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THE JOURNAL OF AGRICULTURE AND HORTICULTURE

VOL. 2. No. 4 — This Journal replaces the former "Journal of Agriculture," is delivered free to all members of Farmers' Clubs. — AUGUST 15, 1898

..THE..

Journal of Agriculture and Horticulture

THE JOURNAL OF AGRICULTURE AND HORTICULTURE is the official organ of the Council of Agriculture of the Province of Quebec. It is issued Bi-monthly and is designed to include not only in name, but in fact, anything concerned with Agriculture and Stock-Raising, Horticulture &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 AND HORTICULTURE, 4 Lincoln Avenue, Montreal. For RATES of advertisements, etc., address the Publishers

LA PATRIE PUBLISHING CO.,
77, 79 & 81 St. James St., Montreal.

Subscription: $1.00 per Annum payable in advance.

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Notes by the Way.

STE-ANNE DE BELLEVUE.

The farms in this neighbourhood are of very good quality; though the soil is light, it responds very kindly to liberal treatment, and only asks for small and frequent dressings of manure to produce capital crops of all kinds, especially of carrots. As the little pasture there is never sees the dung-cart, and green fodder-crops are rarely grown, the factories are not very lavishly supplied. Except at night and in the early morning, the cows get but little water; on one farm in particular, the only drinking place is a mud-hole, about 6 x 7 feet, into which the drainage from the St. Mary's road runs, all the water for the buildings having to be carted up from the river. When the cows are driven home for the evening's milking, it is easy to see, by the rush they make to the river, how keenly they feel their need of a good drink.

Drainage seems to be impossible here, as the only outlet is so serpentine in its course, and its bed is so rocky, that nothing short of a combination of the neighbours can cope with it. A pity; for some of the best land in the parish is thereby rendered almost useless.

Harvest on the farm whereon we are at present residing, is about over (Aug. 5th), and the second cut of clover is down. Not so good as it promised to be in the beginning of July, as the extraordinary heat and drought of the last five weeks ripened the clover-heads too rapidly, on the stony bank near the river. The oats, where sown alone, are a good crop, but, as we predicted in the last No. of the Journal, the pease in the *gabourage*, (1)

(1) Called, in part of the province, *goudriole*. ED.

overpowered the oats and laid them low, rendering it impossible to cut the crop with the machine.

The corn looks well, though the ears of the larger kinds, of which there are two, are not so forward as they might be ; but those of the little Canadian corn are astonishing, and, which is an immense advantage in an average year, are very forward indeed.

On the whole piece, some 3½ acres, one may fairly say, there is not a weed to be seen. What it must have cost to have cleared the rubbish all off, is quite beside the question: there it is; a field of corn *perfectly clean*.

Not so *the roots ;* though there is not much fault to find with them, the spaces between the drills show signs of having been worked with the horse-hoe when too wet. However, both carrots and mangels, though the latter were left much too thick, are looking splendidly. We should have preferred sowing white Belgian carrots to the half-long red ; though the latter may be, perhaps, a little better in quality than the Belgians, the yield is so much less that the larger crop more than makes up for it. The mangels are the long-orange, and will be, in spite of their standing too thick, a heavy yield. A small piece of swedes, in a *bas-fond*, looks full of life, but as they are only about 6 inches apart, they will be all top.

Creamery.—There is a very tidy, well kept creamery in the village, in which the butter-maker is the proprietor himself, a Monsieur D'Urfé. Can he be a descendant of the famous *Thomas Durfey*, Charles II's favourite ballad writer, who composed the old catch :

"Dame Durden had five serving men
To use the spade and flail,
She also had five serving girls
To carry the milking pail."

A more intelligent man than Mr. D'Urfé is rarely to be met with. He has a large farm near the creamery, and from a long conversation we had with him, we should be inclined to think that a few lectures from his lips would be likely to do his neighbours a great deal of good. His ideas upon cattle feeding, clover-haymaking, etc., are sound and not arrived at without thought. As the creamery did not begin operations till last May, it would be rash to predict success or failure for its future, but it is centrally situated, well installed, and Mr. D'Urfé is obliging, and, at the same time, firm ; two qualities that, when combined in the same man, go far towards making a perfect factory-proprietor and dairyman. His books, that he was good enough to show us, give the average daily receipts of milk at about 5,000 lbs. a day : pretty fair to start with. Bran $13.00 a ton in Montreal, $18.00 at Ste-Anne's ! ! !

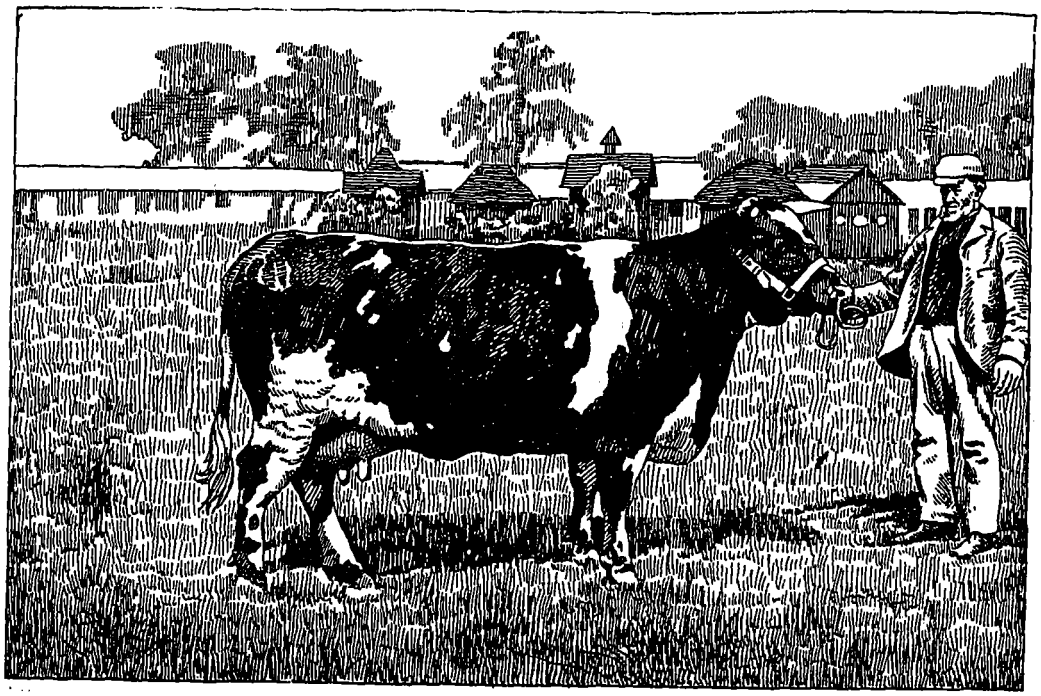
Such a summer we rarely recollect. From the 7th July to the same date in August, we noted the following temperatures at 2.30 p. m., with a northern exposure of the thermometer :

July		July	
7	86°	19	90°
8	80	20	94
9	76	21	84
10	A frost in many places.	22	80
		23	84
11	76°	24	92
12	78	25	95
13	76	26	84
14	81	27	90
15	80	28	94
16	81	29	90
17	80	30	80
18	88	31	78
August		**August**	
1	81°	6	80°
2	80	7	84
3	84	8	86
4	83	9	81
5	79		

And yet, people wondered at the crops coming on so fast, that they wanted cutting before the farmer was ready for them.

The Reburn farm.—We were surprised to find how much deterioration a farm could suffer in a couple of years as we were going over the farm so well known as that belonging formerly to Mr. Reburn, the breeder of Jersey cattle. The stables, cowhouse, and dairy are still there, and so is the *corpus vile* of the land ; but the state of the crops is very different from what its used to be. There are 30 acres of potatoes ; the later planted ones were unhoed and unearthed up on the day of our visit—July 23rd—and adjoining one piece of potatoes, were a couple of acres of swedes and mangels

that for absolute neglectfulness exceeded anything we ever saw. And the more shocking was this state of things that as we happen to know, the outgoing farmer, Mr. Reburn, left behind him a vast treasury of manure. The men on the place told us that, the rent of the farm—about 220 arpents—was $750.00, and that all the stock kept was 14 cows and 7 horses. How the land was farmed in Mr. Reburn's time we do not know, as we never were over it before this summer; but the hay-crop in the barns, the strength of the standing grain, and the luxuriant growth of the potato-tops, show that, at any rate he did not spare the dung-cart. Now, to anyone who knows what farming is, it is a sad sight. And close to a station; and only 18 miles from a great consuming centre like Montreal! Should not we like it, if we were a few years younger!



SHORTHORN COW JEWEL II.

The property of Mr. C. W. Brierley, Eng. Winner of First and Champion Prizes.

We never saw in one day so much discoloured, spoilt hay as we remarked between Ste-Anne's and Montreal on the 4th July: all clover, of course. It must have been *hay* before the mower went into the field, and of course the great rainstorm of Sunday the 3rd had made it into something more like dung than anything else. Could not a lecturer go round the country reiterating the counsel: "Cut your clover early," and nothing else? If farmers would only listen to those who have seen the clover-hay in the London market selling for "a pound a load," i. e., five dollars for 2,016 lbs., higher than any other hay, they would be rejoiced before the first winter's feeding was over.

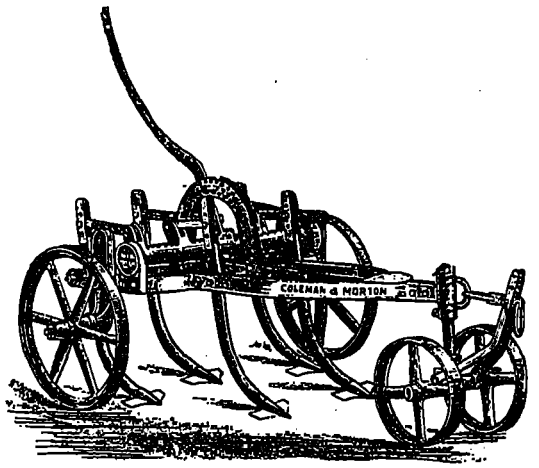
And here we may mention that, according to the Rural New Yorker, a German man of science has shown that the reason why silage is more profitable than the same fodder when dried is, that its nutritive effect is modified by the "ease of digestion!" Any one can see that a great mass of hard woody material takes an amazing amount of hard-wrought energy to work it up in the internal economy of an animal, and that energy is so much productive power taken from the animal. The advantage, then, of cutting hay before it becomes hard and woody, must be apparent to any one who believes in the value of silage. But, we fear, there will be an immense quantity of hay, especially of clover-hay, ruined this season, not by being cut too late, but by being allowed to lie too

long after being cut. Work pressed so much during the period from the 25th of July to the 10th of August, that it was a matter for decision whether to neglect the hay or the grain. Not very far from the place where we are writing, a piece of aftermath clover, cut in perfect season, is lying under the sun and drying up till the upper stratum crumbles like snuff. Nobody's fault, for a fine upstanding piece of oats is ready for carrying, and the weather is threatening.

