We have been sending butter there for many years past, but they don't pay as much for it, not near as much as they pay for Danish, Swedish, French or Irish butter. What's the matter? Is this all a notion, or prejudice, or spite? Some would fain believe that; for the idea that we cannot make as good butter as the people of those countries, is absurd; they say "it's ridiculous."

But the truth is, the Englishman does not like our butter, no matter how well it suits us. If we wish to sell him our butter at a decent price, we must find out how he wants it, then make it accordingly. Secretary of Agriculture, Wilson, is directing a good deal of energy toward finding out what the English market demands. Two shipments of butter have been made, the quality of which is considered good in this country; but our agent over there finds that the package does not suit, that it is salted too much, colored too much, has too much water in it, and the flavor is not satisfactory.

When we do find out just what is wanted, we believe it will be easy for our creamerymen to make the butter accordingly, and sell it as high as Danish, or, at least, as high as Australian butter, that has to cross the equator.

If we fail to get as good a price in the English market as the butter of other countries brings, it will be because of our idiotic stubbornness in sending them butter such as they do not like, just because we like it ourselves, and insisting, for that reason, that it is good. (1)

"Hoard."

(1.) In London, we ask for straw-coloured kid-gloves, in Paris, for gloves "couleur de beurre frais, i. e., colour of fresh-butter.—Ed.

MOTTLES IN BUTTER.

What causes mottles in butter, has long been a problem with many experienced butter makers, and, despite the many discussions of the subject, at dairy conventions, dairy experts are still divided in opinion. But Mr. E. C. Bennett, of Tripoli, Iowa, has contributed to the press a very strong article, as to what he deems the cause, and it is the most plausible view of the question that we have seen. The article is as follows:

VARIOUS REASONS FOR MOTTLES.

Everything, unless it be the tariff, has been held accountable for mottles, and everyone has stated that mottles are unnecessary. The last is, of course, true, for many a butter-maker is making butter free from them.

We are told that improper souring of the cream, that letting some of the cream get dry, that failing to stir the cream, that mixing cream of one temperature with cream of another temperature, that uneven distribution of the salt, that insufficient working—any, or all of these, will cause mottled butter.

The writer is ready at any time to take cream that has been stirred, or that has never been stirred, and make of it mottled or unmottled butter, as per order. He is ready to make mixed cream of two different temperatures, or of a dozen, and make of it mottled or unmottled butter, as requested.

He is ready to take cream which has been air dried in spots, and make of it mottled or unmottled butter. He is ready to take cream soured in any way, or not soured at all, or part sour and part sweet, and make mottled or unmottled butter at pleasure. He is ready to do this, for there is no great trick or se-

(1). Very sensible remarks, indeed.—Ed.

cret—hundreds of butter-makers will undertake the same thing and will succeed.

WHAT DOES CAUSE MOTTLES?

But when the butter is in the granular stage, and plenty of cold water is used to wash it, so that the surfaces of the granules are chilled and hardened, and the interior remains softer, then, when salted, the salt will not strike in uniformly, and the color of the different parts of the granule will vary. If worked in this condition, the chilled butter will not combine readily, but will partially retain its coherence, and the result will be mottles, and lots of them.

Or, if the granules are of the same temperature throughout, but are very firm and hard, the butter of each granule coheres more than it adheres. That is, the granules do not stick to each other with the same force that the butter particles of the granules stick to each other.

MOTTLES OR WAVES.

The working flattens out the granules, but does not make them one homogeneous mass, and the outside of the granules are saltier than the inside, and, therefore, deeper in color, and when cut through, the butter will look marbled, or mottled, or wavy, according to the degree of working. For, if the working be continued until the obstinacy of the too firm butter gives way, and it is capable of being massed and thoroughly mixed and all made uniform, the cooler part cooling the other, and the warmer part warming the cool part (should the temperature vary), then there will be no mottles.

Using too cold wash-water is fruitful of mottles, for it hardens the surface of the granules, and any particle which fails to get the salt evenly distributed through the mass of butter, and all made uniform in salt content, and each granule made to lose its identity completely, will cause waves of different shades of color; for salt heightens color.

Making the butter of uniform temperature in the mass, and of uniform saltiness, will make it uniform in color, regardless of the condition before it is churned; but working so little that granules remain partially intact, being merely rolled out and joined to each other on their surfaces, is productive of mottles.

To avoid mottles: temper the wash-water so the butter will work up waxy, and work it enough to make it uniform in all respects and then it will look alike in all respects.

"Hoard."

WHAT'S IN A NAME, WHERE A PROPHET HAS HONOR, &c.

We have clipped, and publish below, a couple of items from "Farming World" of Edinburgh, which serve to show in what esteem American cheese, and American methods of cheese-making are held across the water. Here is the first one:

GENUINE CHEDDAR.

We heard a curious little story in this decayed village of Cheddar. It is said that early one morning, about four years ago, a "four-in-hand," loaded with editors, professors, champion cheese-makers, "experts," and the like, from North Britain, drove into Cheddar and expressed an eager desire to obtain some specimens of "genuine Cheddar," and get away again. "Ah," said the man, heaving a long drawn sigh, which almost amounted to a groan, "I have often wondered how the chaps got on with their souvenirs." It was only natural to ask the cause of this sadness. "Ah, well," said he, "we all try to do the best we can for ourselves, and as I get more profit out of selling American cheese than by supplying Cheddar cheese, those tourists got Yankee samples."

Those "editors, professors, champion cheese-makers, 'experts,' and the like," who got cheese made in the United States for "genuine Cheddar," were, without doubt, loud in its praise. Unquestionably, it was good cheese, and, quite as important, it was partaken of without any prejudice against it, but rather in expectation of its being first class.

The second item is as follows:

Cheese is cheese and not chalk, and there is a steady determination in many quarters to improve the make of cheese in the majority of Scottish dairies. The subject of the better production of this toothsome article of diet is so much the vogue, that it will be astonishing should merchants continue to have complaints to make similar to those with which we have been familiar in somewhat recent times. The Stewartry Association has opened a dairy-school at Craigley, under the very capable management of Mr. James M'Adam, and that, together with Mr. Campbell's scientific and laboratory work and Mr. Alex. Todd's itinerant instruction ought to place farmers, in that quarter, in the very front as Cheddar cheese makers. It seems too absurd, however, in view of all that has come and gone, that the system under which cheese has been much improved in former years, should be scouted by men professing to write in the dairy interest. The best makers have all, in one form or other, followed the American methods.

Here we have the candid confession that the best makers follow the American methods. What, then, are the causes which keep American cheese and American butter at the very bottom of the market? Nothing but the fact that too many exporters are dishonest. They have sent inferior goods abroad, representing them to be the best produced in this country, until the average buyer there has been forced to believe that there is no good cheese or butter produced in this country. When they visit us here, as we see them from time to time, they are very free to confess that in no other respect are they more surprised than in the superior excellence of the butter and cheese set before them. They do not talk to us about the English market demanding less color, less salt, less flavor, etc., but insist that it is impossible to find any typical, first-class United States butter and cheese there. So much poor stuff has been sent abroad, that the name alone, is its sufficient condemnation, and when, by chance, any of good quality does arrive, it is sold and consumed under some designation that will not suggest its origin.

"Hoard."

HOW THE 100 POINT CHEESE AT THE N. Y. STATE FAIR WAS MADE.

The cheese that scored 100 points at the N. Y. State Fair, in 1896, was made by Mr. J. E. Knapp, in one of the Crown Brand factories, in Lewis Co. The milk used was not selected with especial reference to making a prize cheese; the condition of the milk, however, was good; before adding the rennet, at temperature of 84 degrees, a home-made starter was used, equal to nearly 1 per cent of the weight of milk in the vat. The starter was made from best milk obtainable, the day before. The proper degree of ripening was determined by using 6 ounces milk and 1 drachm of extract. Time required for coagulation, by the test, was thirty seconds.

The milk thickened in 16 minutes, and was ready to cut in 25 minutes.

Perpendicular and horizontal knives were used in cutting the curd, to a condition considered by cheese-makers to be, "fine cut."

The curd was stirred carefully for twenty minutes, before applying steam. The temperature was gradually raised 97 degrees. The stirring process was continued until curd was firmly cooked, when the whey was removed.

The curd was spread once on the bottom of the vat, and turned repeatedly, and cooled, until it began to "flake," when it was packed, cut and repacked until well "broken down," and had taken on that silky and velvety appearance and texture, so much desired by makers of fine cheese. It was then "milled" in a Harris mill, cooled, and salted with two and one-half pounds of salt to one thousand pounds of milk. It was then allowed to stand and cool, until the salt was thoroughly dissolved, when it was put to press. Kept under pressure for about 20 hours, and cured at a temperature of about 65 degrees.

This, in brief, is the system followed in the manufacture of this cheese, essentially the same as followed each day in this factory.

H. E. COOK.

"Hoard."

ALL RECORDS BROKEN.

The Cheese Montreal has shipped abroad.

Prices high and business of the briskest.

NEW YORK LEFT FAR IN THE BACKGROUND.

That Montreal has become pre-eminently the cheese-shipping centre of the world was never so apparent as it is this season, and if the year holds good to the close of navigation, and there is every reason to believe it will, all records will be eclipsed. This is all just as it should be, for with England as the largest consumer of cheese in the world, it is eminently fitting that Canada should be first among producers and shippers.

Up to August 3 the total shipment of cheese from the port this year was 804,356 boxes. This means something like 48,000,000 pounds, and at an average price of eight and one third cents which is well within the prices which have prevailed, gives the country already $4,00,000. If the shipments continue at anything like their present rate the year's business will be worth about $12,000,000 to Canada. Not a bad sum for one industry.

The shipments last year from the port of Montreal, from the opening of navigation to August 3, amounted to 644,000 boxes, a clear gain of 156,000 boxes for the present season. Then, again, the prices which have prevailed this year are averaging more than a cent per pound better than during 1896 and this will mean something like $1,500,000 additional money in the farmers' pockets.

The first shipment of the present season went to London on the steamship Montezuma on May 7, though of course the large shipments did not begin to go forward until June was well advanced, though at the date mentioned the Montezuma had on board some 7000 boxes, and on May 8th the Brazilian also sailed for London with 6000 boxes in her hold. Up to May 31 of this year the shipments amounted to 82,207, a very small proportion of what has gone out so far this year.

