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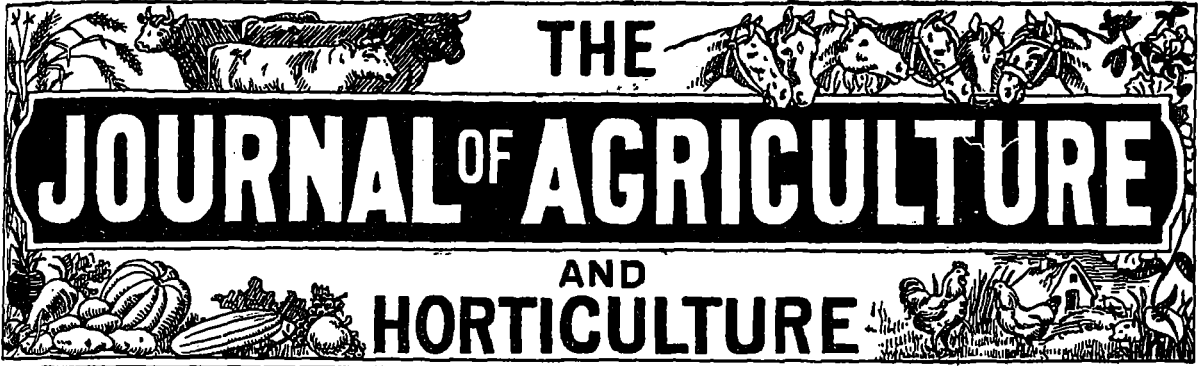
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VOL. 2. No. 2

This Journal replaces the former "Journal of Agriculture," and is delivered free to all members of Farmers' Clubs.

JULY 15, 1898

.. THE ..

Notes by the Way.

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

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STE-ANNE DE BELLEVUE.

Pleasant weather for haymaking, we don't think, have been the last few days of June. And to add to the difficulty of that agreeable though too often tedious job, the crop is nothing short of tremendous. We have never seen such clover in any country. One piece of some five acres, close to the house we are passing the summer at, must have at least 3 tons to the imperial acre. Had it been ours, we should have cut it on the 13th, on which day it was in full bloom; unfortunately, the hoeing of a very fine lot of carrots and mangels stood in the way, and the mower did not start till the 23rd, since which day there has been daily rain, necessitating the cocking and spreading out again every day, until we fear the leaf, the most valuable part of the plant, will be almost entirely left on the ground.

Of course, as the weather was so catching, very little of the clover was cut, and the remainder of this prodigious crop is all "kneed down," scragged all about, one stem embracing its neighbour, in such a general state of prostrate confusion, that the machine can hardly make its way through its anyhow, the horses are worn to death by the continued exertion of backing—no easy thing in a heavy piece of work like this—and, which is almost worst of all, at least ten per cent of the crop is left on the ground uncut.

The reluctance to mow clover early enough in this part of the world arises, generally, from habit. Because timothy is rarely fit to cut before the tenth, or so, of July, people have got accustomed to treat the hay-crop as a whole, and take it all together. Another reason is, that as a man said to us the other day when we were praising a fine

lot of clover that wanted cutting badly: "Oh! yes, that is all very well, but only think what a lot of work it will entail in making. Whereas, if it is left till the heads turn brown, it can be got into the barn the second day."

Clover, really, when made as we, in the neighbourhood of the most difficult of all markets to please, that is, London, make it, takes very little labour indeed. Meadow-hay takes labour enough, and we speak within bounds when we say that it is less work to get five acres of clover ready to carry than to prepare one acre of meadow. Meadow-hay has to be mown, broken out with the tedder, hacked into small rows with the hand-rake, the hacks turned, raked together, and the whole put into grass-cocks—very small ones—before the dew falls; and this is only the first day's work! Then, on the following day, the grass-cocks have to be shaken out, hacked, turned once or twice, and worried about all day, until put into larger cocks in the late afternoon; the third day, the same, and the fourth day it goes, not into the barn, but into stack.