Sheep in England.—Now, here is a marvellous thing! At the great annual show of the Royal Agricultural Society, held this year at Birmingham, there was not a single Cotswold exhibited, though that city is in the neighbourhood of the Hills whence the breed takes its name. Still more curious is the fact, that at the Gloucestershire show, the most remarkable feature was the entire absence of Cotswold sheep, the three classes, with $150.00 prize-money, failing to attract a single entry. This is difficult to explain, seeing that the native habitat of the breed was visible from the show-yard. But the most wonderful of all parts connected with sheep this summer is the price for which the champion of the great Riby flock of Lincolns was sold. Mr. Dudding, the owner, must have been "hard to hold," when the bidding was going on. At last, the auctioneer's hammer fell to Mr Miller's bid, on South American account, of: how much, do you think? Only the trifling sum of *one thousand guineas*, $5,000.00!!! Several rams sold, at the same auction, at over $500.00; one fetched $1,550.00, two, $1,000.00, and $1,025.00, the average of the whole 52 rams being $430.00. The ewes sold for $41.00 a piece, the whole of the sale amounting to $24,230.00.

Shorthorns in England.—On the same day on which the great sale at Riby took place, a sale of Shorthorns was held at Melton Ross, the son of the great Southdown breeder, Mr. Jonas Webb, of Babraham, being what the Scots call, the *exposer*. The father of the present Jonas Webb, whom we knew well, bred some capital shorthorns, one of which, a bull named "The Proctor," we bought of him. The prices realised on the whole were fair, the cows averaging $200.00, and the bulls, $160.00, the highest price, $525.00, being paid for Waterloo Heiress, whose name tells her pedigree.

Surface cultivation.—To stir the land freely during dry weather is an important, advantageous, and needful task. As rapidly as a crop is cleared off the field let the stalks, bine, roots, and weeds be disturbed. Never allow cabbage stalks, pea or bean haulm, or the indigenous flora of the country to continue drawing the sustenance out of the soil. Break up the surface, and allow the sun's rays to penetrate, gather up stalks and weeds for burning, then roll and harrow immediately to avoid the mould becoming rough, coarse, and hard, as this may be detrimental to a future plan.



Coleman & Morton's Cultivator.

No implement is more generally useful for farmers than Coleman and Morton's cultivator, which is an indispensable machine in the summer months. It is also available for spring and autumn cultivation, it works down the soil for the sower early in the season, and cleans the field in the autumn at a time that weeds need checking. When it was introduced many years ago there was great prejudice against it by rural horsemen, and, as is often the case when a new implement is tried, they endeavoured by a nickname to hinder its popularity. Thus the cultivator was named the *devil*. But it has outlived this form of obstruction, and is now to be seen at work on most gardens and farms. Much land at this season is better stirred than ploughed, as weeds and rubbish, if turned in, come to the surface again on a second ploughing.

If the *débris* of a former crop are ploughed in, they hinder a subsequent ploughing. Then, any sober man that can manage horses can drive a cultivator, whilst able ploughmen are in great request. Crops

are frequently sown after the land has been cultivated with this implement without the need of the plough at all.

There will be lots of chances for cleaning the stubbles after harvest this year. No better shaped implement for that purpose was ever made than the Coleman's drag-harrow, as it used to be called in our day, i. e., in 1852, when we first used one. The *broad-shares* pare off the surface, and are then taken off, and their work crossed with the *points*, followed by the harrow and, if needed, by the roller, the couch-grass (*quitch, twitch*, or the *chien-dent* of the French) being subsequently collected by the horse-rake, etc. It is a pretty sight, on a fine September evening in England, to see, on the heavy land farms heaps of little fires smouldering away. The smell of a weed-heap burning has still so great an attraction for us, in the fall, that its first perception almost brings tears into our eyes.

The form of the tines of the Coleman is such that, instead of gathering up the weeds as they are dragged from the ground, it allows them to slip off on either side. All grubber tines that are perpendicular in position are clearly faulty in construction, and the same holds good with the hoes of the horse-implement.

Sugar in England.—Though it is clear, from the experiments of Lawer and Gilbert, carried out in 1871 to 1875, that the sugar-beet might be profitably grown in England, yet, owing to the perversity of Russia and France, neither of which countries will consider the question of internal bounties, the hopes of those who, a few months ago, were full of eager anticipation of benefits to be derived from sugar-making in England from home-grown materials, are doomed to be disappointed. Those great beet-growing nations, Germany, Austria, Hungary and Belgium are in favour of the total abolition of bounties, both direct and indirect: but the other two, France and Russia, will not hear of it. So, nothing can be done at present, unless importing countries impose counteracting duties on sugar, a step which will be taken by Great Britain when the sky falls.

The crops in Britain.—There is no doubt about it: the crops, with the exception, perhaps, of pease, in Britain are superior to any that have been grown there for several years. From Yorkshire to Cornwall, from Norfolk to Lancashire, the same glad note is heard from the farmer, that hay is even superabundant; one well-known Norfolk man puts it down at 50% over the average; wheat much over the average; barley, perhaps a little too quick in ripening, but decidedly good; oats very good; roots, including mangels, a full plant, and the harvest, beginning with the wheat crop, in full swing in the South in the first week of August. The only drawback, as far as we can gather from the published reports, is that, owing to the drought of July, the pastures are pretty bare, and, in consequence, milk is not plentiful, and cheese is going up, which will be good news to our Canada farmer.

But, among all these favourable reports, it is amusing to see how, here and there, the old wailing cry of the ill used tenant-farmer will persist in making itself heard: e. g.

"What appears to be an average, though, owing to the long, cold spring, the threshing-machine may tell a different tale." Essex report.

"Wheat———a most luxuriant appearance, I fear the threshing-machine will spread the news that 'Delusive hopes will charm no more.' There is certainly some rust, and if it spreads, it will mean from 1 to 2 quarters (8 to 16 bushels) less yield per acre." Hampshire report.

Now, as the best white wheat is worth 41s., $10.00 a quarter, or $1.25 a bushel, and the average crop, on which it is fair to calculate, will be at least 32 bushels to the acre, it follows that the gross return of an acre of wheat this year, at present prices will be nearly $40.00; rather a difference from what it was three years ago, when the gross return did not exceed an average of from $18.00 to $20.00!

The great questions now are: will the landlords raise their rents again, or not? If they are wise, they will let them remain at their present rate for the present, until it is seen whether the prices of to-day are likely to continue.

Prices of farm-produce in London.—Wheat, from 40s. for red to 41s. for white, per quarter; barley, none worth speaking of except grinding stuff from abroad at 17s. per 400 lbs.; Oats, from 17s. to 26s. the 8 bushels; and pease from 30s. to 40s. for the blue kind; Canada pease are worth 28s.

Sheep.—64 lbs. Downs are worth about 15 cents, heavy Lincolns 11 cents, and old ewes (i. e. up-

wards of 3 years old) 10 cents a pound. Lamb trade over.

Cattle.—Best 90 stone (720 lbs.) Herefords and Welsh (*runts*) 14 cents; fat cows, 9 to 10 cents a pound, sinking the offal.

Butter.—Irish creameries up to 86s., Danish to 90s., Canadian 84s., which must be highly pleasing to Messrs. Fisher and Robertson.

Cheese.—English Cheddars up to 56s., Canadian 39s. for finest white, 41s. for finest coloured.

Bacon.—Irish lean, as high as 66s.; Danish, 64s.; Canadian, 58s.

Hams.—Canadian hams, best quality of lean, are worth 56s., American, only 45s.

The four last quotations are by the cwt. of 112 lbs.

Wool is cheap enough, best Down tegs only 17 cents a pound, Kents, etc., 13 cents.

Hops are not doing too well in England: lots of lice in spite of four or five washings. Crop not expected to exceed 7 to 8 cwt. an acre.

Hay.—Best meadow-hay is worth 84s., best clover 97s. the load of 2,016 lbs.

Household Matters.

(CONDUCTED BY MRS. JENNER FUST).

EXERCISE IN THE OPEN AIR.

There are a great number of people who make themselves believe they have no time to give themselves a little outing now and then, when they know and feel it is the very thing they want, to change the thoughts, and broaden the mind a bit, it may be from some little worry; there are those who try and worry along, on small means so as to make a good appearance in the world.

I know a case of this sort that happened this spring, in which the mother made herself really ill by trying to dress her daughter like her richer friends. The dress was a work of art, and the child was a lovely picture in it, but the mother's health and spirits broke down, and she is now in the country trying to build up both. I very much fear for a renewed attack of the same kind for the coming winter. There are always to be found foolish people who will sacrifice anything for fashion's sake. These people are often a nuisance to themselves and their belongings, they are bad housekeepers, and, consequently, their homes are badly ordered. Good servants are rare, and where the mistress of the house is careless, nothing will work evenly in it. Consequently, bad meals will be the rule, and is it any wonder that the male portion of the family will find amusement away from home? (No wonder at all. Ed.)

The tendency of the age seems to be a constant rush for excitement of some sort or other; people rush along, each one vying with the other as to who shall make the biggest advance in some wild scheme. There is no real quiet in this kind of life, and, consequently, a time comes when there is no longer the strength of mind, or means to keep it up, and the whole thing ends in bitter failure. The only really happy people are those who have the courage and strength of mind to lead an ordinary quiet life, caring little for what the world says, but going on in an ordinary quiet way, taking things as they come, easily; never overtaxing themselves in any way, but having the strength of mind to give up competition when it becomes too much for them.

SEASONABLE RECIPES: PRESERVES.

Apple jelly should be well boiled. Some varieties of apples require longer boiling than others, but never less than 20 minutes should be allowed after the sugar is added. To extract the juice of apples, they should neither be peeled nor cored, simply cut in slices; then three parts covered with water and stewed till quite soft. It is not generally known that the wild crab apples found in country hedges make a really delicious jelly, which those who have once tasted will probably prefer to that made with the cultivated fruit. The method is exactly similar.

A very pretty-looking jelly can be made with green, rather unripe grapes; very little water is used in which to stew them, and the juice is obtained like any other fruit. It must only boil 3 minutes after the sugar is in, and for every pint of juice, a pound or rather more of sugar will be required.

Jellies are best put away in small pots; to make them entirely air-tight, melted paraffin wax or mutton suet may be run over the top. This will form a hard cake, which can easily be removed when the jelly is required for use. Some clever persons can manage very well with ordinary wide-necked bottles. Their method is to cook the fruit

to be bottled with ¼ lb. of sugar to every pound of fruit, for ½ hour, then to turn it into the bottles, and quickly fasten them down ; but this plan does not always answer.

The only jars I can really recommend are those with screw tops, or with a glass or metal top covered with a rubber. To test these jars, partly fill with water, put on the top, and reverse them ; in 5 minutes' time if no water has oozed out, they are safe. Any kind of fruit can be used, but it must be firm, and not too ripe ; soft fruit, like raspberries or blackberries, seldom answers. A little syrup should be added to the top of each jar before putting on the lid ; to make which, dissolve about 8 or 10 ozs. of sugar in a little water, and as soon as it is ready, divide it amongst the jars.

RASPBERRY VINEGAR.

The following is a very easy recipe for this old-fashioned preparation, so useful for sore throats, and for a cooling drink during the hot weather : Put the required quantity of fresh ripe raspberries into a basin after picking off the stalks. Cover them with the best white wine vinegar. Leave them for eight or ten days, until a crust has formed on the top. Remove the crust, and strain the juice through a hair sieve ; weigh this, and to every pound allow a pound and a half of best loaf sugar. Boil sugar and juice together for ten minutes. When cold, bottle for use.