The largest individual shipment this year, up to August 3 was sent out by Mr. A. W. Grant on July 29, by the steamship Memnon, and amounted to 11,022 boxes. On the same vessel A. A. Ayer and Company had 6192 boxes. The other shipments which have gone forward, amounting to 5000 boxes and over, include Hodgson Bros., on July 28, SS. Fremona, 5762 boxes; A. A. Ayer and Company, July 21 SS. Ashanti, 5843 boxes; Grand Trunk Railway, July 17, SS. Ormiston, 9110 boxes. It may be mentioned in this connection that the railway shipments generally represent shippers whose goods have come through from the west. A. W. Grant, July 15, SS. Lycia, 9212 boxes; same vessel, A. A. Ayer and Company, 5363 boxes; Hodgson Bros., July 16, SS. Keldona, 6049 boxes; G. T. R., July 10, SS. Grecian, 5158 boxes; A. W. Grant, July 9, SS. Etolia, 6164 boxes; A. W. Grant, July 2, SS. Merrimac, 8281 boxes; A. W. Grant, June 25, SS. Memnon, 6200 boxes; Hodgson Bros., June 19, SS. Montezuma 5758 boxes; A. W. Grant, June 17, SS. Ashanti, 5017 boxes; G. T. R., June 19, SS. Fremona, 7911 boxes; A. A. Ayer and Company, June 5, SS. Ormiston, 5505 boxes; J. C. and G. D. Warrington, June 4, SS. Laurentian, 5421 boxes; G. T. R., June 5, SS. Ormiston, 8237 boxes; G. T. R., May 31, SS. Gerona, 6036 boxes.

The other Montreal shippers who have contributed to the cargoes of cheese which have gone forward, and whose shipments though larger, did not amount to 5000 boxes on any one vessel, are: James Alexander, Ducket, Hodge and Co., Canadian Pacific Railway, A. J. Brice, Alexander Mitchell, D. A. McPherson and Co., W. T. Ware and Co., Kirkpatrick and Cookson, P. W. McLagan and Co., William Nivin and Co., and the Imperial Produce Company.

How far Montreal has distanced New York as a cheese shipping point is shown by the comparative shipments from the two ports. For instance, in the last week of July, the total from New York amounted to 21,899 boxes, and in the same week Montreal sent forward 110,380 boxes.

"Star."

CANADA AND THE MOTHER COUNTRY.

THE DOMINION'S AGRICULTURAL INDUSTRIES.

DEVELOPMENT OF NEW TRADES.

Imperial federation is no longer a question for merely abstract discussion, but has entered the domain of practical politics. Many forces have operated to produce this result, and the recent Diamond Jubilee rejoicings have undoubtedly supplied an additional impetus to these forces by the presence in this country of the Colonial Premiers. In those rejoicings was represented a widely scattered empire, united by

bonds of love and loyalty. That is the sentimental aspect of the question, and it is that sentiment which must form the basis of Imperial union for commerce and defence. It was that sentiment which drew our colonial brethren here, and the result has been that the realisation of that union in a practical manner has, between them and the Home Government, formed the subject of considerable discussion and conference. There are, no doubt, many difficulties to be surmounted, but the prevailing belief, and one in which we fully share, is that these will be safely negotiated, and Imperial federation become an absolute fact. To Canada belongs the credit of having taken the first practical step towards that end by proffering.

PREFERENTIAL TARIFFS.

to Great Britain, and she is following this up with an effort—an effort which we hope will be crowned with the utmost success—to gain for her products the place in the British markets to which they are entitled, and thus strengthen and increase the commercial interests which join the Motherland and the colony. If England's free trade policy precludes Great Britain from offering her colonies preferential tariffs, we can at least give preference to their produce. At present we take an enormous quantity of foodstuffs from foreign countries, which grant us no concessions, and yet our colonies can produce both the quantity and quality we require.

Taking agricultural products—Canada's chief industry, despite Mr. Rudyard Kipling's description of the Dominion as "Queen of the Snows," a suggestion of a land of eternal winter, which the Canadian farmers would not excuse, even on the grounds of poetical license—we imported in 1895, 577,699,521 dollars worth, and in 1896, 609,296,866 dollars worth. Canada's proportion of this was, however, only between 40 and 50 million dollars. The exact proportion of the imports from foreign countries we cannot give, but taking butter, for instance, we find that in 1896 of 310,250,664 lbs. imported into Great Britain, about 300 million were from foreign countries. It stands to reason that if the colonies can produce foodstuffs of as good quality as those which we at present take from the United States, Russia, Denmark, France, etc., it is the duty of the Mother country to give the preference to her children across the seas. Of course, it lies with the colonies to show that they can produce exactly what we want, and this is the effort which Canada is now making.

Fortunately, the Dominion possesses a Board of Agriculture which is thoroughly alive to the situation, and is exhibiting remarkable enterprise in the development of her agricultural resources, while in their Commissioner of Agriculture and Dairying, Professor Jas. W. Robertson, they have one of the ablest agriculturists either in the Dominion or anywhere else. About eleven years ago the Government of the province of Ontario desired to develop the dairying industry in that province, and they asked Mr. Robertson to take charge of the dairying department, and to become the professor at the Agricultural College at Guelph. In 1890 the Dominion Government asked Professor Robertson to do for the whole of the Dominion what had been done for Ontario, and he was also requested to become the Government agriculturist. From that time until now he has applied himself to the

DEVELOPMENT OF CANADIAN AGRICULTURE,

and to his skill, energy, and resource, not forgetting the hearty support of the Board of Agriculture, are due the rapid strides which Canada has made during recent years. The development has not been merely in quantity, though in this respect alone there has been development of a very gratifying degree. In 1889 the export of cheese was 88,534,887 lbs., of which that despatched to Great Britain was valued at 8,871,295 dollars. In 1891 Canada exported to Great Britain alone 127,915,648 lbs., valued at 13,086,204 dollars, or an increase of nearly 50 per cent., both in quantity and value. In 1895 the value of cheese exported to Great Britain was 14,220,055 dollars, while the value of the export in 1896 was about 1,500,00 dollars greater than it was in 1895. In 1889 the export of butter was 1,780,765 lbs., of which that exported to Great Britain was valued at 174,027 dollars, while in 1894 the export of butter to Great Britain alone was 2,339,344 lbs., valued at 458,389 dollars. In 1895 the value of the butter exported to Great Britain was 536,797 dollars, while the value of the export in 1896 was over 1,000,000 dollars greater than it was in 1895. These figures indicate that the increase in the value of Canadian dairy exports to Great Britain from 1889 to 1896 was for cheese about 6,849,300 dollars, and for butter 1,362,770 dollars, or a total increase in dairy exports since the appointment of the Dairy Commissioner of nearly eight and one quarter millions of dollars annually.

An important factor in this progress has been the establishment by the Government of dairy stations and creameries throughout the Dominion, and also experimental farms at which splendid work has been accomplished by Commissioner Robertson. Moreover, together with investigations to discover principles, and methods of operation and management for securing economy in production, similar efforts have been directed to the problems of transportation and marketing. The difficulty has been that of getting produce into the British market in the best condition. Hitherto its condition has not been that of the best, and consequently the prices of Canadian produce ruled low. But

A NEW ERA

has been entered upon. The other day we announced the arrival in Liverpool of a cargo of Canadian dressed meats in the s. s. Labrador. This was the first practical test of the complete chain of cold storage which the Government of Canada has organised, extending from the producers in the Dominion to the consumers in this country.

The Government voted 200,000 dollars as a beginning, and last year offered to assist in establishing cold storage rooms in creameries to the extent of 100 dollars for each creamery. This was the first link. Since then it has been arranged that refrigerator cars will be run regularly on seventeen railway routes into the shipping ports of Montreal, Quebec, St. John, Halifax, and Charlottetown. These cars have been built on the most scientific principles, and cold storage inspectors have been appointed to see to the condition of the cars, etc. This is the second link; and the third link has been made by the arrangement, by order of the Canadian Minister of Agriculture, for mechanical refrigeration on seventeen steamships leaving Montreal this summer for Liverpool, London, Bristol, and Glasgow. The produce will comprise, among other foods, butter, cheese, dressed meats, and eggs. Then there will be tomatoes and fruits, including peaches, pears, and grapes. The Canadian fruit growers, we learn, can produce grapes of excellent quality at 2d. per lb. to the producer. The cost of freight is but an infinitesimal fraction per lb., so it will be seen how cheaply they can be placed on the British market. Poultry, again, instead of being merely dumped down for the Christmas market, will be sent from November to the end of March.

Canada deserves the fullest encouragement from the Mother Country in

THIS SPLENDID EFFORT.

In fact, this encouragement it is our duty to extend as a matter of policy to all the colonies in whatever efforts they may make to extend their trade with Great Britain, and so long as they can produce what we want, and of the quality required, preference must be given to them as against the foreigner. Only by doing this can the grand idea of Imperial federation become an accomplished fact. But it is certain that Commissioner Robertson, who is now in this country in connection with the opening up of this new trade, which has just been described, will find that that principle prevails amongst most of the Liverpool commercial men, and that they will express that belief in unmistakable terms at the meeting which he intends shortly to call in this city of all interested in the provision and produce trade. Commissioner Robertson has come to see the existing conditions of the markets here; to learn the newest preferences for packages, styles, and qualities of goods; to give information to Chambers of Commerce and other trade associations about the arrangements made by the Government for getting Canadian products into the markets by these new cold storage channels; to try to remove any lingering remains of the old prejudice against Canadian butter, and to let us know that a new era has come, with the promise of the very best class of products from Canada in the future. We trust that his mission will prove a complete success, and that Canada will find full reciprocation for her preferential tariffs to the Mother Country, in a wide and constantly increasing demand in the British markets for the food products which are the Dominion's chief industry, and upon which the welfare and prosperity of her people depend.—"English paper."

Apiculture.

Transformation — First excursion — Huber's blindness — Drones — Length of life.

170. The last cast-off skin of the larva, "which, by the creature's movements within the cell, becomes plastered to the walls and joins the cocoon near the mouth end" (Cheshire), is left behind, and forms a closely-attached and exact lining to the cell; by this means the breeding-cells become smaller, and their partitions stronger, the oftener they change their tenants.

So thin is this lining, that brood-combs more than twenty years old have been found to raise bees apparently as large as any other in the Apiary.

171. About twenty-one days are usually required for the transformations from the worker-egg to the perfect insect. But the time may be shortened or lengthened by the temperature, or the conditions of the colony. Dzierson and others wrote that a worker-bee can hatch in nineteen to twenty-one days. Collin says nineteen to twenty-three. That the brood can remain even longer before hatching, is confirmed by the report of A. Sannier, in the South of France. Having deprived a hive of all its inhabitants, he found bees, hatching twenty-three days afterwards, that had not even been sealed in their cells, since there had been no nurses there to do this work. ("L'Apiculteur." Paris, 1870.) As these were already full-grown larvae, when the hive was deprived of its bees, they must have been twenty-seven days old when hatching. In this experiment, the heat produced by the larvae, coupled with that of the atmosphere, had been sufficient to keep them alive and help their slow development.