Clover is treated in the very opposite way to this. The idea of all good farmers in England is, that the less you meddle with clover after it is cut, the better. It is simply cut, allowed to lie till it is a little wilted, then turned as gently as possible, generally with longish rods instead of forks, and never on any account shaken out; the third or fourth day, it is usually ready to be put into big cocks, which are very carefully made; it sweats a little, and is soon ready for stacking. Any stranger passing through an English stackyard a week after, would be surprised to see the new ricks of hay steaming away merrily; hay that does not create a good deal of heat in the stack is not considered to be worth much; the heat, no doubt, does some considerable amount of cooking, as it does in the silo.

Clover-hay, managed in this simple fashion, is the favourite on the London market. We asked Mr. Robert Ness, whom most of our readers know, if he had not been astonished at his first sight of such brown stuff! "Why," he replied, "it was more like a plug of chewing tobacco than anything else." And yet this queer looking sticky stuff invariably fetches, on the London market, five dollars the load of 2016 lbs. more than the best green meadow-hay! Horses get it, chaffed, with their oats and beans, but cows never see it by any chance, as it does not give the same delicious

flavour to the butter as meadow-hay, made from a score of different grasses all combining to impart their delicate zest to the gustatory nerve of the consumer.

And only think what a gain early cutting of clover is as regards the second crop. Put it off till the middle of July, as is the usual practice here, and the second cut will probably not be ready till September is well on its way, and September, as we all know, is generally a wet month, or if rain does not fall, the dews are so heavy, both morning and evening, that there is mighty little time left in the interim to get the clover dry enough to cock; the consequence is, that, in three cases out of five, the hay is put together damp, the first sweating takes place in the barn instead of in the cock, the clover is mouldy and dusty, and then people wonder at the number of horses that are met with touched in the wind.

This season, the clover was so early in flower, that we are certain that in all well cultivated farms two good crops of hay might be taken and a fair third cut ensiled or fed off by sheep; thus: first cut, June 13th; second cut, August 4th; third cut, September 22nd.

We mentioned, we believe, in our last, that the farmers in the neighbourhood of St. Johns, Sabrevois, and other circumjacent parts, had actually begun cutting their clover on the 13th June, and very right they were. Perhaps, the practice may prevail, and an improved method of managing this most valuable crop be the consequence.

Roots.—The root-crop, on this farm is very promising. There is a lovely plant of carrots, and though the mangels are left too thick in the rows, they can be thinned out a little at the second going over. Here and there, where the mangels failed, an attempt to fill up by transplanting was made; but the men were not accustomed to the work, and did not know that the great secret of transplanting anything successfully lies in the pressure applied to the thing transplanted. Did not a woman once write to Peter Henderson on transplanting roses, saying that hers had succeeded far better than usual that year, for her husband, whose duty it was to tread the roots of the set out roses firmly into the ground, had gained nearly a stone in weight since the previous season! A joke, of course, but the moral is good.

Another thing we observe here: the ridges or rather drills of the mangel land are not hoed down. Mangels and swedes cannot be left too bare, at the first hoeing. If the curved side-hoes of the horse-hoe are used, there will be not more than at most 2 inches of drill left after it has passed, and the hoer, standing with the hoe at right-angles to the drill, can easily cut that down as he chops out the bunches that the women, with their nimble fingers, single afterwards. Let the plants of mangels and swedes (not of white turnips), after this harsh treatment, lie disconsolately on their backs in the glaring sun if they please; they will be all up and saucy enough the next morning, to the surprise of some inexperienced farmers, who might be inclined to say, as our Sorel friend did, as he passed: Ah! bande de bêtes; vous avez ruiné tout!

As the transplanted mangels all died, the vacant spots were filled up with swedes. Sown on Saturday, the young plant was visible above ground on Wednesday morning: a quick "braird" indeed, as our Scotch friends would say. We should advise men who sow mangels here to use more seed to the acre. The plant is rarely perfect here, and though every "pickle" contains two or three germs, somehow they do not all come up. Unless the land is in very fine condition 7 lbs is none too much to seed one imperial acre. (1).