CURRANT, RASPBERRY OR STRAWBERRY SYRUP

Take either of these fruits, or a mixture if preferred, pick them from the stalks, and lay them in a preserving pan, which should be an enamelled one. To every pound of fruit allow three quarters of a pound of lump sugar, place this in a basin, and pour over it as much water as it will absorb, then add it to the fruit in the pan. Let it stand for twelve hours, then put the pan on the fire, and boil the contents about half an hour, skimming the top as the scum rises. Strain off the juice, and when cold bottle for use. The fruit which is strained off can be made into an inferior kind of jam, with a little fresh fruit, water and sugar added ; or it may be eaten with bread, or plain pudding, as it is. This syrup makes a nice drink, in the same way as the former recipe, and is also useful for sauce to some kind of puddings and sweets ; also for ice puddings.

STRAWBERRY JAM.

This jam is perhaps more difficult to make of a good colour and consistence than any other. The following recipe will be found very superior :— The strawberries should be large and red, but not too ripe ; pick them carefully, then throw them into a large pan of boiling water. The moment the water boils again strain the fruit from the water and leave it on the dish. Allow three-quarters of a pound of sugar to each pound of fruit, and put it into the preserving pan, with rather less than half a pint of water which scalded the strawberries, to the pound. Boil the syrup, without stirring, until a strong thread will form between the thumb and forefinger if dipped into it. Put in the strawberries, and watch till they boil. When this is the case, turn the jam at once into pots, using syrup and fruit in equal portions. Only three parts fill the pots, then when the jam is cold, fill up with the best French brandy ; do not stir up the jam, the brandy will mix with the fruit of itself.

The Spoon.—When stewing fruit, or, in fact, when cooking anything in an open vessel, do not leave the spoon in it if you wish to have it boiled quickly. The spoon carries a portion of the heat off into the air.

ICES, HOW TO MAKE THEM.

The making and freezing of ices used to be a most complicated and difficult operation — so much so, that they were only seen upon the tables of the wealthy. They are now, however, thanks to modern improvements in machinery, within the reach of any ordinary household, and can be made by any ordinary amateur. It is, perhaps, hardly necessary to say that ices are composed of congealed or frozen cream, custard, or water, combined with liqueurs or other flavourings, or the juices of fruits, and that these materials are not more expensive than those which go to form other sweets. Instructions are sent with every machine, but the general principle is the same with all ; the mixture to be frozen, whether cream or water, must be poured into the mould, which is fixed in its place, and the space between it and the bucket filled with finely broken ice and salt ; the lid of the mould is firmly screwed on, and the whole is allowed to stand a few minutes to become quite cold. The handle of machine is then revolved steadily, but slowly at first, for about 12

or 14 minutes, when the freezing should be completed. The most important addition to all the new ice cream freezers is, that as the handle revolves, by the turning of a wheel at the side, the cream is stirred at the same time as the congelation is going on; and the ice mould is properly ventilated, so that all need for opening the mould until the freezing is completed is avoided. It will be seen that when once the freezer is obtained, the principal expense of the ices will be confined to the rough ice itself, about 12 lbs. of which will be required for a small machine; the proportion of salt for this quantity will be 3 lbs.

VANILLA ICE CREAM.

1 pint of milk.	½ pint syrup.
2 eggs.	Vanilla flavouring.

Make a custard with the eggs and milk, let it cool, stir in the syrup and flavouring, then freeze Cost not more than 6d. It mill make a dozen small ices. Syrup is supposed to be better for sweetening ices than sugar; it is made with 1 lb. loaf sugar, boiled with ½ pint of water for a minute, then strained, and bottled for use.

In preparing ices, it must be remembered that too much sugar prevents their freezing properly, and too little makes them brittle. The quantity should therefore be very carefully regulated, and for this purpose an instrument is sold called a saccharometer, which will, if introduced into the mixture, sink or fall according to whether it contains the proper proportion of sugar or not; the cost is only 3s. 6d., and it is well worth the money in the trouble it saves. When summer fruit is in season delicious ices, both cream and water, can be made with its juice.

LEMON WATER ICE.

6 lemons	¼ lb. loaf sugar
1 pint of syrup	1 pint of water

Rub the lumps of sugar on the lemons until all the yellow part is removed, put them in a basin, with the lemon juice strained, a pint of boiling water, and the syrup. Stir till well mixed, and if too sweet add more water. Strain, and when cold freeze as before.

FRUIT SALADS.

Have you ever tried a fruit salad? They are most delicious, and now that fruit is so cheap and plentiful it is just the time to give one a trial. First, the fruit must be ripe, dry, and sound. All fruits are not suitable for this dish, but pine-apples, bananas, apricots, and peaches all combine perfectly. Oranges, lemons, melons, with a small admixture of candied cherries, greengages, and chestnuts, make an excellent fruit salad. The dish is exceedingly ornamental, and provides a charming addition to a luncheon supper, or dessert. Peel and slice the fruits evenly, and arrange in mixed layers in a deep glass dish, and when the fruit is nicely arranged add the dressing made in the following way. Put a tumbleful of water and two tablespoonfuls of sugar in to an enamelled saucepan and boil five minutes. Set it aside to cool, then stir in four tablespoonfuls of cream and the well-beaten yolk of an egg. When the dresing is cold pour it over the fruit very gently, being careful to cover every morsel completely, and let it slowly filter through. To make the fruit salad very ornamental beat up the whites of two eggs to a stiff froth and add powdered sugar. Spread it over the pyramid of fruit, piling it up to look rocky; then set the glass dish upon a flat china one, and arrange round it pretty clusters of leaves, and the result is a most ornamental dish for the supper or luncheon table.

ANOTHER FRUIT SALAD.

This is an agreeable sweet for summer use. A mixture of strawberries, raspberries, red and white, and currants may be taken. Apricots and peaches also make a good salad, but they should be peeled, cut in half, and the stones removed. Put the fruit in a deep glass dish, sprinkle it very thickly with caster sugar, then pour over wine, brandy, or some kind of liqueur; a mixture of sherry and brandy is very good. Stir the fruit lightly before serving. About three ounces of sugar to a pint and a half of fruit, with six tablesponsful of wine or brandy.

The Dairy.

RIPENING-CHAMBERS

The English market is crowded with cheese, and is becoming every year more and more difficult to please. Everyone agrees that nothing should be sent thither unless goods of the finest quality, and in order to ensure that our cheese be of the finest quality, it is absolutely necessary that:

1. It should be made of the best possible quality of milk; and this is the reason that the Dairymen's Association keeps on sending to the patrons of cheeseries bulletins on the care to be given to their milk.

2. That the cheese be well made, in factories kept perfectly clean; on this head, we have spoken before.

3. That the cheese, made from good milk, by a good maker, in a well kept cheesery, should be well matured, and it is on this head that we are going to enlarge to-day.

At what temperature should Cheddar be kept to secure proper ripening? The answer is: about 65° F. Mr. Sydney Fisher, the Minister of Agriculture, told us at the Nicolet Convention that Prof. Robertson had been making experiments on the subject, and that the result was, that cheese ripened in a temperature above 70°, is inferior, by a cent a pound, to cheese ripened in a temperature of from 64° to 68°. Hence, we must come to the conclusion that if a ripening-chamber is to do good work, it is indispensable that it should be capable of being kept at 65° or thereabouts. And, moreover, it is equally desirable that, by means of a good system of ventilation, the humidity of the air in the chamber be capable of control.

To do all this, doubtless demands a considerable outlay, and we are well aware that a good many proprietors are not in a position to afford it in the present state of their business. It is a most important question; and the factory-directors should take steps at once to obtain the means of securing the proper ripening of their cheese. Even if, at first, perfection cannot be attained, some improvement might be made.

We have still far too many cheeseries in which the ripening-chamber, a regular drying-room, is situated at the top of the building, just under the roof; yet in many factories it would be easy, and not very expensive, even were it necessary for the purpose to put two or three rows of shelves one upon another, to make the ripening-room in the lowest story. In many cheeseries the outside walls are not air-tight; would it be very difficult to place it there? would it be very expensive to put on the inside of the factory, on the posts (*montants*), a rough boarding, with two thicknesses of paper above, and an inner lining of tongue-and-grooved boards? (We do not understand this. ED.) If the outside wall is not made with posts, it will be necessary to lay the first thickness of rough boards on furrings, in order to interpose an air-space between the two walls.

As soon as the ripening-chamber is made air-tight, make in it a good ventilator, 12 to 15 inches in diameter, according to the size of the chamber; mind that it projects 6 to 7 feet through the roof; and below, in the chamber, make a sliding-door, with which to regulate the ventilation. (Cut from p. 12, French ed. of J. for July 8), A.A. B.B. Troughs C: Damp cloth, D: Cotton wick, E: Water.

Many makers, during hot weather, water the floor of the ripening-chamber; and a good plan it is, for the evaporation thereby produced tends to cove it.

But the followlng is a more lasting way of getting the same result: take a piece of pretty thick cotton-cloth (a bed-sheet of flannel would perhaps answer better); along the wall of the ripening-chamber place two troughs, closed at each end, rather longer than the width of the cloth; one of the troughs is to be set near the floor, so as to receive the excess of water dripping from the cloth, the lower extremity of which is to fall into the trough, the other trough is to be placed at any desired height and filled with water; so that the upper part of the cloth may rest in it.

That the upper end of the cloth dip in the trough of water is not enough, for evaporation being very rapid, the cloth would never keep damp from one end to the other; so, to ensure that it shall have sufficient water to evaporate and thereby lower the temperature a little, arrange all along the upper trough little bunches of cotton-wick, one end of which is to rest in the water and the other on the cloth. Acting like siphons, these wicks will keep the cloth constantly wet, and the chamber will be the cooler, in proportion to the activity of the evaporation, aided by a system of thorough ventilation, in the absence of which last, the air being saturated with moisture would cause the cheese to become mouldy.

ELIE BOURBEAU.

(*From the French*).

Other Articles in the "Transactions"

Cheese-makers are recommended to read the article of the Highland and Royal Society on "Pure Cultures for Cheddar Cheesemaking," by Mr. J. R. CAMPBELL, in this annual volume. Good results

appear to have been attained in some Scottish dairies by the use of a pure culture as a starter. Dr. AITKEN *describes some experiments on beans, tares, and clover with nitragin, which give practically negative results.*

WENSLEYDALE CHEESE: HOW TO MAKE IT.

The making of this cheese is practically confined to the beautiful dales that render the north-western portion of Yorkshire (England) so picturesque. As the name implies, the chief locality in which it is made is Wensleydale, and here the cheese has been made for centuries. This dale is not only famed for its cheese but also for its variety of sheep, the so called "blue faced Leicester" or Wensleydale.

A study of this method of cheese making shows us that the fine pastures of the Yorkshire dales, chiefly on soils derived from limestone rocks, are especially adapted for producing a first class cheese-making milk. Apart from this, nothing special is needed in the way of food for the cow producing the milk used in the making of this cheese: also no special dairy accommodation is required and no special utensils are employed. In the old fashioned method, a large brass or copper pan, called a "cheese-kettle" was used in place of a cheese vat, but the use of this is fast dying out.