We have often noticed the brood of swarms, that had deserted their hives, still alive after a cold night, but in each case its development was delayed.

172. A newly hatched worker, like a newly hatched queen, is easily recognized by her small size, her pale gray color, and her weak appearance. After a few days, she has grown considerably larger. She is then in the bloom of health; her color is bright, she has not yet lost a single hair of the down which covers her body. These hairs fall gradually from age and work, and sometimes disappear almost entirely.

173. The first excursion of the young bee, out of the hive takes place when she is about eight days old. (See Donhoff's experiment 160.) The disturbing of the colony, or the lack of old bees may cause them to go out earlier.

The first flight of young worker-bees is easily remembered when once seen. It usually takes place in the afternoon of a sunny day. They first walk about on the platform in a hesitating manner and then take flight. Their humming, and joyous and peaceable circles to reconnoitre the location of their home, recalls to memory the gay playing of children in front of the school-house door. Their second trip is made about a week after the first; it is then that they bring in their first load. A young bee coming home is readily recognized by the small size of the pollen pellets she carries, when compared with those of older bees, and by the turns she makes before alighting.

174 The apiarist should become acquainted with the behavior of young bees, so as not to mistake their pleasant flight for the restless motions of robber-bees. (664.)

175. Although the workers are females, they are incapable of fecundation (108). Yet the rudimental ovaries of some of them contain a few undeveloped eggs (fig. 30).

176. Occasionally some of them are sufficiently developed to be capable of laying eggs; but these eggs always produce drones. Laying workers appear only when a colony has been queenless for some time. Huber thought that fertile workers were reared in the neighborhood of the young queens, and that they received some of the peculiar food, or jelly on which these queens are fed. (1).

(1). An extract from Huber's preface will be interesting in this connection. After speaking of his blindness, and praising the extraordinary taste

But it is more probable that it is the increase of the milky food, given lavishly to the larvae in the first stage of their development, during a good honey flow, which enlarged their ovaries (108), and that the young bees, thus raised, having no more larvae to nurse when the hive has suddenly become queen-less, feed each other with their milky food, which excites their laying, as it does for the queens (39). The number of drone-laying workers is sometimes very large in a hopelessly queenless hive; we have seen at least a dozen laying on the same comb. Mr. Vialion, a noted bee-keeper of Louisiana, once had so many in one queenless colony, that he was able to send several dozen for dissection to bee-keepers in this country and Europe.

177. Some persons may question the wisdom of Nature in endowing the workers with the means of laying drone-eggs, when there is no queen in the colony to be fecundated by them. But Nature does nothing without purpose. The main cause of the loss of the queen, when there is no brood fit to raise others (107), and therefore, no hopes of survival for the colony, is usually the death of the young queen in her bridal flight (122). At some seasons, the drones are scarce, and a young queen may be compelled to make several trips before she finds one. If she gets lost, the hive having remained queenless for at least eight or ten days (109), the brood is too old to be used to raise another, and the colony is doomed. That other colonies may not be victims of similar accidents, owing to the scarcity of drones, Nature endows this worthless colony with the faculty of drone-raising.

It is by the same provision of Nature that unhealthy trees, on the eve of death, are seen covered with blossoms and fruits. They make the strongest efforts to save their race from extinction, and perish afterwards.

178. The drone laying of worker-bees is easily discovered by the Apiarist. Their eggs are laid without order, some cells containing grown larvae, or sealed pupae, by the side of cells containing eggs; while the eggs of a queen are very regularly laid. Huber states that the fertile workers prefer large cells in which to deposit their drone eggs, resorting to small ones, only when unable to find those of greater diameter. A hive in our apiary having much worker-comb, but only a small piece of drone size, a fertile worker filled the latter so entirely with eggs that some of the cells contained three or four each.

179. Sometimes the bees do not seem to know that these eggs are drone-eggs, and in their eagerness to raise a queen, they treat some of them as such, by enlarging their cells and feeding them on special food (109). The poor over-fed drones, thus raised, usually perish in the cell (136). The workers soon dwindle away, and the colony perishes.

180. They often even fail to raise any queen from brood, which may be given them by the apiarist, unless some hatching bees are given at the same time. The latter, when informed of the needs of the colony, usually succeed in raising a queen. The introduction of a laying-queen in a laying-worker colony, is the best remedy. (533.)

181. The bees of the same colony understand each other very well for all their necessities, and they work with an "entrain" which is truly admirable. They know each other, probably by smell, for it is very rare to see a bee of the hive treated as a robber (664). They never use their sting except to defend themselves, when hurt, or their home, when they think it is threatened.

182. Their life is short, but their age depends very much upon their greater or less exposure to injurious influences, and severe labors. Those reared in the Spring and early part of Summer, upon whom the heaviest labors of the hive devolve, appear to live not more than thirty-five days, on an average; while those bred at the close of Summer, and early in Autumn, being able to spend a large part of their time in repose, attain a much greater age. It is very evident that "the bee" (to use the words of a quaint old writer) "is a Summer bird;" and that, with the exception of the queen, none live to be a year old.

If an Italian queen be given, in the working season, to a swarm of common bees, in about three months none of the latter will be found in the colony, and as the black queen removed has left eggs in the cells, which take twenty-one days to hatch, it is evident that the bees all die from fatigue or accident in the remaining seventy days, making their average life thirty-five days "in the working season."

The age which individual members of the community may attain, must not be confounded with that of the colony. Bees have been known to occupy the same domicile for a great number of years. We have seen flourishing colonies more than twenty years old; the Abbé Della Rocca speaks of some over forty years old; and Stoche says, that he saw a colony, which he was assured had swarmed annually for forty-six years! "Such cases have led to the erroneous opinion, that bees are a long-lived race. But this, as Dr. Evans (1) has observed, is just as wise as if a stranger, contemplating a populous city, and personally unacquainted with its inhabitants, should, on paying it a second visit, many years after, and finding it equally populous, imagine that it was peopled by the same individuals, not one of whom might then be living

"Like leaves on trees, the race of bees is found,
Now green in youth, now withering on the ground
Another race the Spring or Fall supplies
They droop successive, and successive rise."

(From "The Bee," by EVANS.")

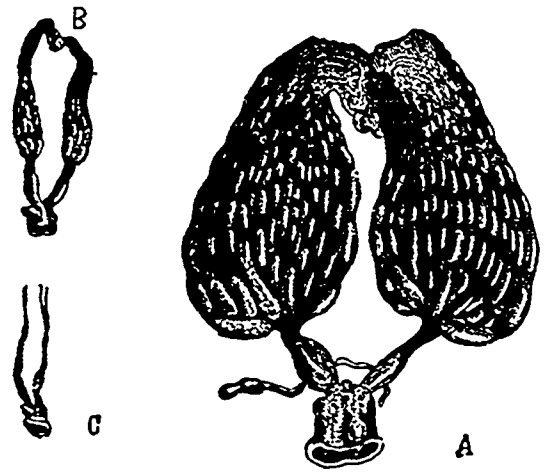


FIG. 30 — COMPARATIVE SIZES OF THE OVERIES OF QUEEN AND WORKER.
(All magnified. From Girard.)
A, queen ovaries; *B*, laying-worker ovaries; *C*, sterile-worker ovaries.

for Natural History, of his assistant, Burmens, "who was born with the talents of an observer," he says: "Every one of the facts I now publish, we have seen, over and over again, during the period of eight years, which we have employed in making our observations on bees. It is impossible to form a just idea of the patience and skill with which Burmens has carried out the experiments which I am about to describe; he has often watched some of the working-bees of our hives, which we had reason to think fertile, for the space of twenty-four hours, without distraction * * * and he counted fatigue and pain as nothing, compared with the great desire he felt to know the results."

(1) Dr. Evans was an English physician, and the author of a beautiful poem on bees. (More likely Welsh than English).—Ed.

The Poultry-Yard.

Increasing Interest in Poultry Culture —The Profits in poultry—What a farmer's wife did—A large margin of profit.

(A. G. Gilbert).

It is most gratifying to note the increased interest in poultry culture and development that is being taken by farmers and the more advanced newspapers of the Rural press. Perhaps, I ought to place the latter first, for it is by the intelligent discussion of profitable poultry-keeping and the means thereto by the county newspapers that the interest of the farmers is, in many cases, first directed to the unpretentious hen as a money maker. Much good has also been done, in this way, by poultry talks by experienced men at meetings of farmers. Among the leading rural newspaper none treats of poultry matters in a more intelligent and inviting manner than does the "Cornwall Freeholder," the editor of which I am happy to say is a practical poultry enthusiast. In a recent number of that paper there is an article entitled "Profits in Poultry," and I only wish every one of the many intelligent farmers in the Province of Quebec, could see the article. I am sure to most of them it would be a veritable eye opener.

PROFITS IN POULTRY.

The statement is at once made, "You have excited our interest: what does the paper in question say?" Well, the editor takes the results of careful management of fifty hens by the Central Experimental Farm, Ottawa; Mrs. Joseph Yuill, the well-known gilt-edged butter-maker of Carleton place; and Mr. W. D. Graham, an experienced poultry breeder of Belleville, *to prove that there is much* greater profit to the farmer in poultry-keeping then the modest One dollar per annum per hen, I have always held out in the "Journal of Agriculture" as the amount to be made by farmers. Of course, in writing of the experiment at the Experimental Farm, I write of my own work, and can vouch for its correctness. Now, *let us see what was done!*

The 50 hens at the Experimental Farm were composed of half thoroughbreds, half mixed or common fowls, the aim being to have fowls as much like the farmer, as possible. By having the hens lay when their product was worth most, namely, in late fall and winter, and reducing the ration to cost as little as possible, the 50 hens were made to pay a profit of $94.00 or nearly two dollars each for the year. I have not *time, nor have you space, on this occa*sion to permit of my going into details of management so as to secure the result named. I may do so again. What will be valuable is, to show that the daily ration of the 50 hens cost no more than 10 cents and was composed as follows:—

3½ lbs. of cut green bones @ 1 cent per lb.	3½ cents
5 lbs. of grain @ 1 cent per lb.	5 "
Unmarketable vegetables and grit.	1½ "
Total. . .	10 "

There was a certain number of eggs sold for hatching purpose, at one dollar per setting, but if these eggs had been turned into chickens the result would have been rather better, the thoroughbred cockerels being sold a ten cents per lb. in Montreal, for eating, and the pullets retained as future layers.

Any one by feeding the above ration to 50 hens, or a greater number in proportion, and keeping the layers busy working all day, will get plenty of eggs. Having got the product it is for the farmer to sell at the best possible advantage in the best market. Try it and the results will be most gratifying. What one man can do another can, in this case, anyway.

WHAT MRS. YUILL DID.