A very fine piece of Indian corn, on land that looks likely to yield a crop. Planted in hills, and horse-hoed with an effective, though most ungainly looking two horse implement, it is free from weeds, particularly from that pest of the district, wild mustard, of which some fields along the line of railroad from Lachine hitherward, are so prolific that they look like cloth of gold. (2).

Gabourage or *mélange*, called in Yorkshire, Eng., *maslin* or *meslin*, is preferred to oats and pease sown separately, on this farm; but we fear the wet weather will have a tendency to push the pease to such an extent that they will overpower the oats and prevent them from heading out as well as they should do. (*As it did.*)

A good piece of oats and vetches just near the road; just coming into blossom, and therefore

(1) The farmer tells us he only sowed 1 pound of carrot-seed to the acre; and yet the plant is perfect throughout.—Ed.

(2) This is corn after corn, which is pretty hard on the land. We shall see.—Ed.

nearly fit to give to the horses, which will need it before haymaking is finished.

The only *stock* kept on this farm is ten milch-cows, a charming young Jersey bull, a dozen or so fattening hogs, and a few horses, of which last the farmer is a great lover. The milk is used for butter-making, except for a month or so in the hottest part of the summer when it is sent to the neighbouring factory. The cows are a mixed lot, partly grade-Ayrshires, but look like milkers. The hogs are cross-bred too, showing the Yorkshire, Tamworth, and Chester-white descent as plainly as if they could say so. The two first may do for what is looked for nowadays, that is, lean bacon; but the Chester-white can only go into the pickle-tub.

Such a lot of *wild strawberries* in the timothy-grass this year! We fear the Ste-Thérèse people will worry Mr. Bouthillier nearly to death, with their shameful trespassing on his mowing land. It is a pity that, for at least four months in the year, the law of trespass is so difficult to enforce.

Talking of *gabourage* just now, we prefer to say that, had we to deal with it, we should chaff the whole instead of threshing it, except we wanted the pease for the pigs. No food can be better for milking cows than this, and horses at work all through the winter, would stand fatigue as well as in England, hunters do on oats and beans. Wonderful things are pease. As a rule, all English Stallions, on their travels, and pretty exhaustive travels they are, have a certain proportion in their daily food. The pease are, generally, white pease, imported from this country, hard and sound food indeed. It is a pity that, except in early spring, the horse-bean does not get sown soon enough to ripen well, here. And yet, even if only $\frac{2}{3}$ ripe, they would make famous fodder if passed through the chaff-cutter.

Thomas' phosphate seems to have given the greatest satisfaction to all those who have tried it in Britain. We never open one of our English agricultural paper without seeing one or more letters from practical farmers extolling its effects. It seems to be particularly efficacious on heavy clays, such clays as are hardly conceivable by the farmers of this country. Of course, the phosphoric acid is the real active agent in this manure, for the lime is not in sufficient quantity, even with a dressing of 600 lbs. to the acre, to have much effect, and, with a full remembrance of the much vaunted "soluble silica" of the fifties, we

doubt very much if that has any effect on the stiffness of the white-straw crops. (1). Its proper place in the rotation is with the root-crop, to which a heavy dressing should be given, in combination, with say, 224 lbs. of superphosphate (plain) to the acre. It should be borne in mind, however, that when dung is used for *mangels*, no more phosphoric acid is needed than that contained in the dung, as mangels are not much affected by that otherwise invaluable element, preferring nitrogen.

We see, in the *Journal d'Agriculture*, that Mr. Gigault, the assistant Commissioner of Agriculture at Quebec, has imported eight tons of Thomas' phosphate from England. The freight cost him \$1.75 a ton, and the whole cost, landed at Quebec, was only \$15.00, including commission, analysis, and freight. The bulk analysed gave an average of 21% of phosphoric acid, so that 500 lbs. to the acre, costing \$3.85, ought to be enough for a series of hay, roots, grain and clover. The phosphate powder can be had from Messrs. Ewing & Co., McGill street, Montreal, Messrs. Wallace & Fraser, Toronto, as well as from the firm, from which Mr. Gigault imported his, "The Phoenix Oil Mill Co.," 3 Rumford street, Liverpool.