The cheeses are made in two shapes, "flat" and "Stilton" shape. The former of these is suitable for making in spring and autumn, and also when the cheeses are intended for immediate consumption. When the cheese are made "Stilton" shape, they are supposed to develop a greenish blue mould just as the real Stilton, but with the "flats" this is not looked for. The Stilton shaped Wensleydales are therefore classed as British blue mould cheese. The period of ripening of Wensleydales varies according to the shape adopted, but this is only so owing to the difference in the curds used in making this respective shapes. The "flats" take only a short time to ripen, the Stilton a longer time. Although we speak of Stilton shaped Wensleydales, it is rare to find them exactly resembling a Stilton in shape, as the cheese usually becomes much distorted after its removal from the hoop. Indeed, some makers consider that irregularity in shape is a sign of good quality. Nor is this without reason, for, in order to acquire the distinctive character of a Wensleydale, the curd must be hooped when it is in a moist condition, and only a small amount of pressure must be applied to the cheese, and these two factors render a cheese liable to unshapeliness.

A good Stilton-shaped Wensleydale possesses the following characteristics: A smooth surface, frequently a distorted shape, a soft, yielding texture, similar to a Stilton but tougher, a blue mould evenly distributed throughout the body of the cheese, and not running in veins as in the real Stilton, and a mellow creamy, mouldy flavour.

In the past there was no fixed method of making the cheese, but now, teaching is aiding to bring about a definite system, and also it is raising the average in regard to the quality of the cheeses produced. Some good cheeses were formerly made, but these were also many bad ones, and the average was decidedly lower than that of the present time.

The method of manufacture about to be detailed is the modern method, and although the utensils used are not such as most of the dalesmen possess, yet they would undoubtedly be able to get a greater uniformity in their produce by using such. More especially would this desirable result be brought about if they gave attention to the quantity of rennet recommended, to the temperature of coagulation, of scalding, of the curd on salting, of the curd on hooping, to the amount of acid, and finally to the method of salting. The adoption of such particulars avoids the haphazard results of the old style of making.

Preparatory treatment of the milk.—Allow the evening's milk to run into the cheese vat and cool it down to 60 degrees. Stir the milk occasionally during the evening, which will help it to cool, and will also prevent the cream from rising. In the morning, skim the cream off the evening's milk, and heat it to 90 deg. F. Then pour this morning's milk, and the heated cream along with it, into the vat amongst the evening's milk and raise the temperature of the mixed milks to 86° F.

The above method of treating the milk is applicable to cases where making is followed once a day, and only in very hot weather need the cheese be oftener made. If an excessive amount of acidity develops in the milk, the cheese will be dry and hard, and will never possess the true qualities of a Wensleydale.

Renneting.—Given that the temperature of the milk is as above, and that the milk itself is perfectly sweet, the rennet may be added. One drachm of rennet extract to 40 lbs. of milk will produce a firm coagulation in about an hour, and therefore is the right quantity to add. After the addition of the rennet, stir the mixture for five minutes, and when the curd is sufficiently firm, break it into cubes about half an inch square. This breaking takes about five minutes and after it is performed the curd is again allowed to settle for another five minutes. After settling, the curd is stirred for about twenty minutes, with a shovel breaker, rake or hand. The last for preference, when a small quantity of milk is being handled. After the stirring allow the curd to settle for ten minutes.

Partial Scalding.—Sufficient whey is now drawn off so that when heated it will raise the temperature of the contents of the vat to what it was previous to renneting; the whey taken off should not be heated to more than 130 degrees F. After adding the heated whey, stir constantly for about half an hour and then allow the curd about twenty minutes to settle. It is not always necessary to even partially scald in the making of Stilton shaped Wensleydales, indeed, in summer time, it is only requisite when the weather is damp and cold, or whenever the curd seems as if it would be long in getting dry and firm. When "flats" are made scalding is always necessary.

Drainage and Development of Acidity.—After drawing off the whey, take the curd out of the vat, and place it on a straining cloth. Put it on a draining rack, open it out after the first half hour, and cut it into pieces: continue to do this every half hour until the curd is ready to grind. A board is also placed on the curd whilst on the draining rack, and weights placed on the board. The amount of pressure should be regulated by the weather, and the drainage of the whey. When the weather is cold and the drainage slow, apply more pressure to the curd, and vice versâ. The curd when ready to grind should be decidedly sour, fairly dry, flaky, but not hard. It should be weighed before grinding.

Salting.—The ground curd is salted at the rate of 1 oz. to 4 lbs. of curd. The curd preparatory to salting is either ground in a mill or broken by hand, but in either case it must not be made too fine. The effect of fine grinding is a tight cheese, in which no mould will develop. The time elapsing between adding the rennet and valting the curd is from 6 to 8 hours. In the old system of making, the direct application of salt to the curd was only practised with large cheeses, the rule being to put the pressed cheeses into a strong brine, and leave them there for three or four days. The objections to this method will be readily seen by dairymen.

Hooping.—After grinding and salting the curd, put it into perforated tin hoops or moulds without bottoms or with moveable ones. Place the hoop on a board and cloth, and loosely fill in the curd. The curd required to fill a standard sized Wensleydale hoop is that which can be obtained from 14 gallons of milk. The temperature of the curd on hooping should be 64 to 65 degrees. This comparatively low temperature is required in order to encourage mould developments. The cheese after being hooped is placed on a slab in the cheese-making room. Two hours after filling the hoop and cheese should be turned, the cheese put into a dry cheese cloth. When the cheese is left all night without pressure, or with very slight pressure, the temperature of the room should not be less than 60 degrees.

Pressing.—Next morning, turn the cheese, put it into a dry cloth, place it in a press and apply 1½ cwt pressure for about five hours. Then remove it from the press and turn into a smooth cloth; replace in the press and apply 5 cwt. pressure till night. Next morning take out of the bress, sew on a bandage and remove the cheese to a cool moist room, and there place it on a stone shelf. Let the cheese remain for nine days, turning it daily.

Curing.—Take the cheese to the curing room, which should be about 60 degrees F. Turn cheese daily and if weather is hot turn twice daily. During the first few days it is necessary to skewer the cheese to prevent excessive heating. After six weeks in this curing room, the cheese should be unclothed, and if the blue mould is not developing the cheese must be skewered.

The Stilton shaped Wensleydales are ripe in from 4 to 6 months, the flats in 2 months.

Properly made, Wensleydales are prime cheeses, and there is quite a possibility of their supplanting a great deal of Stilton. This is not only on account of their possessing all the good qualities of the genuine Stilton, but also on account of the greater yield of cheese from a given amount of milk by the Wensleydale process as compared

with the real Stilton process. Though up to the last few years Wensleydale cheeses were little known outside the locality of their making, they are becoming now of much wider repute and this demand is steadily increasing. (1)

W. R. GILBERT.

The Farm.

ORGANISATION OF A LOCAL SYSTEM OF "OBJECT LESSONS"

Under the control of the Government. "Experiment-fields."

The following is an abstract of the plan for the establishment of local experiment-fields, proposed by Prof. Robertson, and approved by the Hon. S. A. Fisher, Minister of Agriculture.

The means taken up to this time by the Dominion Government to assist agriculture, are:

1. Dominion dairy-stations, by which the making of butter in winter was introduced throughout Canada, and co-operative dairying made known in places where it was as yet unknown.

2. The starting of refrigerator-stations for perishable commodities.

3. The spreading abroad of information about the demands, etc., of markets, that need Canadian products, and the sending of samples of such to those markets.

4. The providing and keeping up of experiment-farms.

5. The encouragement of Agricultural Societies, in the North West especially.

6. Protecting breeders by sanitary visits and the quarantine.

All the above matters have been attended to during the last ten years, with great benefit to the quality of dairy-products and to the economising of cattle-feeding.

Still, though, much remains to be done with regard to the improvement of the general system of *farming*. Experiments are useful enough, in their way, either by finding out something as yet unknown, or by showing the adaptation in practice of methods already known; but, as a rule, the history of government experiment-stations show a tendency to make a great display, and to be of but little use in a practical sense.

When a principle, or a method of any kind, has been recognised as being of real agricultural value, the sooner it is shown to be so by practical demonstration the better. And, so, it seems clear enough that our best way to benefit the farmers, as a class, is to organize demonstrations: 1. in places easily accessible; 2. in an easily understood fashion; 3. in such a way as to excite an ambition to practically test the value of the lesson inculcated on the observer's own farm.

To ensure such a result, some local agricultural organisation, whether a club, an agricultural society, or what not, should furnish a "Demonstration field." In counties, where no local club feels inclined to do this, the county-council, or any municipal council might do it. From 10 to 20 acres of land would be requisite, and the soil should be as uniform in quality as possible; the situation near a highway, and not far from a public market; all the better if it is in the neighbourhood of a school.

The society would make arrangements with the proprietor or farmer of the "field" that it should be worked in accordance with the instructions issued by the Dominion Department of Agriculture. The "Field" need not be immovable, so to speak, but after being used for two or three years, a fresh site might be selected.

The general plan and its details would be furnished by the Dominion Department of Agriculture. In each district, there would be a specified object: here, the introduction of new kinds of grain; there, the most improved method of cultivation; so that in each spot, the farmers of the neighbourhood would gain information of immediate practical utility.

The procedure must be simple and clean. For instance: Four different kinds of oats might be grown side by side, each on a quarter-acre of land; or four sorts of potatoes, of carrots, etc.

To show the effects of different modes of cultivation, an acre of land, (1) divided into four plots, might be planted with fodder-corn, thus: plot 1, broadcast; 2, thickly in rows two feet apart; 3, in rows three feet apart, harrowed, horse-hoed, etc.; the fourth to be sown, as before, in rows three feet apart, but left to itself without any

(1) If we want, as we doubtless do, to increase our cheese exports, we must learn to increase the varieties of the cheeses made in the Dominion. Of Cheddars, we have already reached our limit.—ED.

(1) Are there any hopes of abolishing the *Arpent*, and having only one measure? ED.

subsequent cultivation. Other crops might be treated in the same way.

The Dominion Department of Agriculture would supply the seed, and pay the farmer of the land, who would be the superintendent of the demonstrations, for the extra labour required in sowing, etc., the plots. The cost is calculated at from $50.00 to $100 per "Field."

There would be a "Lecturer-Inspector" for each group of 20 to 25 "Fields"; a practical farmer, able to use pen and voice to express his ideas, and that clearly.

As it may be hoped that in ten years these practical demonstrations would increase our crops by, say, 25 per cent, and as the annual farm-production amounts to-day about 250 million dollars, the gain, 62 million dollars, evidently throws the annual production of the Klondyke into the shade.

(*From the French*).

Breeders.—Apparently the farmers of this district have no wish to improve their stock of milch-cows. When we repeat that, for several years, Mr. Abbott's Guernseys held the fort on one end of the parish of Ste. Anne de Bellevue, and Mr. Reburn's Jerseys the other end, it will seem odd to the observer that these two almost perfectly bred herds have left hardly any sign of their race behind them. Except one bull, a pure-bred Jersey, belonging to Mr John Grier, we have seen no stain of Jersey or Guernsey blood in the byres. Just so it was at Sorel: one Guernsey, from Mr. Abbott's herd, stood there for service three years, and to practically no effect. We know of only one cow of his get.