Mrs. Yuill's fowls were Plymouth Rocks. She figures the cost of winter feed as follows, the summer feed of course being much less, as the hens are allowed the run of the farm:

2½ lbs. clover, at $8 per ton. .	1 cents.
5 lbs. shorts, at $12 per ton. .	3 "
20 lbs. mangels, at 10c. per bush.	3-1-3 "
5 lbs. ensilage, at $2 per ton.	½ "
Meat scraps.	½ "
5 lbs. oats, at 29c. per bush. .	3 "
Total.	11 1-3

The 50 fowls, therefore, cost Mrs. Yuill 11 1-3c. per day for six months.

Mrs. Yuill sold her chickens at 50 cents per pair, (because they were fine large thoroughbreds) and she made from sale of chickens	$37.50
Feathers.	3.00
659 dozen of eggs (at average price of 13¾ cents per dozen).	87.86
	$128.36
Total cost of 50 hens for year and raising the chickens. . . .	38.87
Profit.	$89.49

In the case the hens made a profit of $1.78 each. And it must be borne in mind that the eggs were sold at much less than the market price in city or town. Mrs Yuill must have sold to a middleman. But it will show what a farmer's smart, intelligent wife can do. WHAT SHE DID OTHERS CAN DO!

WHAT MR. GRAHAM MADE AT LOW PRICES.

Mr. Graham has two hundred Plymouth Rock hens and he made his hens pay well in winter, but to show what can be done at the period of lowest prices viz., the second week in April. Mr. Graham figures for one week :-

7 bush. oats, at 20 cents	$1.40
210 lgs. grain (1) (30 lbs. daily) at 70c. a cwt..	1.47
Total cost for the week.. ..	$2.87
58 doz. eggs, at 8c. per doz. ..	$1.61
Cost of feed for week..	2.87
Total gain..	$1.77

No allowance is made for meal, for the fowls are running at large.

WATH THE "FREEHOLDER" CONCLUDES.

But we quote the newspaper for the conclusions are valuable. He says :—

"Let us see what there is to learn from these figures. Mr. Gilbert quotes 10 cents per day for 50 hens. Mrs. Yuill 11 1-3 cents. The meat and green stuff is figured at about half this amount, leaving five or six cents per day as the price of summer feed to a farmer, though at present prices of grain it should be a little less. The hens must be very poor indeed that will not lay two dozen eggs a day among 50 in the summer, which cost, as our authorities have shown, five or six cents for feed. At the very lowest price for the commonest product—eight cents per dozen—we cannot come to any other conclusion than that there is money in hens, even at summer prices, and if one is skilful enough to have a supply in winter, when they are worth at least three times the summer price, a very handsome profit."

CAN EGGS BE PRODUCED IN SUMMER AT FOUR CENTS PER DOZ ?

My own opinion is that a farmer whose hens are running at large, in summer, and which hens can find insect life, green stuff and grit, representing five cents of the ten, ought to be able to get eggs at no more cost to him than four cents a dozen. As prices go four cents will buy five pounds of grain, and I would divide that amount into two daily rations and certainly give no more to 50 hens, running at large. With eggs at 8 cents a dozen there would be, in such a case, one hundred per cent profit. And there is nothing out of the way in the statement. Who says there is no money in poultry to the farmer even at low summer prices ?

HOW ALL FARMERS MAY HAVE FRESH EGGS DURING THE WINTER MONTHS.

Directions for the first step necessary to egg production in winter ,may be given by quoting Uncle Ebenezer's receipt for hare-soup :

"First, chillens, you must catch your hare," so the first necessity is to secure a suitable hen, and to that end after an experience of upwards of forty years, we have no hesitation in saying, no breed is at all to be compared to the Black Minorca for winter laying.

We are not comparing the Black Minorcas with some other breeds as table fowls or chicken raisers, indeed it is difficult to coax a Black Minorca to sit, and having succeeded in inducing her to do so, do not be surprised if, after a few days you find she has abandoned the nest for a more active and congenial occupation.

The superior qualities of the Black Minorcas are summed up by stating, they are par excellence an egg producing breed—pullets hatched in May, commencing laying in October.

It is not supposed but that the conditions necessary for egg production in winter have been more fully set forth than can be attempted in the short article admissible in your valuable practical Journal, but we shall attempt to apply the principles in a manner to render them available to the conditions of the average farmer.

Millions of dollars, doubtless, have been lost by Canadian farmers neglecting to provide, as nearly as possible, summer conditions and food to enable their hens to lay in winter, when in our cities, eggs fetch from thirty to sixty cents a dozen, instead of in summer, when they fetch from six to ten cents a dozen!

The cause of this loss is mainly due to the mistaken idea that a large outlay is necessary to produce eggs in winter; whereas, the fact is every farmer who keeps cattle might have a few hens to share the warmth of the cowhouse without additional expense.

We are met with the objection that keeping fowl in a cowhouse, causes vermin on the animals, but poultry taken care of in such a manner as to be in the best egg producing condition will not be troubled with vermin. As a preventative wash the roosts occasionally with kerosine, and to their meal of mash add each week a little sulphur, also put a few spoonsful of sulphur in their dust bath.

Farmers too often imitate Pharaoh's task-masters, demanding eggs of the hens, without furnishing them the necessary materials, and then, because a hen receiving, perhaps daily, a "gorge" of grain which she is left to moisten with the surrounding snow, then, when the eggs are not forthcoming the whole poultry business is voted a failure!

A good daily menu is : for breakfast a mush of corn meal, wheat bran provender either separately, or mixed : moisten with boiling water or, which is better, milk, to which should be added just a little seasoning of salt and pepper. It is well to mix over night, and feed warm.

The evening meal should consist of whole grain wheat, pease, corn, oats, etc., remove all food left over at all times, let them have access to pure water, which in very cold weather is better slightly warmed, have a sufficiency of gravel, a lack of which causes diarrhoea, which may become chronic, vary by an occasional breakfast of vegetables, and let them have a raw turnip or cabbage to peck at : give them a small quantity of green bone daily, say from one to two ounces each, crushed or pounded : if one's finances do not warrant the purchase of a bone-mill, which can now be had as low as ($5.) five dollars. The great thing to aim at in feeding is to give an abundance of food containing the nutrition necessary to form eggs, and which in summer the hen provides herself from grubs, worms, insects, etc. ; nothing better supplies the place of these than the scraps from the table, bits of meat, etc.

In planning what part of the stable shall be devoted to the hens, be sure and give them a sunny south window. Have space enough for the dust bath feeding and watering vessels. One empty stall will accommodate twenty hens if they have the run of the stable during the day time, supposing the stable to have five or six feet width behind the cattle.

Make haste slowly, begin with a few hens, and increase the number as your profits and experience increase, and you will find poultry keeping to be a profitable and delightful branch of farm work; and we trust ere long fresh eggs in winter will not be confined to the breakfast tables of the rich, but that every farmers family may share in the luxury, and who has a better right to do so ?

C. T. DICKSON. (1)

Trenholme, Aug., 10th, 1897.

(1) Brewers' grain are meant we think.—Ed.

(1) We shall be very happy to hear from Mrs. Dickson again.—Ed.

The Household.

About the end of September, the young girls from the country begin to flock into the different towns seeking situations, and there is always a demand for them.

Many of them are farmers' daughters, who have been working hard on the farm during the summer and are ill-prepared for confinement to house-work.

It is no wonder that a large proportion of them after a few weeks trial, have to give up and return home. I know of five who did so last winter, and no wonder, for when they came to town, they were confirmed dyspeptics and ought never to have left home, but such is the greed of human nature and the love of dress at the present day, that for high wages people will undertake duties for which they are utterly unfit.

A young girl who has never left home before, should be content to take light duties where she could learn her new work, and of course must be content with small wages till she has got into the ways of her new departure, and can feel herself capable of doing that for which higher wages are given.

As a rule, girls engage themselves to the highest bidder, and take upon themselves to do work which requires a stronger and older head than theirs.

One does not wonder so much when one realises where and how they have lived for 17 or may be 18 years.

I had in my house during the last winter, one of the nicest girls possible, and her coming to town was her first experience in travelling by railroad.

She often spoke of the quiet of the farm life, 12 miles from the station, getting up at 4 o'clock in the morning, working hard in the fields all day during sowing and harvest, milking in the early morning and evening, churning the butter in the spring before the factory opened, and after the autumn closing ; pretty hard work at any time, and still more so in this case, where they had to do the churning with the old fashioned "chumper," which all sensible people have discarded years ago. She spoke of three of them churning, by turns, a whole day, and then putting the churn by in despair to finish next day, and as long as the old churn held together, she said, they would have to use it, as many of the neighbours did. (1)

I think one need not wonder at the young people leaving this at the first opportunity, and going off to take situations where they will be paid for working. The young men are the first to go, which makes it doubly hard on those left behind; the more so if they are girls only.

Now, girls, brought up like this in a quiet country place, are not much fitted to battle with the world. Going to church on Sunday morning, spending the rest of the day quietly in doors, neither visiting, nor being visited; not allowed to walk in the fields, for a little recreation ; to say the least of it, I think, the good man of the house carries out his old fashioned, religious principles a little too harshly for the young people of to-day.

No wonder that it takes about two months to develope the minds of these girls, and drill them into useful members of the household.

In this case the old saying holds true :

All work and no play make Jenny a dull girl.

(1) They evidently do not read their "Journal."—Ed.

MISCELLANEOUS.

LIME-WATER.—One of the most useful agents of household economy, if rightly understood, is lime-water.

Prepare it by putting 7 pounds of unslaked lime into a stone jar or an unpainted pail, and pour over it "very" slowly, (so as not to slaken too rapidly). two gallons of hot-water. Stir well and let it settle, and then stir again two or three times in twenty-four hours.

Bottle, carefully, all that can be poured off in a clear state.

ITS USES, 1.

A teaspoonful in a cup of milk is a remedy for children's summer complaints, and when diarrhoea is caused by acidity of the stomach it is an excellent remedy ; put into milk, it rather improves the flavour.

2.

A little put into milk that might curdle when heated, will prevent it doing so, and the milk can be used in cooking.

3.

A little stirred into cream or milk, after a hot day or night, will prevent its turning when used for tea or coffee.

4.

For cleansing babies nursing bottles, or any vessel that milk has been in, it is unequalled, as it sweetens and purifies without leaving any unpleasant odour or flavour.

5.

A cupful, or even more, mixed in the sponge of bread or cake made over night, will prevent it from souring.

6.

A mixture of lime-water and sweet oil, is invaluable in case of a burn ; dip a cloth into the mixture and apply to the burn as quickly as possible : it has a most soothing effect, and great healing-power.