COMPETITION OF AGRICULTURAL MERIT.

(From the French)

VISITS TO FARMS

No. 9. GABRIEL DUMONT.

This farm contains 150 arpents of land (= 127 acres) of which 130 (110 acres) are under the plough, 5 in permanent pasture, and 15 in bush.

Mr. Dumont is a man desirous of instruction, progressive, and one who never postpones work.

So we saw with much interest his fine establishment. The house is in every respect suited to the reception of a farmer's family; the buildings are well arranged, and in perfect order.

We have rarely seen a better barn. There is a good dung-pit which Mr. Dumont values highly for the preservation of manure, but still more for the means it affords of increasing it.

We assigned full marks for the system of cropping, as we are sure that with so much manure the

(1) Of course, we know that soluble silica exists in soils and stiffens the straw.—Ed.

fertility of this farm must be on the increase. Ashes and mineral manures are used in abundance.

About 5,000 loads of stone have been employed in drains, fences, buildings, etc. Eighteen arpents, (about 1080 yards or 180 rods), of drains act very well. A drain, too, leads the waste washing water, etc., 200 yards to the dung-pit.

Madame Dumont rejoices in a fine garden, and supplies the family with flannel, carpets, wines, etc.

A silver medal is awarded to Mr. Dumont, with a certificate of very great merit.

No. 10. MADAME C. A. COLLET.

Of this superb estate, situated at St. Henri de Lévis, 18 arpents are in bush, the remainder, 70 arpents, are under the plough.

Rotation good; but we should like to see more hoed-crops, lest the weeds get ahead.

The division of the farm into fields is perfect, a good lane going clean through the farm, giving access to every field. The fences are good and in proper order.

Nothing can be more suitable than the house; the barns and other buildings act first rate.

Dung well cared for and increased in bulk.

Fair accounts are kept.

Seven thousand loads of stones have been worked up, and 25 arpents of drains act well.

The stock, though fair, needs improvement; we gave 7.75 out of 15 wards for it. Crops decent, and home-manufactures much esteemed.

This farm looks well, and is kept in a most orderly fashion. A good many farm-trees planted, and a fine garden completes the tale.

We granted \$6.20 marks, which entitles Madame Collet to a silver medal and a certificate of very great merit.

EXPERIMENT-FIELD.

Mr. Damien Pilon, sends the following report of his experiments, in 1897, on his farm, at St. Benoit, Deux-Montagnes.

An arpent, 11-13 of an acre, was divided into two plots, No. 1 and No. 2.

1st Experiment.—Wheat.—Soil clay; 400 lbs. of wood-ashes spread in the fall of 1896; 200 lbs. superphosphate carefully mixed with thrice its volume of earth, spread in the spring of 1897, and thoroughly amalgamated with the soil by the use

of the grubber. Plot No. 2, only received ashes in '96. No. 1 yielded 25 bushels of wheat, and No. 2 only 19 bushels (1), but wheat, as every one knows was generally good last year.

2nd Experiment.—Oats.—Same soil; 150 lbs. superphosphate *Capelton*, treated as before, and well stirred into the soil. After sowing, 80 lbs. of nitrate of soda were spread on plot No. 1, at twice, with 12 days interval between. No. 2 plot got no manure. No. 1 yielded 29½ bushels, No. 2, 18½ bushels.

3rd Experiment.—Flangels.—Same soil; the whole arpent was dressed in the fall of 1896 with 18 tons of dung and 400 bushels of ashes, all well spread and the land ploughed and subsoiled. In the spring of '97 were added 100 lbs. of plain superphosphate and the same of plaster, mixed with thrice their bulk of dry earth, and well worked in, the two last only on No. 1. Plot No. 1 gave 25 tons; plot No. 2, 15 tons. (this must mean, one would think, "at the rate of—," for 25 tons to the half arpent, as the original reads, is equal to all but 60 tons to the imperial acre.—Ed.)