THE READING, ENGLAND SEWAGE FARM

A VISIT BY A SPECIAL COMMISSIONER

As some inclination seems to be manifested to start a sewage farm near Montreal, the following will probably be found interesting.

As, by common repute, a good example of a well-managed sewage farm, the Manor Farm, Reading, appeared to be well worth visiting, and an inspection of it a few days ago fully confirmed this impression. The farm, which is about 2½ miles from Reading, in the parish of Whitley, is 850 acres in extent, and, excepting 3 acres; it is the property of the Corporation of Reading. It was established as a sewage farm in 1874, and since 1888 it has been under the management of Mr. Thomas Chettle, who is obviously a man of great energy and resourcefulness, a capital farmer, and an excellent judge and manager of live stock. The sewage of the town is first carried to a point near Messrs. Huntley and Palmer's Biscuit Factory, where it is pumped up, mainly by turbines worked by the current of the river Kennet, (1) assisted by steam power when necessary, to a slight eminence, whence it flows by gravitation to the Manor Farm, where it is distributed over portions of the land as required.

Ten acres of the farm are let to a tenant, and 12 acres in allotments, and, in driving from Reading, one of the first portions passed was that comprising 217 allotments of 10 perches each, let chiefly to Reading workmen and railway porters. One man may hold 4 allotments, if they are available, but not more. The rent is high, 9d. a rod, but this carries with it a free supply of water and dung carted on at 2s. 6d. per cart load, and no rates or taxes to pay. Close by its magnificent field of 30 acres of wheat, as stout as it can be to stand, and not likely to keep up if we get much wet weather between the present time and harvest. The variety, Excelsior, is one selected by Mr. Chettle from Squarehead, and in one year he grew 62 bushels per acre of it after peas for picking. (2) At the last Christmas show at Birmingham this wheat was highly commended, and large quantities of it have been sold for seed in different parts of England, and to the Congested Districts Board in Ireland. Wheat is grown chiefly on the higher portion of the farm, to which sewage has not yet been applied, as it would require to be pumped up if used on that portion of the land. Next we passed a later piece of wheat after wheat, exceedingly thick on the ground and broad and heavy in the flag; and then another heavy crop of wheat after two crops of potatoes, on lower land which was sewaged before the potatoes were planted. The last crop of potatoes, it may be mentioned, was sold as it stood, at £14 an acre, the buyers being at the expense of raising and marketing the tubers.

On arrival at the homestead some details as to

(1) Such trout! ED.

(2) Fall-wheat, of course, sown in the autumn after the pease were picked. ED.

the cropping of the farm were supplied by Mr. Chettle, as follows :—

	Acres
Wheat	64½
Barley	15¾
Oats	89
Peas	8½
Potatoes	41½
Mangels	68¾
Garden Vegetables	9
Rye Grass	147½
Fallow*	22
Pasture for mowing	160
Pasture for grazing	111
	736¾

*To be sown with rye grass in the autumn.

These are net measurements, space occupied by fences, roads, yards, buildings, cottages, and gardens not being included. As there are twenty-three cottages and a farm house on the farm, and all the cottages have large gardens, they and the spacious farm buildings and yards occupy a good deal of ground, while roadways between the fields also take up a large space, and as already stated, 22 acres are let.

The course of cropping varies with the soil, and one of the difficulties of managing the farm for sewage disposal consists of the great differences in the soil. Some portions of the farm consist of a heavy loam on the clay, others of a sandy loam over a subsoil of running sand, and yet others of a peat bed of great depth. From this description, it may be remarked in passing, readers will see that the farm is not precisely an ideal one for sewage disposal ; and the pity of it is that there is plenty of sandy soil near Reading much better suited to the purpose. But, to return to the cropping ; on the high land wheat is grown for two or three years in succession, then peas for picking, or potatoes, and then wheat again. (1) Sometimes potatoes are grown for two years in succession between crops of wheat. On the peaty soil, and on the sandy loam, the usual rotation is rye-grass two years, mangels two years, oats two years. Italian rye-grass is used, and it is never allowed to lie more than two years. A longer period has been tried, but it was found that the crop deteriorated greatly.

Immense crops of rye-grass (2) and mangels are produced. The former is cut five or six times in a season, the average crop being reckoned to be five to six tons per cutting. From the first cutting nine tons of green grass have been produced. The first cutting is usually in April, and the last in October ; but last year rye-grass was cut on the 6th of December, while some was ready this season at the end of February. On the occasion of the visit there was some nearly ready to be cut a third time. One crop of mangels was phenomenal. The roots were left somewhat thick in the rows, and they grew so large that they nearly touched when mature. A small portion of the crop was weighed, and from this the crop was estimated at 105 tons 17 cwt. per acre. Less astonishing, but still remarkable, was a crop of 72½ tons per acre all weighed. Mangels are sold to a great extent, the quantity produced annually being much greater than is required for the live stock on the farm.

The pasture is not sewaged, but is manured with farmyard manure occasionally. A few years back some of the pastures, on peat, was dressed with basic slag, 10 cwt. per acre on a portion, 7 cwt. on same, and 5 cwt. on another piece, while one acre was left undressed between each couple of one-acre plots. Mr. Chettle was never able to see any difference in results, which is strange, as the soil is one on which it might have been supposed, basic slag would have proved highly beneficial.

In wet seasons silage is made extensively from rye-grass. Mr. Chettle lets the grass lie three or four days, and turns it, before carting it, thus differing in his management from that which is commonly pursued for silage stacks. But he has found that there was a great waste of liquid from stacks made of fresh green grass, and especially sewaged rye-grass, which, no doubt, contains more moisture than that grown in the ordinary way. He makes some excellent silage, as shown by the quality of some still left from last season. A stack was in course of erection on the occasion of the visit. Johnson's system of pressure is used. Mr. Chettle prefers hay to silage when he can make the former well, but would rather have good silage than bad hay. By the by, one of Gibb's hay-driers was noticed on the premises, and this machine is still used to some extent.

To return to the root crop, mangels are found to answer best on sewaged land ; but very little sewage is applied after the crop has been sown, not enough to run over the ridges. Swedes have been tried, but were found to grow nearly all to necks and tops. White turnips and carrots grow well, but do not keep well, and kohl rabbi flourish, but are less valuable than mangels. For potatoes, sewage is applied before planting, but not after-

(1) Pease for picking are cleared off by the end of June. Ed.

(2) Pacey's perennial. Ed.

wards. Its application after planting was tried once, the result being such a sealing of pores of the soil that the seed tubers were apparently stifled, very few of them having come up.

In driving round the farm some magnificent crops of oats were seen, deep green in colour, and broad and heavy in flag. Some pieces were partly laid, and the crop as a whole must go down if we have a wet summer. (1) Barley is being tried on sewaged land for the first time this season ; but it is far too heavy to stand well, and probably it will be flat before harvest. Sewage is never applied to the corn crops ; but they are grown on the low land after sewaged crops.

All potatoes are drilled with the potato planting machine, one which was improved by Mr. Chettle, and a similar one was afterwards acquired and perfected by Messrs. Ransomes of Ipswich. The crop is a credit to the machine, where it is up. Potatoes are drilled and ridged, the fields being afterwards worked both ways with Ogle's spliced chain harrows, to kill annual weeds, before the potatoes are up. These harrows do their work admirably. The principal market garden crops are peas, broad beans, onions, lettuces, cabbages, and rhubarb.

These are sold as they stand to men who cart them away and market them. On one occasion the rhubarb was sold at 6d. per plant and the return was £90 an acre. This was too high a price, however, and it would be difficult to get half as much now. Mr. Chettle has a plan of his own in growing peas. He drills double rows 6 inches apart with intervals of 2 feet between them ; and after the peas are well up, he ridges them so that a double row appears like a single one.

The live stock on the farm consists of about 250 cattle, including 100 milch cows, and 143 horses, 35 of which are for the use of the Corporation in the town of Reading, and kept there at the expense of the farm. The horses are Shires, which are bred extensively on the farm. No sheep or pigs are kept. The cows are Shorthorns, and those bred on the farm are descended from good strains, the Lavender, Snowflake, and Martinet blood being largely represented. The bulls in service are Rosedale Javelin, bred by Mr. Brierly, sire Martinet, dam Cowslip by Javelin ; Rosedale Briton (just sold), bred by Mr. Brierley, sire Martinet, dam Rosedale Snowflake ; Umpire, by Reuben, bred by Mr. W. Arkell ; and Staffordshire Heir, by Mr. Deane Willis's Captain Quadroon. These are very useful bulls, and at least two of them distinguished themselves at the Birmingham Shorthorn Show and Sale at which they were purchased. A very handsome young bull, 10 months old, by Umpire, is now for sale. There are many very fine cows in the herd, giving up to four gallons of milk per day, while one gave six gallons soon after calving. All the heifer calves are reared on the farm, while the bulls, except a few choice ones, are sold when a week old. There is a capital lot of heifers on the farm at the present time. All calves are taken off the cows when a week old, and reared at first on calf meal, made into gruel, the meal being obtained from a Reading firm.

One cow-house has stalls for a hundred cows, and another accommodates eighty. They are spacious buildings, well constructed, but not in all respects well designed. One has no proper ventilation, fresh air not being readily brought in without creating a strong draught ; and in both, the flooring (of concrete) is on a dead level, so that liquid sewage does not pass very readily. Mr Chettle has improved the arrangements to a considerable extent, but cannot make them perfect. There is a spacious covered yard for calving cows. The cows are tied up all the year round, except that they are allowed to run out for exercise on a pasture from 7 till 11 o'clock daily, in all seasons. They are milked at 4 a.m. and 12.30 p.m. Behind every cow is a record of the dates of birth, first calf, last calf, first bullding, last bullding, and when dry. The animals are fed on rye-grass in summer and mangels in winter, with hay or silage, and 4 lbs. of undecorticated cotton cake, 1 lb. of decorticated (or linseed cake when cheap), and 2 lb. of dried grains each, daily. Dry food is given all the year round, but to a less extent in summer. The cows have water constantly in front of them. The milk is all sent to Reading dairymen.

The stud of Shire horses contains many remarkably fine mares, geldings, fillies, and colts, several of which have taken prizes at the Royal Counties, East Berks, and Newbury Shows. In 1897 Mr. Chettle sent ten to the East Berks Show, and won seven first and three second prizes. The stallions in service are Whitley Jasper, by Canute ; John Bull's Premier, by Premier ; and Whitley Bar None, by Catthorpe Gauger. There were also four promising entire colts two years old, on the occasion

(1) Fortunately, for this farm, the season was very dry. We should be glad to hear of the yield. Our dear old Farm-tutor, Wm. Rigden, once grew 140 bushels of "White-Tartars" *to the imperial acre!* Ed.

of the visit, two by Whitley Jasper, and two by Norman Duke (by Hitchin Duke), only two of which, however, are stallions now, as the other pair were to be converted into geldings on the following day.