ICED CHOCOLATE.—Put two heaping teaspoonfuls of cocoa into a double boiler, and add gradually a pint of water. Cook and stir about five minutes; beat thoroughly; add half a pint of cream whipped for a moment with an egg-beater, and stand aside to cool. When cold fill a glass one-third full of finely-chopped ice and a little pulverized sugar; then pour in the chocolate, cap it with a teaspoonful of whipped cream and serve. This makes a refreshing drink.

INSECT PESTS OF THE SUMMER.—The summer heat usually increases the number of insects which annoy the housekeeper. The croton or water bug and the roach are, perhaps, the worst of these pests. Cucumber peelings scattered over the floor each night will soon exterminate the roach. The water-bug, however, is more difficult to get rid of. To banish it all food materials must be kept tightly covered. At night, after the kitchen work is done, brush all around the woodwork with a weak solution of corrosive sublimate, which can be obtained from any druggist. This is very effective, but as it is poisonous care must be exercised in using.

KEEPING THE HOUSE COOL.—How best to keep the house cool in summer is a grave problem. During the hot months the house is much more livable if artificial heat can be cut down to the minimum. Use the stove early in the morning, prepare certain foods that will keep well, and avoid the necessity of a big fire during the rest of the day. Bare floors are very much more pleasant in summer than straw matting, although the latter is preferable to carpets or rugs. Where one can command a water supply the house is measurably cooled by reducing the temperature of the pavement and grounds around by copious sprinklings. A goodly stream of new air should be allowed to sweep through the entire house morning and evening. The hot air of midday will condense quickly on cold walls and cause mould or dampness, consequently it should not be allowed to enter any portion of the house. All the rooms in the house should be kept scrupulously clean and neat.

TO COOL THE SLEEPING-ROOMS.—If the outside temperature is not appreciably lower at night than during the day it is almost impossible to keep sufficiently comfortable to obtain necessary rest. The sleeping-rooms may be cooled by placing in the centre of each a tub two-thirds full of cool, or better, ice water. This will absorb the heat of the room in a few hours, and will be found particularly helpful where there are children. If the heat continues during the night the changing of the water will preserve an even temperature in the room.

Air your cellars at night when it is possible. Close them at nine in the morning and they will be cool and dry the entire summer. Exceptions to this rule are on windy days, as the rapid motion of the air does not allow condensation. Keep the cellar perfectly clean and fresh. Frequent coats of white-wash with plenty of lime are of the greatest value in summer. "Le Journal."

HOUSEKEEPER.

Garden and Orchard.

SOME DESIRABLE MID-SUMMER PERENNIALS.

By John Craig.

The average farmer cannot afford the time and has not the facilities for growing each year plants of the many desirable free blooming annuals. In order to secure an abundance of bloom before frost from most annuals, the plants should be started in the window seed-box, or under glass in the hot-bed. This entails a certain amount of labour and attention at a specially busy time of the year. To-day, in looking over the list of plants now blooming in the perennial border in the arboretum here, I noticed a few that struck me as particularly beautiful at this time, some of which are well known, but the majority of them seen only occasionally in the farmer's garden. (1)

1....The perennial plant, as its name indicates, grows on from year to year, springing each season from the old roots.

2....The perennials mentioned in the following list are hardy; they need no special winter protection, but are benefited by a mulching of strawy manure put on in the autumn and worked into the ground in the spring.

3....These plants need not be planted with any formality or regularity, they may be grouped in a border or grown in clumps on the lawn.

4....In border planting, care should be taken to so arrange them that the taller growing types do not obscure the lower forms.

5....They may be transplanted in the autumn or in the spring. If set early in September they will become rooted before winter and will flower the following season. Plant in masses for rich effect.

The following are now in flower at Ottawa:

"Achillea ptarmica, fl. pl."—A form of the common Sneeze Wort. Two or three feet high, covered practically with a mass of double white flowers. Extremely showy and pretty.

A large variety of the Aconites are now in bloom. Most of these belong to the tall pyramidal types. Prominent among these is "Aconitum lycoctonum." Three to four feet high, bearing an immense mass of cream yellow flowers in long loose spikes.

"A. L. squarrosa."—Is one of the handsomest of this form, of a brilliant blue colour.

"Asclepias." (Milkweed).—Some members of this genus are justly classed as noxious weeds, at the same time it should be remembered that there are among them individuals of decided ornamental merit.

"A. incarnata."—Two to three feet high, bearing large umbels of salmon coloured flowers. This plant should be staked and tied up.

"A. tuberosa."—One of the commonest American forms, and at the same time one of the most desirable, growing two to three feet high and carrying for a long period its bright orange clusters of flowers. The flowers of this plant are also very much appreciated by bees.

"Baptisia tinctoria" called Dyers' Baptisia. A plant belonging to the leguminosae and resembling in a general way the genistas (Scotch brooms). Two to three feet high, with glaucous green foliage, bearing bright yellow pea-like flowers.

"Coreopsis."—This genus of the great Compositae family contributes a number of interesting and useful members to the perennial collection at this time.

"C. lanceolata."—Three feet high; centre and rays yellow, just going out of flower.

"C. delphinifolia."—Differing from the last named only in having slightly smaller heads with brown centres.

"Campanula" (Bell flower).—The Campanulas at this time of the year are among the striking objects in the old fashioned gardens that one sees in travelling through the country. Among the most attractive at the present time are "C. Vanhouteï," growing three feet high, bearing dark purplish-blue bell-shaped flowers. This is recorded as a hybrid.

"Delphinium," (Larkspur), belonging to the crow-foot family. These, like the Campanulas, give at the present time character and colour to the perennial border.

"D. Cashmirianum."—Two to three feet high, bearing flowers which shade from deep blue to the most delicately tinted white. Extremely floriferous; very useful for bouquets.

"Eryngium macrocarpum."—One of the members of that useful family known as umbelliferae to which the carrot and parsnip belong. Grows two to three feet high, with a general thistle-like expression; bearing small flowers tightly packed together in round heads, steely blue in colour. This is one of the best bee plants at this time of the year. Perhaps, not intrinsically beautiful, yet distinctly curious and in some respects desirable.

"Gypsophilla paniculata."—While the flowers of this plant are individually rather small, yet they are produced in such numbers and distributed over the plant so regularly, that a clump of this in a perennial border when clothed with blossoms is a thing of beauty. One clump now before me covers a circle having a diameter of six feet. The foliage is of light green, while the flowers are white. As a plant for bouquet-making it is unrivalled.

"Gaillardia."—This almost entirely American genus contains a number of most interesting and beautiful perennials.

"G. grandiflora."—Produces particularly large flowers, with orange yellow rays surrounding the crimson centre. In some form of "grandiflora" the rays are only tipped with yellow. There are a number of garden forms of this type.

"G. perfection."—Flower heads, yellow with a cluster of deep crimson in the centre. Base of the ray florets, dark red; extremities tipped with yellow.

"G. aristata."—Two of the prominent varieties of this type are "maxima," with tubular florets: and "Jupiter," with ray florets of a bright yellow colour and heads generally larger than the last.

"Heuchera sanguinia."—A Mexican plant, not new to gardens, but insufficiently cultivated. Brilliant colours, such as afforded by the flowers of "Lobelia cardinalis;" are rare.

"H. sanguinia" produces from a low mass of geranium-like foliage, tall loose panicles of brilliant scarlet flowers; charming in the border and beautiful in the bouquet.

"Hemerocallis, (Day Lily).—A number of this genus of what are practically lilies are now in flower.

"H. disticha."—Four to five feet high, bearing large, yellow, double lilly-like flowers.

"H. minor."—A dwarf form from Siberia, Perianth single; light yellow.

"H. thunbergii."—Very closely resembles the last.

"Lychnis chalcedonica rubrum."—Two to three feet; leaves clasping stems, dagger shaped; flowers, scarlet in bright rosettes.

"Phlox."—Most varieties of perennial phlox now in flower, are about the same height, 2 to 3 feet, and are varieties produced by Horticulturists from "P. decussata." One of the best is Pantheon

"Polemonium Richardsonii or "P. humile."—This plant has been in bloom for two months and will give flowers for three or four weeks longer Flowers blue; attractive. A native of the Rocky Mountains.

"Pentstemon barbatum Torreyii."—This genus of American plants contributes many valuable species to the herbaceous border. That just named is a curious plant. The plant proper grows six to twelve inches high, then throws up flowering panicles to the height of two to three feet. These flowering scapes are festooned with light rose coloured tubular flowers, altogether quite beautiful. Nicholson records this variety as only half-hardy, yet here it withstood a temperature of from 26 degrees to 28 degrees below zero last year.

"Spiraea."—Most members of this genus now in flower belong to the ulmaria type. This species, which is just going out of flower, bears creamy-white, loose panicles of flowers; plant three to four feet high.

"S. venusta."—Five to six feet high, flowers bright pink in large panicles; handsome.

"S. v. lobata."—Four to five feet high, with beautiful plume-like feathery pink panicles; very desirable.

"Yucca filamentosa."—Many forms of this showy tropical looking plant are catalogued. The type should be more generally cultivated. It is exceedingly handsome, with its flowering stem of three and a half to four and a half feet high, generously decorated with large creamy-white, six-petalled, bell-like flowers.

Experimental Farm,
Ottawa, Aug., 3, 1897.

(1) Aroma—scent; flavour—taste.—Ed.

POTATOES.

A very instructive bulletin has lately been published by the Ohio Experimental Station giving the results of the last three years experiments on the potato crop.

The culture of this esculent has been an important issue with the Ohioans for a number of years, and they have taken advantage of the soil and climate so suitable for its profitable production; we are also indebted to them for several of the best varieties of which the "Early Ohio" is one, and the sorts tested for three seasons, and recommanded for general cultivation are: "American Wonder," vigorous and prolific, near the head of the list as to productiveness in all trials, good shape and color for market, and possessing good table qualities; "Carmen," Nos. 1 and 3, white varieties of great merit; "Early Norther," the best variety of the Early Rose, type tested. "Rural New-Yorker," No. 2; "Sir William", one of the best for late planting, yielding more than any of the early sorts; "Wise," vigorous and prolific,

and of excellent quality, but not pure white; we epitomise, the summary of the last bulletin.

CHANGING SEED.

More depends upon the selection and keeping of the seed than changing from one soil to another.

Changing for the purpose of securing an improved variety is not always advisable, many of the new varieties are inferior to the old ones.

KEEPING.

Can be done by pitting, but storage in a temperature of 35 degrees Fah., is the best method. Potatoes thus stored make a quick and vigorous growth when planted.

PLANTING.

Seed planted as late as July, 1st, have yielded a good crop after it has been thus stored.

Early planting gives the largest crop, but late grown potatoes have superior keeping-qualities.

Medium and late varieties are the best for late planting.

TO PREVENT SCAB.