4th Experiment.—Potatoes.—Sandy soil; twelve tons of dung spread in the fall of 1896; No. 1 plot had in addition 600 lbs. of ashes; the whole ploughed in in the fall. In the spring of 1897, 125 lbs. of plain superphosphate, mixed with thrice its volume of earth, was spread on No. 1 plot, and well worked in. Besides, in spring, on No. 1 plot, some *sic* nitrate of soda was spread, at twice, with 12 days interval. Yield: No. 1 plot, 165 bushels; No. 2, 113 bushels.

5th Experiment.—Improvement of Old Pasture by Lime.—Plot No. 1 got 5 bushels of quick lime, with thrice its volume of earth, well mixed and spread; timothy, white and alsike clover were sown on Nos. 1 and 2, and well harrowed in. No. 1 plot was much more productive than No. 2 plot, and kept green up to the autumn.

I sowed in the spring of '97, as an experiment, the following seeds I had in hand:

No. 1 Red Top.

No. 2 Trefoil.

No. 3 Bokhara Clover.

No. 4 Sweet-meadow Grass.

No. 5 English Rye Grass.

} *United. Ed.*

No. 6 Orchard Grass.

No. 7 White Clover.

No. 8 Meadow Fescue.

DAMIEN PILON,

Farmer.

JUDGES: { FRANCIS RENAUD.
MAXIME LAMADELEINE.

SECRETARY OF THE CLUB: DAMIEN MASSON.

COMPETITION OF AGRICULTURAL MERIT, 1897.

No. 11. ONESIME LUPIEN.

On the 23rd July, we visited Mr. Onesime Lupiens' farm, at St. Valère de Bulstrode, Arthabaska county.

The whole of this farm, 150 arpents—127 acres—is under the plough. It is well watered by a pretty little stream, that, as if reluctant to leave the lovely spot, makes more than one curve before quitting it.

Mr. Lupien grows supplies for the neighbouring lumber-camps, and does a good dairy business as well.

Up to the present, his rotation has been profitable, but before long he must grow more hoed crops.

His accounts, though unmethodically kept, show that he is a good reckoner. Mr. Lupien has not always been so comfortably off as he is at present, as he had nothing to start with; he is now the fortunate possessor of some \$17,000, in money invested in loans and in landed property unmortgaged. This shows that agriculture may be profitable to those whom Providence has endowed with the talent of making good use of their time.

For live stock, we gave Mr. Lupien 10 marks out of 15; he has 4 horses, 21 cows, 14 head of young cattle, 5 yearlings, 21 sheeps, 10 pigs, etc., one head of horned stock to every 3 arpents.

The dung is very well cared for and even increased.

Mr. Lupien wins a silver medal and a certificate of very great merit for his 85.30 marks.

No. 12. GERMAIN CARON.

Mr. Caron's farm at Trois-Saumons, l'Islet, we went over on September 25th.

All this farm of 93 arpents—79 acres—is arable except one arpent.

Mr. Caron is a tradesman as well as a farmer,

(1) Surely Mr. Pilon does not mean that No. 1—half an arpent—yielded 25 bushels; equal to all but 60 bushels to the imperial acre.—Ed.

and everywhere is to be seen good management, and the good effects of a proper system of cultivation.

The division of the farm into fields and the fencing are both well arranged.

Very few weeds to be seen.

The buildings are good and in good repair.

The dung is well managed and generally used for the hoed crops, which, however, are not extensive.

No accounts kept except a few general notes.

Permanent improvements sufficient for the needs of the farm.

Nine points out of 15 allowed for the live stock.

Crops pretty good.

Mr. Caron works a home-dairy successfully, having a good ice-house and all things necessary for the purpose.

We assigned 85 marks to Mr. Caron.

GENERAL CONCLUSIONS.