Turning to the financial details of the farm, it is first to be mentioned that the expenses are very heavy, chiefly on account of the large amount of labour required. About seventy men and twelve boys are usually employed, including the blacksmith, two carpenters, a painter, a gardener, and nine men who do draining and levelling. There are blacksmith's and carpenter's shops on the farm. Ordinary farm labourers are paid 16s. a week, with 1s. extra at stack work, and 9d. extra in the field, during hay and corn harvest, and 4d. an hour for overtime after 6 p.m., the ordinary hours in summer, including harvest time, being from 6 a.m. to 5.30 p.m.

The wages in 1896 amounted to £3,093, and in 1897 to £3,214. Purchased feeding stuffs also come to a great deal of money, £1,849 having been paid for them in 1896, and £1,701 in 1897. Corn and provender purchased for 35 horses employed and kept on the farm are included. Rates and tithe amount to about £400. No rent is charged, and the sewage is delivered free on the farm.

In 1892 and again in 1894 nearly the whole of the farm was flooded. The Thames overflowed and headed up the water of the Kennet, which runs through the farm, and 750 acres were submerged. Great damage was done to the farm by these floods, not only in the seasons of their occurrence, but also subsequently. Bearing in mind on the one hand the losses thus occasioned, and on the other, the fact that no rent is charged, the following account of profits and losses on the farm may be considered ;—

Year ending with March.	Profit. £	Loss. £	Year ending with March.	Profit. £	Loss. £
1884	1,842	—	1892	—	3,503
1885	1,062	—	1893	373	—
1886	553	—	1894	1,449	—
1887	—	103	1895	—	865
1888	—	186	1896	—	189
1889	—	1,498	1897	—	303
1890.	1,112	—	1898	1,322	—
1891	2,057	—			

The loss occasioned by the floods, chiefly affected the accounts of 1892, 1893, and 1895 and subsequent years. Sewage farms rarely show a profit, and the best that they can do, as a rule, is to afford a means of disposing of sewage at less expense than would be incurred by treating it in any other way than that of letting it pass through the soil, thus fertilising the land and raising great quantities of produce. The effluent which passes into the Kennet is very clear in appearance. About six hundred and twenty million gallons of sewage are now applied to the farm in a year, and the quantity keeps on increasing with the population of Reading.

Sawdust as Manure

I have fully proven the fact ; decomposed, or three parts decomposed, sawdust, is not injurious to the roots or plants of cultivated crops. Some eighteen years ago I was deputed by the London General Omnibus Company's Secretary to thoroughly test the subject, when they carted direct from their stables to my place such quantities of their sawdust-bedded horse manure as I required for the experiment. I tested it in numerous forms, especially with vegetables and flowers ; the result was the exceptional vigour, health, and cropping of all. An undue quantity, placed in window-boxes, gave such luxuriance from such confined root space as I have never before or since seen. So much for the non-injurious effects of sawdust. As to its usefulness, or fertilising capacity when used alone, I am inclined to the belief that it is of very meagre merit. It is not at all likely to produce wireworm. If pine sawdust is used fresh and not decomposed, as suggested above, the turpentine it contains would be somewhat adverse to root growth, also fungus may arise from it ; this, in fact, being hitherto the main objection urged in connection with applying it to land. (1) WILLIAM EARLEY.

The Orchard and Garden.

(Conducted by Mr. Geo. Moore).

THE PLANTING OF FRUIT TREES AND BUSHES

BY THE REV. FATHER-TRAPPISTS.

(*From the French*)

(*Continued.*)

III.

Many of the drawbacks in fruit-culture are the result of bad planting. Autumn planting may succeed in certain cases, but, as a rule, planting in the spring offers the greater chance of success.

(1) Mr. Earley is one of the largest market-gardeners in England. Ed.

Division of the land.—Divide the land so that the long lines shall run in the same direction as the prevailing wind. Show by means of stakes, the place which each tree is to occupy. There should be 30 feet space between each two trees, and the same between the rows. In the intervals between the apple-trees a plum-tree should be planted. The latter will not live so long as the former, but will bear abundant cups of fruit before the apple trees are large enough to require all the space. Finally, between each fruit tree currant and gooseberry bushes should be planted, which, having roots that plunge much less deeply into the soil than the apples and plums, occupy space which would otherwise be lost, and produce a crop without interfering at all with the growth of the others. When the orchard is in full bearing, these bushes must be taken away, because they would not yield satisfactorily when overshadowed. It is easy to calculate what we can put on an acre.

Apple trees, ...	25 costing	$10.00
Plum trees, ...	20 costing	15.00
Currants and gooseberries,	50 costing	10.00

Thus, for $35 we can furnish an acre.

The approximate profit will be as follows:

Apples	$125
Plums	120
Currants and Gooseberries	15
	$260

The place having been marked for each tree or bush, holes must be made of a size proportionate to the roots. Supposing the land of an orchard has been trenched ploughed and mellowed, it is not necessary to make the holes very large, only large enough for the roots to have plenty of room so that they can be spread out. The top earth, which is the richest, should be set apart and mixed with well rotted manure. Another heap should be made with the poor earth from the bottom of the hole.

In stony soils, the large stones must be taken out. In heavy land, the holes may be made in the autumn, to allow the frost to enter the soil and thus make it more friable. The depth of the hole should be regulated by the length of the roots so that the trees may stand at the same height out of ground as in the nursery. To plant too deep will certainly cause a check, the roots not having air will infallibly perish: while if not planted deep enough, they are exposed to the direct action of the solar heat and dry up rapidly. Besides, the tree will not stand so firmly in its place. Certain nurserymen, careful to deliver their plants in good condition, plunge the roots of the young trees and bushes into a puddle of clay, which keeps them fresh during transportation. This layer of clay gives the roots a grey appearance, but it would be a grave error to take the upper line of this colouring as indication of the right depth at which the young tree should be planted.

Planting—The hole finished, planting should now be proceeded with, the young tree will require a very important operation which consists in re-establishing the equilibrium of growth between the roots and the branches which have been disturbed by the digging up. All the ends of the broken and bruised roots should be cut off clean, with a sharp knife, and the branches of the head shortened in one half. Now place in the bottom of the hole the soil which has been mixed with manure, and with it form a little mound on which the roots should be spread. The roots should now be covered with the same soil, and the planter shakes the tree up and down to cause the good earth to penetrate amongst the roots. Then press lightly, so that the soil shall adhere to them, and cover entirely with the earth taken from the bottom of the hole.—The planting done, the earth should form at the foot of the tree a little mound, which will disappear as the earth settles.

Staking.—It is well to put stakes to the young trees to prevent their being shaken by the wind, the effect of which would be to disturb the roots, prevent them from catching hold of the soil, and hinder their taking. Stakes should be a little longer than the young plant, and should be driven into the ground at the same time; by driving it in afterwards we run the risk of bruising the roots.

Watering.—If the land is not sufficiently moist, the young tree should be watered immediately after it is planted. On light land which dries up rapidly, cover the earth with long dung to make it retain its humidity. On soils which retain little moisture, line the bottom and sides of the hole with sods, watering them to cause them to rot quickly.

In low lands, or lands which are liable to be flooded, plant the trees on the surface. Instead of digging a hole, trace on the earth a circle 6 feet in diameter and cultivate it 8 or 10 inches deep; place the tree on this, and make a mound of good earth mixed with proper manure in order to con-

fine the roots to this level by supplying them with plenty of nourishment. To avoid this being washed away, beat the earth and cover it with sods.

ADVICE ON FRUIT CULTURE

IV.—Subsequent Care.

It is not enough to plant trees well to insure success but we must also give them constant care, visit them often, and take every precaution against disease. This requires but little time, and when done at the proper season will save many reverses.

First year after planting.—Young trees must not be pruned the first year after planting. Every branch which grows, even on the stem, should be left. It is a good plan to lime-wash young trees immediately after planting. This has the effect of keeping the bark fresh. Dissolve completely some clay in water, then add double the quantity of slaked lime, and enough water to make the mixture about the consistency of batter. Apply it with a brush to all parts of the tree. Towards the month of August, wash the bark of the tree with soap-suds; this has the effect of preventing the parts exposed to the air from becoming dry, and it also drives away insects, which infest young and as yet tender plants.

At the approach of winter, before the frost has hardened the ground, earth up the tree, to drive away mice, and protect the base against the sun in the spring. If we fear the too great accumulation of snow, and the branches are in danger of being broken by it when it melts, we must fasten them together and tie them to stakes.

Branches which grow along the stem are to be removed; do not cut them off quite even with the trunk, for fear of frost, but leave a little spur a few lines long, to be cut off when spring arrives.

Second year.—During the month of March, prune the young plants, working in the following manner: keep, for the frame work of the tree, only four branches situated symmetrically round the stem, independent of each other: it would be wrong to allow two or three branches to start from the same point, they would sooner or later be split off, either by the action of the wind or the weight of fruit.

The young shoots which are to be preserved as the starting points of the frame-work should be shortened in to about half their length to an eye situated on the side next to the prevailing wind; the others should be cut off even with the trunk; the cut should be made at the little swelling which is found at the starting point of each branch, so that it shall slightly run with the slope of the stem. A very sharp pruning knife should be used. The wound should be covered with mastic, to prevent the air from disorganising the tissues.

At the end of June, pinch off the buds which are growing in the interior of the head, leaving the top or the extremities that are destined to prolong the framework (*the leading shoots*). This pinching consists in removing with the thumb the herbaceous extremity of the shoot and has the effect of causing the sap to flow into the two leading shoots. If, after this pinching, more buds appear at the end of the pinched shoots, they should be cut off about August.

Third year.—In the month of March, in the third year, cut off even with trunk, the branches pinched the preceding summer and shorten in the leading shoots to half their length, continue the pinching as in the preceding year, and at the close of vegetation the tree should be composed of 16 branches; the head symmetrically formed, the framework strong and well formed, with a few fruit-buds aheady beginning to appear.

Fourth year.—The fruit buds must be reduced in number, so as not to exhaust the tree: from this time the pinching should be discontinued. Pruning is now only necessary each spring in the month of March, to reduce the number of twigs and greedy shoots which have pushed into the interior and bring confusion and shade. The sides exposed to to the prevailing winds have, generally, a tendency to be failures. If necessary, shorten in the young shoots to the eyes which are killed on that side. As long as these rules are observed, the trees will always be vigorous and consequently in a condition to yield good crops. The production of fruit causes exhaustion to the trees but nature helps them marvellously to repair the loss. It is remarked that trees yield abundant crops only every second year. The year of rest is employed in repairing losses, and in making new fruit-buds for the next year. We cannot complain of this state of things, on the contrary, we should do all we can to assist in restoring these good conditions. The fruit will sell dearer in the scarce years, and the grower will find his profit in it. We should always keep free from grass, etc., a circle round each tree, about three feet from the stem, for at least 8 or 10 years after planting.

Thinning the fruit.—When a tree is abundantly covered with fruit it is not well to allow it all to remain. Therefore, thinning should be practised. The young fruits absorb a quantity of the sap without any profit to the tree or to the proprietor, because they are unsaleable. In thinning try as much as possible to leave the fruit growing on the larger branches, those which are left will be the largest and best flavored. However, when the trees are old and spreading, thinning is hard practicable, and although it is just as useful then, it should be abandoned, especially by those who have large orchards. In gathering time, and in the storage, the fruit should be sorted if it is desired to sell only the best of the crop.