Soak seed potatoes, one hour, (not more), in solution of corrosive, sublimate; do this sometime before planting, and let them dry: do not plant on land which has been infested with scab

SPRAYING.

To prevent blight has been attend with variable results, because the forms of blight have not been the same.

DISEASES AND INSECTS.

Potatoes appearing to be sound, but showing a dark ring when cut, are diseased, and will carry blight to the field.

The Colorado, ——, blister, and flea-beetles, carry the disease from plant to plant; therefore it is essential to spray with Bordeaux mixture, adding six ounces of Paris green to the barrel of mixture. Reject all diseased seed; plant on land where potatoes have not been grown for several years; cultivate thoroughly, thorough cultivation keeps up a vigorous growth, and enables the plant to resist the blights.

FERTILIZING.

Superphosphate has increased the crop to a profitable extent; superphosphate used with nitrate of soda and muriate of potash have given best results.

Superphosphate, 480 pounds to the acre.

Nitrate of soda, 320 pounds to the acre.

Muriate of potash, 300 pounds to the acre.

Increased the crop, 52.9 bushels to the acre.

S tons per acre, increased the crop, 40.7 bushel.

G. MOORE

THE ADVANTAGES OF HORTICULTURE TO THE FARMER.

It is a curious fact that there are many farmers who scoff at the idea of having a garden, and discourage it even if their wives, who are often the best judges of domestic economy, desire to cultivate one, begruding the time requisite to do a little of the heavy work even although she and the family are willing to do the lighter part of seeding cultivating, and gathering the crop. These men are entirely mistaken, for the garden and orchard, when well managed, especially where there is a family growing up, will be a source of income, and pleasure.

In the hope of convincing these skeptics we will notice some of the advantages to be derived from the cultivation of fruits, vegetables, and flowers. First on the score of economy, it will be conceded that all that we can produce by our own effort, from the land, to feed those employed on it, or dependent upon us for their support, is so much gain; now if, by these efforts, we can obtain food which we should otherwise have to purchase, we certainly are practising the wisest economy.

To keep ourselves and our families in health, is also economy. Doctor's bills are terrible bugbears and it is our duty to do all that we can to avoid them, to say nothing of the suffering of sickness to those we love. Nothing is more conducive to a healthy developement of the system, than a good supply of well ripened fruits and fresh vegetables, and these cannot be obtained in all their pristine purity, and freshness in any other way than by growing them, and using them immediately they are gathered.

There is a lingering principle of vitality which remains in vegetables for a short time after they are gathered, which disappears in a few hours, and it is while this lasts that they are the most delicious, wholesome and nutritious; this can be illustrated by comparing the difference in flavour and quality of fish which are cooked immediately after being taken out of the water and those which have been kept only a few hours, or until this vital principle has entirely subsided. People in the country, who have a garden, have in this respect, great advantages over the dwellers in cities, who have to get their vegetables from the market, after they have been gathered for sometime, and have lost their appetizing life-giving qualities; and yet we have some farmers short-sighted enough to despise a garden, and think that the care of an orchard is a waste of time.

Let us glance too at the pleasure to be derived from the cultivation of a garden, and its effects upon the moral welfare of the family, what delight it can afford to the well-regulated mind to perform the easy task of keeping it, if not neglected and allowed to run to weeds, but a little done daily, as required, or to watch the growth of the various crops, and study the effect of the various processes we have adopted to assist their developement. With what pride we gather our first dish of peas, potatoes, or sweet corn, when we feel that they are given to us by a beneficent Creator, who has also taught us how to co-operate with Him by our skilful cultivation of the crop! What gratitude to the Giver of all good, to feel that our humble exertions are thus rewarded!

How pleasant, to say nothing about the saving of expense, to feel that the table is supplied with luxuries of our own raising! that the city family can scarcely obtain: of our the very thought gives relish to the repast.

The richest banquet, with all its courses prepared by the skilful hands of the most accomplished cooks, cannot equal for true and wholesome comforts, the humble meal prepared by the good house wife, and composed of those materials which were the products of the farm with its garden and orchard.

FLOWERS.—Many a farmer professes to entirely ignore flowers and a flower garden, looking upon them as foolish and useless; to such we would say: Which would you prefer, that your sons and daughters should love their home and its attractions, or the boys spend their time in vitiating pursuits, and the girls in frivolous and degrading amusements, become discontented with their surroundings, and take the first oportunity to leave them? If you prefer the first alternative make home a place so delightful as that their affections will be chained to it, and that the sweet memories of their childhood's home will cling to them in after life and exercise a salutary influence upon them in times of temptation, or a soothing one in seasons of grief. Oh! do not let us slight or overlook the beauties of nature which God has given us in the shape of flowers. They are His messengers, divinely appointed to woo our souls to Him. A farm house without an accompanying garden with its fruits and flowers, has a barren, unfinished look, however neat it may appear and however well it may be painted, it is like a jewell without a setting, or a picture without a frame. No, no, flowers are not useless, they are given to us to embellish this work a day world, and to assure us that duties and responsibilities are not thrust upon us without corresponding delights, if we will only give them consideration enough to make us appreciate them. We shall do wisely if we encourage and assist our young people in the taste for horticulture in all its branches, even in the love of flowers, for by that means we shall fulfill our duty to them, namely, train them to be good and consequently happy themselves and a source of happiness to others. The poet has well defined the use of flowers as follows:—

"Oh were I in some distant land remaining,
"And far removed from Preacher, or Divines,
"I still could find in flowers of God's ordaining
"Priests; Sermons, Shrines.

G. MOORE.

PRUNING.

(Continued).

In the last article the season for pruning occupied our attention; we now proceeds to notice the "methods of pruning."

Sharp tools are a necessity, because all cuts must be smoothly-made. The first year of the life of a tree, very little cutting will be required to insure its future symmetrical growth or fruitfulness, but rubbing off the young laterals as soon as they appear on the growing stem will best answer the purpose.

This stem is to form the future trunk of the tree, and its vigorous developement is of the utmost importance; if therefore the side growths are removed while they are yet quite young and tender, no wound will be made which will not immediately heal over and leave the bark perfectly clean and smooth. These shoots, however, it must be remembered, play an important part in the growth of the tree, supplying the sap, necessary to its robust habit: therefore too many must not be taken away of those which grow high on the stem else we shall fall into the error illustraied by fig. 3 and 4 The latter never can be made a strong healthy tree, for no staking or training can make it straight or well formed.

When the trunk of our apple- or pear-tree has grown 5 feet with a clear stem, it must be shortened back, and then the side shoots will be formed near the top; these should be reduced in number to about 5, the others being rubbed off. And now is the time when a little judge-

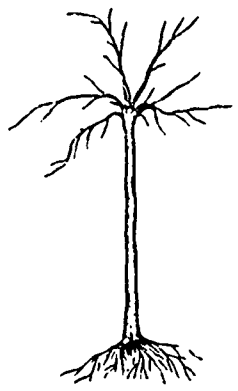


Fig 3—Young apple tree which has been properly pruned first and second season.

ment will influence the future form of the tree, all buds which will produce shoots that will grow towards the centre, or are likely to cross each other are those which should be prevented from growing. Figs. 5 and 6 will explain this. Careful watch should be kept to see that whenever a new shoot makes its appearance out of place, it is rubbed off while yet tender, so that

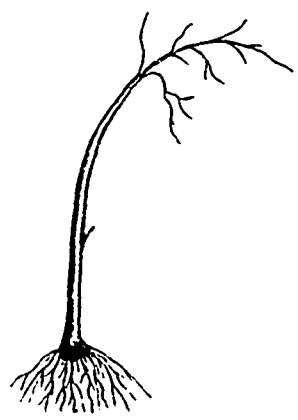


Fig 4—Ditto when laterals have been taken away too freely and too high up the stem.

no large wound will be made and no suckers will start, thus a clean barked, healthy tree can be secured; a matter of great importance to its future existence, because there will be no shelter for parasites as in a badly pruned or neglected tree.

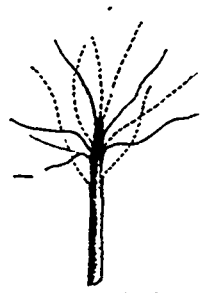


Fig 5—Natural growth of tree if branches shown by dotted lines, were allowed to grow.

The training of a young tree is full of interest, and the Proverb holds good in the case of a tree as of a child: Train it up in the way it should go, and when it is old it will not depart from it.

Having got the principle branches in the right position, we must not relax in our attention to the removal of such shoots as will be likely to make the head too thick, and impervious to light and air, and with this end in view the rubbing off of superfluous ones must be con-

tinued, it is quite possible to have a properly formed tree without the use of a pruning knife, except to shorten growing shoots or to remove any branches that may have been broken or killed by, what is usually called, fire blight; and a tree thus trained will certainly be the best, because the most beautiful, fruitful, and long lived; hence our watchfulness care, and attention, beside being a most pleasing occupation, will be well repaid, not only by the quantity, but the quality of the fruit produced.

To increase the fruitfulness of the tree it will be necessary to shorten back the last seasons growth as shown in (fig. 7). If this operation is performed

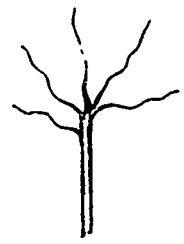


Fig. 6—First years growth of top when properly disbudded.

somewhat late in the growing season it will be most likely to produce the desired effect, namely the formation of fruiting spurs, if it is done too early the tendency will be, especially in strong growing kinds, to produce new wood instead, and the object will be defeated, at least for one season, for then these new shoots will require to be shortened before fruit bearing spurs can be formed

Judgement and practice is needed as to the extent to which pruning may carried. Different varieties and habits of growth require different methods of pruning; some robust growing sorts of Apples, Pears and Plums will bear much closer pruning than those of a weaker growth, because new wood is formed much more quickly. Trees, such

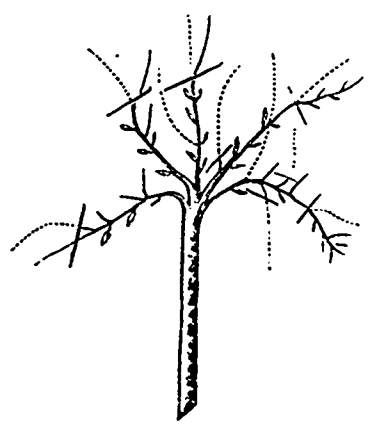


Fig. 7—Tree shortened back to produce fruitfulnes; branches indicated by dotted lines to be cut off.

as the Duchess of Oldenburg Apple, can be shortened back more closely than those of which the Golden Russet is a type; these should only be thinned of their branches to prevent the tops becoming too dense. If the method of pruning from the start is followed as stated, there will be no large branches to cut off and the tree will have to experience no shock to its system caused by their amputation.