System.—The greater number of farmers have not live-stock enough to keep up the fertility of the soil. It is easy to see that one head of cattle to 4 or 5 arpents is not enough, so the land is getting worn out by degrees.

Fields.—Badly divided into fields are the farms of this district. How can a proper rotation be followed here without well managed pastures? A good lane through the farm is often indispensable.

Fences.—In this year's district, we often found good fences; but many a load of stones that injure the land might have been utilised for walls or drains, and without much outlay.

Weeds.—Bad systems of rotation are the chief cause of so many weeds.

Buildings are certainly improving. Still the cow-houses are generally badly floored, so that the stock is never kept clean.

Siloes are not so popular as they were; too many farmers have failed to succeed with them. Still, we find good farmers taking them up again, and we foresee that, before long, every one will be convinced that it is almost hopeless to look for any considerable increase of live-stock in the absence of a good silo.

Manure.—We are happy to say that much greater care is being taken of farmyard manure than here-

tofore. This is a great improvement. Those who have a good dung-pit get the most good out of their manure, considering our climate, etc.

Order and management are the signs of a good farmer. Order in work presupposes orderly ideas.

Accounts.—We should like to see in the farmer's hand books got up expressly for his use. It is always easier to fill up blanks made with order and skill than to make up one's own accounts without any guide.

Permanent improvements are chiefly stoning and draining. It will be seen by the preceding report that it is by no means impossible to conduct these great works with prudence and perseverance.

Planting forest-trees.—Too much credit can hardly be given to those who adorn the purlieus of their farm-buildings with fine trees and shrubs. Our forests, too, need attention.

Roads.—The improvement of our roads would be equivalent to millions of dollars in the pockets of our farmers.

Stock.—As a general rule, the people are too inert in the improvement of their live-stock.

The decay of many proceeds from their keeping horses, cows, pigs and other stock, that eat without paying for their food, and that for want of improvement. In the list of awards, it is easy to see that we have hardly assigned more than half the marks.

STATE OF THE CROPS.

Wheat.—Wheat growing is carried on on a much larger scale than it has been for many a day, thanks to the progress that farming has made, and which is getting more perceptible every year.

Tares or vetches sown for green-fodder with other grain are pretty generally cultivated.

Clover.—An enormous increase in the growing of clover is reported by the competitors; several grow their own seed.

Flax.—Most of the competitors have their small piece of flax, which they intend to increase in size in the future.

Hoed-crops.—Hoed and fodder-crops now occupy a large share of the farm, which shows that the people are thriving and have every prospect of improved condition.

Turnips and rape.—Many farmers are in the habit of sowing either turnips or rape in all the

grain-crops, and a good plan it is as it affords quantities of vegetables and pasture, without the expense of hoeing, and supplies the young cattle, sheep, and pigs with cheap food. (1)

Cows giving milk, however, ought never to have turnips, in spite of what some people say. (2)

Meadows.—Many farmers have learnt how to patch up their meadows (injured by the frost?) in early spring, (by harrowing in grass-seed?) and thus to repair the injury done to them in bad years.

Pastures, too, are improved in the same way.

Green-fodder.—Every one has a field of green-fodder; some as much as 15 arpents.

Orchards.—On every side there appears to be some desire to plant orchards, but it seems to us that, on this point, instruction is needed. Hardly any one seems to consider the probability of there being a good deal of improvement in our export trade.

Gardens.—We saw, in this years' tour, many fine, well managed gardens.

Domestic Manufactures.—We saw, with much pleasure, that the home-manufacture of articles in wool and flax was emerging once more from the desuetude in which it had so long lain idle; and we cannot too warmly congratulate people on this revival. We were obliged to add a column to the table for an illustration of this, on account of the vast number of competitors who were proud of an opportunity of displaying the useful and pleasing work done by their wives and daughters.

Ploughing.—One, and a last, word on ploughing. We are grieved to say that, throughout the 12 counties we visited, we never saw one solitary instance of first-rate ploughing. There may be such a thing, but we never met with it. (3)

We advise, that at all ploughing matches, the judges be selected from among men who have a reputation to lose.