Replacing dead and worthless trees.—It is always prudent to replace a dead or infirm tree by one of another tendence. Remove as much as possible of the roots of the tree replaced.

Diseases.—Fruit trees are the prey of a legion of insects and fungi, against which never ceasing struggles must be made. The treatment of the diseases is indicated in the few lines devoted to each species.

It seems costly and difficult to apply these remedies, but it is a trifle if we take care to prevent the malady by treating it at the proper time. We strongly advise our farmers to mutually protect themselves against the invasion of hurtful insects and fungi. Who can estimate the damage caused to his neighbours, and sometimes to a whole parish, by one negligent farmer.

THE CASTOR OIL PLANT

Palma Christi.—Ricinus communis.—This plant, which is one of the most magnificent for decorating the sub-tropical garden at this season, is also interesting on account of its uses and associations. In the warm climates of which it is a native, it grows to a large tree and is cultivated extensively for its seed, form which the Castor Oil is obtained. The name *Palma Christi* is given on account of the similarity of the leaves to a hand or palm, and for this reason it was held sacred ; the oil was called *castus*, or sacred oil, hence our term castor oil.

CORN COCKLE

This plant which is so injurious to the wheat crop, on account of its seeds mingling with the grain, and if not taken out rendering the flour dark in colour and unwholesome, has appeared in the wheat fields of this country and it will be well to check its spread. It is an annual bearing a purplish pink flower and black seed, Its ancient name was *agrostemma*, meaning "crown of the corn field" but the common name it bears now is *lychnis*, Greek for lamp, because one variety with cottony seed was formerly used to make lampwicks. The derivation of the names of plants is an interesting and curious study.

GREEN FLY

On many hands there have been bitter complaints of damage done far and wide by the green fly, which has been baneful this season to grass in the marshes, to lettuce and carrots. Mr. G. Buckton writes:—"The addition of wings to the viviparous females obviously must much facilitate the spread of each species. This modification of form does not occur at fixed or stated intervals, but appears to be in some measure induced by an overcrowded state of the colony, aad a deficiency of food. Gardeners are well aware of the sickly and poisoned conditions produced in those plants which are subjected to the exhausting and irritating attacks of *Aphides*. When the nutritive juices of the infested plants begin to fail, a change commences in the larvæ of those *Aphides* which are subsequently born. Swellings occur on the sides of the meso and meta-thorax, within which the wings of the future insect are developed . . . I have repeatedly observed the effect of stinted food in hastening the development of wings whilst keeping the larvæ in confinement under bell-glasses.

"Some naturalists have thought that the often sudden appearance of swarms of winged *Aphides* in early spring may be caused by the action of nipping easterly winds, which by checking the flow of sap in the vegetation, remotely produces the same effect on the insects as the stinted food above noticed. To this atmospheric condition, which is usually accompanied by insect swarms and a peculiar haze, the popular voice gives the name of *blight*. Similar conditions of food and climate probably operate to produce the second large migratory flights of early autumn."

Miss Ormerod adds :—"The above views, which seem to me very much borne out by what we constantly observe, namely, that the checked growth caused by bad attacks of *Aphides* is favourable to

their rapid increase, points to the special benefit of washes which may kill the *Aphis* as fly or louse on the leafage, and likewise, by falling round the plants, may act to some extent as a stimulating watering in driving on growth heartily.

"Soft soap is the best material that we know for the foundation of an *Aphis* wash, as it acts as a fertiliser at the roots besides being an insecticide. For this purpose it is particularly useful by reason of it adhering to the insects, from which mere watering washes, unmixed with sticky material, slip off without necessarily injuring them, unless they are in clusters where the wash can lodge.

"The great difficulty is how to apply the wash or watering on the broad scale of field labour. But so far as an acre or two of land goes, where water is at hand or can be carried from a neighbouring supply, if on experiment it was found the mixture was useful, the expense of applying the wash by hand power from watering cans would be a far less loss than that of the crop."

Naturally, it would be far easier to treat some plants than others, as the upper and under sides of the leaves would be, to a greater degree, accessible to the syringe. For instance, the open foliage of the carrot would be easier to douse than the crinkled leaf of the cabbage, lettuce, or the closed heart of the lost lettuce. The size of the field is of less importance, as if the remedy was effectual for an acre, it would be equally effectual for ten acres. —*Eng. Ag. Gazette.*

THE POPULAR FAIR

Canada's Great Eastern Exhibition has come to be regarded as the Fair of the season not only by the farming residents of this district but by all classes both in the Province of Quebec and the Eastern States.

The Eastern Townships Agl. Assn., since its formation, has always made it an aim to advertise honestly, fulfill their engagements faithfully, and treat their patrons both exhibitor and visitor with that same fairness which still concinues to be a characteristic oftheir efforts to please. This, then, is the secret of their, success for Sherbrooke's Fair is indeed a success, and so long as the management continue farming public and persevere in their untiring to extend their substantial encouragement to the efforts to provide the best and most appropriate attractions, regardless of expense, their exhibition will continue to be a popular word upon the tongues of the fair-going public and ensure a continuance and even increase of that hearty patronage which has marked their Fair ever since its initiation.

The crops.—We have just received a copy of Mr. Gabriel Henry's Bulletin on the state of the crops in the Province of Quebec. The reports from 1172 correspondents give a most encouraging amount of the grain, roots, and corn. Potatoes are super-excellent, and as for hay, fodder-crops and pastures, the question is : where are the cattle to eat them?

We print the following explanatory note from Messrs. Wallace and Fraser, of Toronto. The article in question was the translation of a passage in the French edition of the Journal in the No. for June 8th, p. 162.—Ed.

THOMAS PHOSPHATE POWDER

"We beg leave to say that Thomas-Phosphate Powder is registered in Canada by Messrs. Wallace & Fraser, of Toronto and St. John, and consequently this firm controls the sale of this excellent phosphatic manure. They introduced it into Canada about three years ago, and the remarkable growth of its sales here have only been a repetition of the business in Europe and England.

The Chemical Works (late H. & E. Albert) of London, England, are the principal producers of Thomas-Phosphate Powder (Registered), having some sixteen factories on the continent of Europe and in England. As there has been shown a great difference in the activity of Thomas-Phosphates, it is important that along with their high content of phosphate there must be a guarantee of their solubility and fineness, and it is of the greatest moment that it be purchased only from a concern giving such guarantee.

It must be remembered that the content of phosphoric acid by ordinary analysis is not a guarantee of its solubility to vegetation. Messrs. Wallace & Fraser are the Canadian Agents of the Chemical Works above, and sell the product of their English works as Alberts' Thomas Phosphate Powder. They are the only importers of it, and Messrs. Wm. Ewing & Co. are the agents of the above firm at Montreal.

The Phœnix Oil Mill Company are not producers of Thomas-Phosphate Powder, and merely buy to resell to customers for their other manures and oil cakes, and are not entitled to sell in Canada. The price of Alberts' Thomas-Phosphate Powder, which is all sold with guarantee of analysis, solubility and fineness, is $21 in car lots of 15 tons minimum. It is very valuable to spread broadcast on meadows and pastures, and as a fall top-dressing, or in preparing ground for tobacco the following year, and its assistance to grain is fully recognized.

The solubility of Alberts' Thomas-Phosphate Powder is guaranteed so high that it more than equals superphosphate, so that in using it an admixture of the latter is not needed."

The Poultry-Yard.

MANAGEMENT OF DUCKS

(Continued).

I give another system of feeding ducks for marketing at ten weeks of age.

This system is practically the same as the one given before, differing only in the ingredients used for the first two parts or until the duckling is twenty days old. The method given before is used successfully by one of the largest duck raisers on Long Island, N. Y. It is divided into three parts as follows :

(1) From time of hatching to seven days old, feed equal parts by measure. Corn meal, wheat bran, and No. 2 grade flour, and 10 per cent of this bulk of coarse sand, mix with water to a dry crumbly state and feed four times a day.

(2) From seven to fifty six days old, feed equal parts by measure, corn meal, wheat bran, and No. 2 grade flour, 10 per cent of this bulk beef scraps ; 10 per cent coarse sand ; and 12½ per cent green foods (green rye, oats, and clover, etc.) mix with water to a dry crumbly state and feed four times a day.

(3) From fifty six to seventy days old, feed, two parts by measure, corn meal ; one part wheat bran ; one part No. 2 grade flour ; 12½ per cent of this bulk beef scraps ; 10 per cent coarse sand ; 12½ per cent green food. Mix with water to a dry crumbly state and feed three times a day, morning, noon, and night. Give last feed an hour before sundown. When ducks are raised for breeders they are fed differently from those intended for market. They are not forced so much as are the latter, and less fattening food is given them. The corn meal and beef scraps are reduced to one half the quantity used in the above rations. The following is an excellent ration: equal parts corn meal, wheat bran, green food, 5 per cent beef scraps and 5 per cent coarse sand or grit.

A ration for breeding (laying) ducks is recommended as follows : Fifty per cent by measure, corn meal ; 15 per cent wheat bran ; 15 per cent green foods (cooked vegetables, such as potatoes, turnips, etc.); 12 per cent beef scraps and 8 per cent coarse sand or grit. Mix with water to a dry crumbly state and feed twice a day, morning and night. After the feeding season is over and the ducks have stopped laying, they are changed from this to the equal parts ration as given to the ducklings from seven to fifty six days old.

The food material should be mixed in a trough large enough to hold the quantity without wasting over the edge. First mix the corn meal and bran together while dry ; after these have been mixed thorough by making an evenly colored mixture, it should be moistened with water and mixed to a dry, crumbly, well incorporated mass. It should not be too wet or sloppy, as it is then not so good for the birds, neither can it be handled and fed properly. Warm water should be used when the weather is excessively cold. In a second trough place the green foods, such as cut rye, oats, etc., and dampen with water ; then mix the allowance of the No. 2 grade flour with it. Thoroughly mix, so that the flour completely cover, the green stuff. After this has been done mix the flour and green mixture with the corn meal and bran mixture and add the allowance of beef scraps and sand. When vegetables are used, they should be well cooked before mixing in the rations. The duck raisers on Long Island use large quantities of fish for their breeding stock. This is known as the *fish diet* and is considered as being very valuable to induce egg production. Where fish are cheap, they form an excellent substitute for beef scraps in the rations for breeding ducks, or ducks not intended for market, but under no circumstances should fish be fed to stock that will be marketed. Fish makes the flavor of the flesh strong, and ducks fed on fish will not have as early sales on the market. The fish are cooked by boiling in iron camp-kettles until well done and then mixed, bones and

all, in the rations as given above for breeding ducks. When fish is used, the beef scraps are omitted.

The amount of food needed each day for young ducks varies as much as does their growth. Their growth averages a half a pound a week, and to make this increase of weight each week requires an additional quantity of food over each preceding one. The rule is to feed each meal what they will eat up clean with a relish and do not allow them to linger over the feed trough. It is better they should have a short allowance than too much, as they will be more hungry and prepared to relish the next meal. One thing is considered to be of as much importance as the feed and that is removing the food left over and thoroughly cleaning the troughs after each meal. This is scrupulously attended to by successful duck raisers.