Pruning is important to the health and longevity of the tree in respect to the fact that trees, in perfect condition are better able to ward off the attacks of insects and parasitical growths of lichen or fungi which infest sickly ones.

G. MOORE.

SAN JOSE SCALE.

The following account of this insect, which I gave in the form of an interview to a newspaper reporter, covers the most important features connected with the life history, spread, and preventive remedies at present known, relating to this insect.

JOHN CRAIG,

Experimental Farm,
Ottawa.

A DANGEROUS ENEMY TO CANADA'S FRUIT INTERESTS.

Ottawa, July 19th.—Public attention has, of late, been frequently drawn to the consideration of a comparatively new pest, the San Jose Scale, so called. As it is a subject which might be fitly and profitably referred to at this time, I deemed it advisable to interview the Horticulturist at the Experimental Farm in respect to this scourge which is threatening the property of the farmer and fruit-grower in all parts of the Dominion. Accordingly, I visited the Central Farm, this morning, and found Mr. Craig busily engaged in examining some samples of plum foliage, covered with scale life in nearly all its various stages. These samples he had secured during his recent visit to the Niagara district. Upon asking his opinion as to the gravity of the situation in respect to the subject under consideration, he replied as follows:—

"I am very glad indeed to give you my opinion at this juncture on a question which I think is, in all its bearings, of greater interest and importance to the fruit industry of Canada, than any other which has appeared during my life-time. It is stated by the newspapers that fruit-growers are alarmed by the appearance of the San Jose scale, and you ask me if the cause of the alarm is well founded, or if it is merely a newspaper scare? I believe that there is every reason for the fruit-growers of to-day to view with the greatest possible concern the probable outcome and effect of this threatened invasion of orchards by the San Jose scale.

ITS LIFE HISTORY.

What is the scale you ask? To answer this you must allow me to digress a little, and to draw your attention to a class of insects whose habits and life history are insufficiently studied, and therefore little understood, by fruit-growers in general. An insect, to the mind of the average fruit-grower, gives him an impression of a grub, a beetle or a butterfly. The San Jose scale is unlike any of these three classes. It is, at first, a microscopic, or almost microscopic, soft, oval bodied, orange-colored, six-legged louse. This little chap who is less than a fiftieth part of an inch, in length, is supplied like a mosquito, with a small tube-like sucking attachment. With this instrument it attaches itself to the bark of trees. It is not particular as to its kind of food,—apples, plums, pears, peaches, ornamental shrubs and small fruits, suiting its appetite equally well. Within a few hours after the little insect becomes attached to the bark, an excretion is thrown out, around and over its body. This excretion hardens until it forms practically a shell, or cover, attaching it to the bark and protecting the soft bodied insect within. There are several insects which, like the San Jose scale, are supplied with this shell-like covering, among which are the oyster-shell bark louse, so common in Eastern Canada, and the scurfy bark louse, found in greater quantity in the central states than in the East. These, with the San Jose scale, are classed among the armored scales on account of their body protection. It is rather interesting to look into the history of the San Jose scale.

ITS HISTORY.

"We find that this scale has been known in California since 1870, but it was not described, nor was its life history worked out, until Prof. Comstock, of Cornell University, undertook the work in 1880. A study of the habits and the vast injuries wrought by this peculiar insect, induced Prof. Comstock to give it the name of the pernicious scale (Aspidiotus perniciosus). The fact that it was first discovered in the San Jose Valley, California, accounts for the popular title which is usually given it. Its spread in eastern America has been marvellously rapid. In 1893, it was first discovered east of the Rocky mountains, in an orchard in Maryland. From bulletins, in my office at the present time, relating to the insect, I learn that its dread presence has been discovered in nearly thirty of the fruit producing States of the Union. But to return to the life history of the insect. We had arived at the point where the young insect had attached itself to the bark and was protected by its scaly covering. Some 12 or 15 days after it becomes fixed, the insect passes its first moult losing its skin, legs and antennae,—these remain attached to the scale. When a little more than a month old, the female begins to bring forth young. At this point I notice your surprise. You ask me do not all insects multiply by means of eggs? I answer, yes, that is the usual method of re-production, but in the case of the San Jose scale and some other insects of the lower orders, such as plantlice, the females are able to reproduce their young alive, and this is the feature and characteristic of this scale which makes it so dangerous. In the climate of Southern Ontario, a female scale will certainly be able to bring forth during the season three generations, and possibly four. Last evening, while examining, under the microscope, the body of a female, I counted, within her, 61 young insects in various stages of development. It is said that a single brood may include 100 individuals. When it is realized that each one of these in turn may, in one short month, give birth to as many more, and repeat the operation before close of the season, we can readily appreciate the truth of the statement that the product of a single female scale, under favorable circumstances, may amount in one season to 1,500,000,000. A billon and a half, as you say, is rather a large family. There is a great preponderance of the female scales over the male. Their appearance too, is slightly different. One of the distinctive characteristics of San Jose is a small, nipple-like protuberance which appears about the centre of the scaly covering. In the female, this is approximately in the centre, and the scale is always circular in form. The male is oval in form, and bears the nipple near one end. The male scale in its later stages of life usually develops wings. The young insect, after it emerges from beneath the mother scale, is quite active, it may crawl only 2 or 3 inches before fixing itself to the bark, or it may travel a foot or more. On a half-grown plum I found 400 scales which had only fixed themselves evidently within a few days. Upon the upper side of a plum leaf, by a careful estimate I concluded there were fully 4,000 young scales set. The minute size of the insect, in its larval form, gives it unusual facilities for being transferred from tree to tree by various agencies. The larger insects, such as beetles, butter-flies and bees will, undoubtedly, carry away on their legs and distribute the young larvae. Birds also offer a means of dissemination, and horses, while cultivating an orchard, may easily transfer the young scales and larval from branch to branch as they brush along their backs.

SPREAD IN CANADA.

"Information as to the spread of the pest in Canada is not exact.

"We know of 4 or 5 sections,—and I should like to take this opportunity of warning fruit-growers against withholding from us information which might lead to the discovery of the scale in their own or their neighbours' orchards. It is not difficult to detect its presence, and those who have obtained stock from New Jersey, Ohio, or New York nurseries, should at once examine such trees. Badly affected trees will present an unhealthy appearance. A close examination will show the bark to be more or less completely covered, to be minutely roughened, somewhat encrusted, and of a dusky or dark greyish hue. Rub the surface with the finger and it will have a greasy feel, due to the exudation of an oily fluid from the crushed bodies of the insects. A superficial examination with a hand-lens will reveal the characteristic nipples and circular groove surrounding these.

PREVENTIVES AND REMEDIES.

"Doubtless the best preventive is to keep out fruit-trees and stock from other States where the scale is known to exist. It is manifestly the duty of the farmer and fruit-grower to consider his own interest, his neighbours', and those of the community in general, by purchasing stock only from nurserymen, who can furnish, with each bill of trees, a certificate signed by a competent entomologist, that such nursery is free from this injurious pest. Where trees are already infected, I am of the opinion that the wisest course to pursue is to tear them up and burn them root and branch. The best treatment is spraying or washing the trees, in winter, with whale-oil soap, using a strong mixture, made by mixing 2 lbs. of the soap in a gallon of hot water. This is applied after the leaves fall. During summer, when the insects are active, kerosene emulsion is probably the best remedial measure. The situation, on the whole, demands energetic, intelligent and persevering effort on the part of fruit-growers and government officials. The authorities of both departments of Agriculture, (Ontario and Ottawa), are studying means and methods for the destruction of the insect and the preservation of our great fruit industry. It is only by the close and hearty co-operation of all concerned, that we may hope to circumvent an enemy which is characterized by Dr. Howard, Chief of the Entomological department, at Washington, as the most serious menace ever known to the deciduous fruit interest of the country."

A. V. W.

The Horse.

HORSES OF ENGLAND.

Crosses — Spanish — Eastern — Thoroughbreds.

When Cæsar invaded Britain in the year 55 B. C. the cavalry horses which he brought with him were crossed with the native breeds which he found on the island; thus new blood, consisting of strains from every quarter from which Roman remounts were procured, "when Rome was empress of the world," was infused into the native breed. Five hundred years later, 449 A. D., the great black horse from the valleys of the Rhine and Elbe was introduced by the Saxons and Jutes.

The next authentic record we have of anything relating to the horse in England was in the reign of Athelstan, about 925 A. D., when a law was passed prohibiting the export of horses, except for presents. Even at this early time English horses must have been highly valued, or a law prohibiting export would not have been passed. This excellence was probably produced in part by judicious breeding, but also by the admixture of blood from so many different countries. England was at that time a mixing ground for horses, to the same extent that it was a land of union between various races and tribes of men. Uniting various races of men has produced the English speaking nations of the world, and uniting various races of horses has produced the English horse. Can any better recommendation of judicious mixing of blood be required?

In the reign of Edward III, about the middle of the fourteenth century, it is recorded that fifty Spanish horses, which were probably jennets, were brought to England. These Spanish jennets were small, active horses; a cross of the Arabian and Barb. More of these were imported about 1382. At this time, the tendency was to breed light horses; the increasing demand, however, for heavier horses capable of carrying the heavy arms, (both offensive and defensive) of the period, soon put a stop to this practice, and heavier animals were bred. The Crusaders probably introduced fresh strains from the East, although some authorities think that very little Oriental blood was brought to England by them.

The next record of importation was of heavy horses. King John, who reigned from 1199 to 1216, brought into the country, at one time, one hundred Flemish stallions. This was perhaps the largest single importation of horses ever brought to England. They were introduced in order to increase the size and strength of the native breed which seem again to have become too small for service in war.

During the reign of Richard III, about 1483, the system of post-horses was introduced; (1) this again created a demand for lighter, or at least quicker horses than the ordinary English native had become. The tendency in France at this time was in the same direction, the heavy war chargers of Charlemagne were being replaced by the lighter and more active Percheron.

Henry VII, who succeeded Richard III, ascending the throne in 1485, prohibited the export of stallions, but allowed mares to be taken from the country; many of these went to France where their blood was mingled with the Norman. Again we see exportation partly prohibited, probably, as in the previous case, on account of the superiority of British horses which the sovereigns of England wished to retain.

When James I, who had an inordinate fondness for racing, came to the throne in 1603, he found that English horses were too slow to suit him, so he gave 500 guineas, a large sum for the time, for an Arab stallion which had been procured from Constantinople by a Mr. Markham, and which has since been known as Markham's Arabian. This horse was not a success either for speed or as a sire, so James bought another Eastern horse, known as Place's White Turk, which proved to be a great factor for increasing speed and stamina in the English racer. Charles I who succeeded James I continued to breed light horses until there was danger of the heavier animals becoming extinct.