(1) Sorry to differ from the judges; but, in our opinion, this is anything but an "excellente habitude." Ed.

(2) Sorry to differ again. We have made exquisite butter, Devonshire fashion, from the milk of cows eating half a bushel of turnips a day a piece. Ed.

(3) In 1886, at Sorel, we had the greatest difficulty in making the ploughmen of the M.M. Guévremont see that it made any difference whether one furrow was three or four inches wider or deeper than another, its neighbour! Ed.

So great is the value of *good* ploughing, that it would be an immense step in advance to encourage the best ploughmen in some way or another, and this might be worthy of our consideration now that most other questions are being studied.

We close our present report by affirming that the competition of Agricultural Merit is, in itself, a full course of study for our farmers; and the proof of this is, that those who formerly competed seemed proud of showing that their work during the intervening five years had been done with greater precision. Their hearty welcome, too, testified to their gratitude.

In it there is a means for the public to study and improve their practice. The farms of the successful competitors serve as examples of successful cultivation, and useful lessons may be drawn from the harmony of the ideas that govern the whole competition.

Honour, then, to all those who are working for the benefit of their families and for the prosperity of the province of Quebec.

The whole respectfully submitted.

Judges of Agricultural Merit { THOMAS DRYSDALE,
JOSEPH DELAND,
ARSÈNE DENIS.

(From the French).

The Orchard and Garden.

(CONDUCTED BY MR GEO. MOORE.)

PRACTICAL ADVICE FOR THE MANAGEMENT OF FRUIT TREES IN THE ORCHARD.

BY THE REVD. FATHERS TRAPPISTES DE NOTRE DAME DU LAC, OKA, P.Q.

(From the French)

The Revd Fathers Trappists, of Oka, in this Province, have long been known for their practical achievements in fruit culture, and the essay they have written is so plain and useful that the merest tyro, if he would study and adopt the rules it contains, faithfully, could scarcely fail of success: I therefore take pleasure in translating, and reprinting it for the benefit of my English readers.

Practical advice etc.

- 1st Provide good, healthy and vigorous plants.
- 2nd Prepare the soil properly.
- 3rd Plant with great care.

4th Give intelligent attention to culture subsequently.

5th Gather, pack and preserve the fruit very carefully.

Choice of the plant.—A great part of the disappointment suffered by our farmers is caused by misrepresentation of dishonest agents, who have not the interest of the purchaser sufficiently at heart to give him a profitable orchard, nor even to supply him with whatever he wants. These miscarriages have taught some to judge for themselves what are the best varieties for their locality.

The careful nursery man who makes a specialty of fruit culture and understands the fluctuation of the market, is the proper guide to the purchaser in the choice of varieties; let him apply to a well established and trustworthy house, and follow its advice as to the sorts he should plant.

Evils of planting old trees.—Some persons think that there is an advantage in planting a large tree, and hope to have a crop of fruit sooner. This is a grave error: old trees not only yield poor fruit, but become stunted, subject to disease and decay, and in a few years perish for the following reasons, they have a system of large roots which suffer by being cut off in replanting the tree, while those which remain are insufficient to nourish the branches. Again, the bark is hardened and covered with lichens and knots, and becomes the prey and nesting place of insects.

Age of the trees to be planted.—Trees, when planted, should be three, or at the most, four years old from the graft, such trees have their roots but comparatively little developed, suffer very little by being transplanted and present all the conditions necessary to insure healthy growth.

Height of trees to plant.—Too low trees should not be planted, generally, for when they grow, culture under them becomes impossible, and when they are fully developed they have fruit only at the summit: the shorter the stem the more vigorous the lower branches, and they will soon produce a crowd of gluttons which must be speedily cut away: while to do this, much extra work is required, and wounds, which should always be avoided as much as possible, are made. Notwithstanding, there is no doubt but that low trees present some advantages; they are easier to work at, when young, the treatment of disease is easier, and they protect each other against high winds. As for trees with too high stems, the difficulty of pruning them, of attending to them in

case of disease, and of gathering the fruit with the care which is indispensable, should suffice to proscribe them. Between the two extremes, trees which are four to six feet high in the stem, which have a diameter of $\frac{3}{4}$ to $1\frac{1}{2}$ inches should be chosen: it would be bad economy to plant trees of any other dimensions with the idea that they are cheaper; in this line of articles, the cheapest are always the most costly in the long run.