One raiser gives as a generous allowance for one day's ration for one hundred laying ducks the following: For the morning meal, 35 quarts of the mash and for the evening meal 40 quarts, making a total of 75 quarts for the day's ration or three fourth of a quart to each duck a day.

Another raiser allows 400 quarts fed in halves, twice a day, to six hundred breeding or laying ducks, averaging two thirds of a quart a day for each duck.

Duck Hints

A good bill of fare for one day for a flock of twelve or fifteen ducks is this: Four quarts of cooked potatoes or turnips, thickened with a quart of ground or rolled oats or bran, one half fed in the morning and the other half at night, giving grain food or scalded chaffed clover at noon.

A fence 18 inches high will keep them from straying away.

That damp weather is good for ducks is an old saying, but the fact is that dampness is as fatal to ducklings as to chicks. When giving water to ducklings (and they must be liberally provided with it to drink) the trough containing the water must be covered, leaving only openings for the bills of the ducklings. If this is not done they will get into the troughs and become wet, the result being that they are soon chilled, and the poultry man will find them dead from no apparent cause. Keep them dry and warm and allow them no privileges in the water until they are well feathered.

OVER FEEDING OF DUCKS

Ducks become weak in the legs and die when fed too much grain, and they cannot be fed the same food as the hens without liability of loss. Yet farmers will feed all kinds of poultry together and on the same food. A duck's egg is very large, and as ducks lay nearly every day after they begin, the tax on them in egg production is a severe one. What they require most is animal food and bulky material, such as lean meat, or ground meat and cut clover, scalded, though bran and ground oats moistened should also be allowed. Just as soon as the ducks indicate lameness it is a sure sign that too much grain is being fed, and the nitrogenous food insufficient.

S. J. ANDRES.

Science.

PLAIN TALKS ON BACTERIA AS APPLIED TO FARM PROBLEMS.

(For *Hoard's Dairyman*, by H. L. Russell, Professor of Bacteriology, Wisconsin College of Agriculture.)

General Outline of Subjects to be Treated.

INTRODUCTION.

I. What are bacteria, how they live and grow.
II. Effect of external conditions on growth.

BACTERIA AND DAIRYING.

III. Bacterial life in milk.
IV. Quality of milk as affected by germ life.
V. Sources of bacteria in milk.
VI. Exclusion of bacteria from milk and effect of chilling.
VII. Souring of milk.
VIII. Detection of bacterial taints.
IX. Direct absorption of taints (danger from the same in stable.).
X. Pasteurized milk.
XI. Milk as related to public health.
XII. Ropy or slimy milk.
XIII. Sweet curdling of milk.
XIV. Ripening of cream.
XV. Pure culture of butter, including Pasteurization as applied to same.
XVI. Pin holey curds. How caused.
XVII. Detection of bad or tainted milks. (Curd tests, etc.)
XVIII. What ripens cheese.

GLOSSARY.

Bacteria,—single celled plants that are characterized particularly by the fermentations, decompositions and diseases they produce.
Cell,—the simplest unit of structure of living things. All animals and plants are made up of one or more cells.
Bacillus, (plural bacilli),—a form of bacteria that is rod-like, or elongated, in appearance. The majority of bacteria belong to this group.
Spirillum, (plural spirilla),—a spiral or twisted form of bacterial cells.
Cilia, (singular, cilium),—the tiny thread-like appen

duges on the surface of the cell, by the movement of which the organism is able to move.

Protoplasm,—the life-stuff of which the animal or vegetable is composed.

Spore,—a latent structure, formed within the cell, capable of resisting many unfavorable conditions and of producing, by germination, another similar cell. Spores are analogous in function to the seeds of the higher plants.

Aerobic,—organisms that require the free oxygen of the air for their development.

Anaerobic,—organisms that can grow without air. The bacteria and the yeasts are the main groups that possess this property.

Mammalian life,—animals that belong to the group mammalia—those that suckle their young.

Cholera Infantum,—an intestinal disease affecting infants.

Saprophyte,—an organism that lives on dead organic matter.

Sterile,—free from all living germs.

BACTERIA AND DAIRYING.

There is no phase of agricultural activity that stands in closer relation to bacterial life than the processes embraced under the general subject, dairying. The methods that have been adopted in actual practice are, for the most part, the result of long years of experience, and while experience is often a safe and valuable teacher, it cannot but be conceded, that the introduction of modern scientific methods is revolutionizing the dairy business of to-day.

Up to the last decade, dairying was an art; today it is fast becoming a science. The fundamental laws of nature, that are operative, in dairy processes, are being rapidly discovered, and as the why and the wherefore of the various changes come to be better understood, more rational methods are sure to be inaugurated. Greater uniformity will then prevail, and values will, thereby, be increased at losses due to inferior quality of product are lessened.

Bactaria in Milk.—It may seem a little strange but it is nevertheless true, that the fluid intended by nature to serve as food for all kinds of mamlian life, including man, the lord of creation, is likewise admirably adapted for the development of the lowest vegetable forms that are known to exist. Most bacteria thrive in milk. Not only does it contain all the ingredients to make a balanced bacterial ration, but they are in such degrees of concentration and such form, that they are readily assimilable by germ life. If bacteria gain access to milk, various changes induced by them are sure to occur, and, to a considerable degree, these are such as to diminish its value as a human food.

Number of Bacteria in Milk.—If we were to measure the extent of pollution of different substances according to the number of bacteria they contain milk would be almost the worst food we could use, for, as a rule, a drop of milk, as we drink it at our meals, contains more bacteria than an equal volume of sewage. A water supply that would contain a fraction of what is ordinarily found in milk, would in most cases, be considered unwholesome, not on account of the mere numbers that it contains, but in a light of what such a condition means. A water supply containing hundreds of thousands of organisms per drop is unsatisfactory, because it indicates, indirectly the presence of organic matter in abnormally large amounts, and such material is undesirable in water. In milk, this number would not be interpreted in the same way, because, normally, milk contains organic matter that would support such a growth.

Even under the most favorable conditions, milk contains many more bacteria than water ordinarily does. As it comes from the animal, it generally has from one hundred to a thousand germs per drop. These immediately begin to multiply, on account of the favorable conditions of growth, so that with increasing age, the germ content is greatly increased, until, in commercial market milk, there are, frequently, millions in every drop.

The character of the bacteria in any milk is of vastly more importance than the presence of mere numbers. Ordinarily the great majority of the contained organism are harmless so far as their effect on the human system is concerned. They are the kinds that cause the various fermentations to which milk is peculiarly subject.

Not infrequently, certain bacteria gain access to the milk, that are able to form deleterous substances. Cholera infantum and other disorders of the intestines are frequently attributable to their effect. The presence of even a few organisms, of this class, is very much more dangerous than the millions of saprophyte that are concerned in the production of the various fermentative changes.

IV.

QUALITY OF MILK AS AFFECTED BY GERM LIFE.

The amount of butter fat in milk is usually taken as a measure of its value, but this value is often lessened by the character of the germ life in the fluid. If undesirable organisms are present, taints are produced that injure the quality of the product, thereby reducing its market value. In

estimating fairly the true worth of milk, we must take into consideration, not only the nutritive constituents as fat, solids, etc., but also the quality of these as affected by different kinds of bacteria.

Inasmuch as bacteria are alive, and therefore capable of reproduction, we are dealing with a factor that can readily assume a varying aspect, dependent upon the conditions that favor or retard growth. It therefore follows, that if milk once becomes seeded with bactéria, an increase will take place in the amount of germ life, just to the extent that conditions favor the growth of the contained forms. At ordinary temperatures, development is possible, and in increasing degree of warmth up to a certain point, favors a more rapid development.

The farmer usually believes that a "tainted" or "off" condition in his milk arises from the absorption of foul odors that come from decomposing vegetables or animal refuse, but more frequently such trouble is due to the introduction of undesirable livino germs that breuk down certain constituents of the milk, forming by-products that produce thâ tainted condition. If a taint in milk was due to direct absorption of some pre-existing bad odor, it would be an easy matter to prevent milk from being polluted with the same, but when it is caused by an unseen germ that establishes itself in various ways and undergoes a development in the milk that increases the intensity of the undesirable change. then the matter of getting rid of it becomes much harder.

What every dairyman should do is to learn how milk becomes polluted, and the conditlons under which such contamination may become evident, then he is able to forestall trouble by avoiding it, rather than trying to cure it after it has once established itself. The manner in which milk becomes seeded with germ life is then of prime importance.

V

SOURCES OF BACTERIA IN MILK.

Under ordinary conditions, if left to itself, milk invariably spoils, and yet in the healthy udder as it is manufactured by the cow, it is absolutely germ-free. Under ordinary conditions, however, even where precautions are taken, and the milk is allowed to flow out through a sterile milking tube, it is very difficult to gét it perfectly free from all living germs. The number of organisms can be so greatly reduced in this way that it will keep sweet for hours, and even days, longer than when milked in the ordinary manner. This is the secret of "certified" or "sanitary" milk. Such milk does not need pasteurising to destroy noxious organisms, for their introduction has been prevented.

Keeping Quality of Fore or First Milk.—One might naturally think that the minute opening in the teat would effectually keep out bacteria, that it would act as a tight valve, inasmuch as its walls are collapsed, but still there is sufficient room in the mouth of a teat for bacteria to work their way up the milk duct for at least a short distance. Ordinarily, they do not penetrate to any considerable degree, except in the case of disease, as in garget, but in any event, the conditions are very favorable for growth. A droo of milk in the teat gives elbow rpom for millions, and wsth the necessary warmth, food and moisture, rapid growth takes place.

Other Sources of Contamination.—But this is only one source of contamination. Another, that is fraught with much more harm and danger, is the pollution that occurs from entirely external sources. Everybody knows the sequel of a rusty milk pail or can. Every dairyman ought to know why such a utensil should be reiected. Such vessels are hard to clean, and therefore they are often imperfectly cleaned. Dirt and bacteria are invariably associated, so that if the cans are dirty, they will contain large numbers of bacteria, that serve as seed to inoculate the milk as it is received. In the rusty seam and crevice, the tiny microbe lurks in safety.

Then again, the open milk pail affords ample ppportunity for hair, dust and filth to fall into the milk. In a dried condition these particles are readily dislodged from the hairy coat of the animal, and every one of them serves as a vehicule for the distribution of germ life. You may think that the trouble is removed if these particles are strained out, but such is not the case. True it is, that the visible dirt is thus taken out, but the invisible germ life, the very thing that is the real cause of the mischief, easily passes through the mesh of the strainer, however fine.

An actual determination of the amount of foreign matter in milk reveals frequently very startling resnlts. Backhaus estimates that 300 pounds of dirt and filth are actually consumed each day in the mllk supply of Berlin, Germauy.

The kinds of bacteria that find their way into milk from these sources are those that are the most undesirable. They are, as a class, the putrefactive organisms. Not only do they produce taints that impair the commercial value of the milk for butter and chesse, but very frequently such organisms are able to produce intestinal disturbances, such as summer diarrhœa and cholera infantum in young children and infants especially.

(*To be continued*)