This breeding of racers by James I was the foundation of the race horse of England. Charles II continued in the same line by importing Barbs and Turkish stallions. Henry VIII also imported hot-blooded (1) horses from Turkey, Naples and Spain; and in 1523 he passed an act prohibiting the grazing of entire horses over two years old and under fifteen hands, on the commons. This act also caused the poorer animals in the forests and waste places to be killed off every year. The aim of the law was to prevent poor animals from breeding. Here was an instance of artificial selection worthy of note by modern breeders of live stock.

During the reign of Elizabeth, from 1558 to 1603, the introduction of carriages created a demand, as in France, for a lighter and quicker horse than the typical charger of the time. Gunpowder was also invented during this period; this caused lighter armor to be worn, and hence more active cavalry horses were desired. The Persian horse, which is a descendent of the Arabian, was brought in at this time, and by the infusion of this blood, an excellent type was produced.

Charles II who reigned from 1660 to 1685 imported, for breeding purposes, fifty hot-blooded mares, Barbs, Turks and Arabs, known afterwards as the Royal Mares. During the reign of William III who lived from 1650 to 1702, the first of three horses to which all modern thoroughbreds trace, namely Byerly Turk, was imported. The other two are the Darley Arabian and the Godolphin Arabian. The Godolphin Arabian was, however, wrongly named, as he was in reality a Barb imported from France to England. He was a small horse, only 15 hands high.

All thoroughbreds must trace back in the male line directly to one of these three stallions mentioned above. In fact it is impossible to find one that does not combine the blood of all three.

The Straddling Turk, another famous stallion was brought to England during the reign of James I. The Darley Arabian was imported during the reign of Queen Anne. From this small bay stallion the very best horses have descended. He was the sire of many of the most noted horses of the turf; among them are Monica, Aleppo, Almanzor and Flying Childers. Flying Childers, Eclipse, Herod, and Matchem were the greatest sons of the three original hot-blooded stallions.

Native mares of England, mostly Cleveland Bays, had much to do in forming the racer; they gave size, while the Eastern blood gave endurance, nerve and speed.

The thoroughbred marks the last epoch in the development of British horses. Excepting the American trotter which, however, is made up largely of his blood, he is the most wonderful horse ever produced; far exceeding in size, strength, endurance and speed his hot-blooded ancestors of the desert. (1)

CHAS. S. MOORE, B. S. A.

Stanbridge East, Que.

(1) The "post-horse" was ridden by the traveller. No stages, or "machines," as they were called, were in vogue for nearly 200 years after Richard III.

(1) What an epithet!—Ed.

Farmers' Clubs.

PORTNEUF COUNTY.

By Dr. W. GRIGNON.

(Continued).

A great quantity of gas-lime and wood-ashes is used. There are some parishes that bought this year two carloads of salt, 5 of ashes, and ten of gas-lime. Ashes cost 17 cts. a bushel, and gas-lime, 40 cts. for three bushels. And yet, at Montreal, this lime can be drawn from the gas-works for nothing.

THE CREAMERIES AND CHEESERIES IN PORTNEUF.

Here, there are 12 creameries, 38 cheeseries, and 2 combined factories, of which one-third are syndicated. All of them are under the control of an inspector of syndicates, and it is a pleasure to observe that this inspection is signally advantageous.

ST. AUGUSTIN.

GAS-LIME.—This is lime that has served for the purification of gas for lighting. Dr. Larue, a former M. L. C., was the first to use this extensively. In order to induce the farmers to follow his example, he persuaded the C. P. R. to carry the lime from Quebec to St. Augustin, for a mere trifle. In 1885 or 1886, in the Legislative Council, Dr. Larue advised the use of gas-lime and ashes as manure, but it was a long time before he could get farmers to use them. At last, MM. Onésime and Alfred Cantin, hazarded the purchase of a few hogshead of lime and ashes, and to-day every one uses them. The universal opinion is that the lime, to be effective, must be spread on the ploughed surface in the fall.

M. Edmond Valin tried the following experiment: he spread lime on two previously ploughed ridges, and ashes on two others; the grain on the limed ridge was not so fine as the grain on the other, but the grass following in the rotation was equally good on both.

DRAINAGE.—The Revd. Curé Pilotte, the founder of the Farm-school of Ste-Anne de la Pocatière, was the first some 18 years ago, to try land-drainage. He drained the whole of the glebe and that most successfully; consequently, his example was followed by his flock, notably by M. A. Couture, the Mayor, M. A. Raté, Frs. Couture, Ed. Valin, etc. M. Valin has 20 arpents drained.

We find here a winter creamery, and 1 cheesery, 3 silos, 10 dung-pits, and 90 dung-sheds among 100 farmers. Last season, the Club bought 150 bags of timothy-and clover-seed in due proportions. The usual corn sown is the "Yellow Flint," for both silo and green-fodder.

THE HENHOUSE.—ITS RETURNS.—POULTRY-FOOD.—M. Ed. Valin, the Club's secretary, is an active, energetic young farmer. The secret of his success is contained in the words: I follow the market. His specialty is poultry. He has two incubators, one of which cost $18.00, the other, $75.00. The latter broods 300 eggs at once.

"I sell eggs and butter to customers whom I deceive neither as to the quality of the goods nor as to their punctual delivery. At present, (April 6th), I am selling my eggs at 18 cts. a dozen. For the last 3 years I have kept 150 hens, and this year I mean to have 300 which I shall keep as long as the market requires it. Not one of my hens has brought in less than a dollar a year, and their keep costs about 25 cts., though, as far as I can see, the sale of chickens pays for the keep of the hens. I feed on grain, meat, bone-meal, oyster-shells, cabbage, clover chaffed and scalded; still, after all the food the great thing is to get them to scratch and to keep them dry (it is worth while to hear M. Valin enlarge upon these two points). They have wood-and coal-ashes to scrabble among. Last year, I bought 3 old horses and 2 old cows, cheap, which I slaughtered as food for my poultry; (1) the bones I ground up in my mill for them; and I think this pays better than burning the carcases of animals that die on the farm and have them scratched up again by dogs. Of course the hens have all the kitchen-waste. I keep regular accounts, for which I gained the greatest number of marks in the Merite agricole competition, and I fearlessly maintain that poultry is almost the most profitable department of the farm.

"Five days after setting, I make a candle-test (je mire) of the eggs. If the eggs are fecund it is easy to tell, for one can see the head of the chick, but if sterile, the whole will seem a dull white. These latter I lay aside for subsequent cooking, and give them, mixed with bread-crumbs, to the chicks during their first month." M. Valin takes in 5 periodicals treating of poultry alone.

LES ECUREUILS.

"A small parish."—Only 43 farmers. Nearly 100 persons were present at the lecture. The Curé, M. Soulard, is an enthusiast about farming. No Club, but every one is anxious for one to be started. Some of the farmers belong to clubs in the neighborhood.

(To be continued)

(1) What would Mr. Huntington and Miss Dillon say to this?—Ed.

(1) We should have thought, for a pack of hounds!—Ed.

Special Notices.

Some Uses of Salt.

Potatoes should always be boiled in salt water in preference to the practice of salting them afterwards, because salt water boiling at a higher temperature than fresh water, the cooking is more perfect, and the flavour preserved.

Cooking, baking, &c.

Cabbages, broccoli, Brussels sprouts, and cauliflowers should always be put in salt water before cooking to bring out any insects Lettuce, celery, spinach, watercress and other vegetable eaten raw, should be cleansed in salt water to destroy worms and other animalculae

Salt as a Disinfectant.

HOUSEHOLDERS WOULD ALSO FIND THE ATMOSPHERE CONSIDERABLY PURIFIED by throwing salt occasionally upon the contents of the ashpit; salt absorbs the noxious gases arising from decaying refuse and vegetable matter. A few handfuls of salt thrown daily into the water closets, and occasionally into the wash-basins, would counteract, to a large extent the dangerous effects of the sewer gas.

Salting Manure Heaps.

Horsekeepers and gardeners will find salt most useful for their manure heaps in destroying vermin and in preventing too rapid fermentation and the consequent escape of ammonia.

Weeds.

To destroy weeds in pavements and garden walks, make a strong brine with salt and boiling water. Apply with a watering can. A moderate quantity of salt stimulates the growth of all vegetation, it is therefore a mistake to suppose that a sprinkling of salt will exterminate weeds.

Salt mixed with their food is a necessity for Poultry. The best eggs come from places near the sea coast

The Value of Coarse Foods.

I first used Herbageum for my entire and working horses, and found it very beneficial. It picks up a horse rapidly that is run down or is off his feed.

I weaned a colt four months old, and as it was rather thin I commenced feeding it skim milk with Herbageum, and have had unusually good results with it. In less than two weeks a good growth was started, and from that on there was a steady gain in flesh. In the spring I fed sour whey with bran and Herbageum, and to-day the colt is a very fine one for his age.

My next test was with fat cattle that were not doing well. They were getting straw once a day, and about every ten to twelve days they would get off their feed, and for a couple of days would refuse food. After I began with Herbageum they never refused their feed, and I was able to give straw twice daily, which was eaten clean. I find that straw and other coarse foods will be eaten clean in larger quantities when Herbageum is fed, thus saving hay and grain

After this, I decided to try it on my milch cows, and found it satisfactory. I had no means of testing for improved quality, but as milk was paid for at the creamery by test, I found at the end of the season that I received between five and six cents per 100 lbs. more than a neighbor, whose cows appeared as good as mine, if not better, and I think that the gain in returns made the Herbageum profitable.

Yous directions say to give a smaller feed ration when Herbageum is used, but my experience is that for working horses there should be no reduction in the regular ration, unless they have been over-fed and cannot assimilate the heavy feed. And with cattle there should be fed all they can assimilate, and with Herbageum more straw and coarse foods as well as hay and grain can be assimilated.

With a ration of grain and coarse food one tablespoonful of Herbageum daily is sufficient. When there is no grain, only coarse feed given, a tablespoonful twice daily will be required to secure the best results.

D. A. McFARLANE.

Trout River, Huntingdon P. O., Que,
July 15th, 1896.

Sherbrooke Exhibition.

The Official Programme for the Sherbrooke Fair has been issued, and can be obtained at this office at all railway stations, Post-Offices, General Stores, &c.

We would advise our readers to look it over carefully, as the programme is very complete, and tells exactly what is to take place each day, so that the public can judge for themselves the best days to attend

The programme also gives information as to special railway service on all the different lines, by which it will be seen that special excursions are run from all directions to Sherbrooke in some cases on two days, and on others during the whole week of the Fair.

The railway arrangements and accomodations have never been better, and with the very low rates secured, and the magnificent attractions offered, there can be no doubt that Sherbrooke will next week see a greater number of visitors than it has ever seen before.