Care to be taken on the arrival of the trees.—As soon as received, the package should be opened very carefully and the trees planted immediately, if possible. If all is not ready for planting, they must be put into a trench; for this purpose a trench must be made sufficiently deep, and wide enough to receive all the roots; place the trees in these trenches one by one, and not in bundles, and see that the roots are covered with earth in such a manner that all shall be in immediate contact with the soil. If the trees are received in the autumn, they must be placed in a cellar, sheltered from frost, and the roots buried in fresh sand, neither too dry nor too moist. Nevertheless, we do not recommend purchasing in the fall; those who have suitable cellars to keep the trees in, may do so, and they will then have the advantage of having them on hand, and so be able to plant them as soon as the land is dry enough in the spring. It may happen that, in the autumn, the frost may have injured the trees during transportation, in that case, as soon as they are received they must be sheltered from the cold, and a few days must elapse before they are unpacked.

(To be continued.)

BATS AS INSECT DESTROYERS

Dr. C. F. Hodges of Clark University, Worcester, Mass., writes to the "Country Gentleman" about bats as insect destroyers; we condense his remarks. In one orchard he found a number of the grubs of the codlin moth in a very short time, in another, not a mile distant, he found them very scarce, and the owner of the orchard accounted for this by saying that an old barn near at hand was the home of numerous bats, and his trees were always free from worms. To prove this, Dr. Hodge caught a bat and offered it some of the grubs which it greedily accepted, he also took a dozen bats home, and kept them in his parlor. They made their home in the folds of the window cur-

tains. From time to time insects were released in the room at night, and in the morning all were devoured. The bats would not eat meat but never refused flies or other insects.

If it were possible to colonize bats it might be a cheaper and safer method of battling our insect enemies than the use of poisonous sprays. This may appear a somewhat difficult thing to accomplish, but it is well worth while scientists experimenting on, and the facts "as stated by Dr. Hodge" should teach us to be careful not wantonly to destroy the bats.

PLANT PROTECTORS

These cuts show the uses to which two triangular boards nailed to a square one can be applied

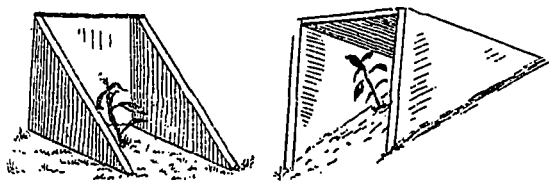


Fig. 1.

Fig. 2.

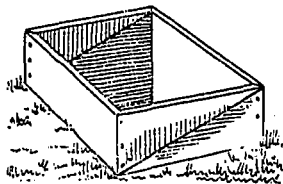


Fig. 3.

in the raising of plants; the simplicity and utility of the contrivance is apparent.

Fig. 1, placed facing the south, affords protection to plants in early spring. Fig. 2, covers freshly transplanted plants. Fig. 3, two parts combined make a box to put around plants to protect them from insects.

INTERESTING TO LOVERS OF FLOWERS.

A new Orchid, *Sanderi*, with gorgeous crimson flower, with spikes twenty to thirty inches long and thick as an ordinary walking stick, has lately been discovered in New Guinea. The renowned French botanist and explorer Mr. Micholitz has the honor of being the discoverer, and as it was found in a country where cannibals still exist, he must have braved many dangers to obtain it. It made a great sensation lately in a London flower show. It is said to be constantly in bloom and of easy growth, therefore it may be hoped that we shall soon see specimens in our exhibitions.

GRAFTING ON VIGOROUS STOCK.

I saw what appear to me to be an excellent object lesson to illustrate the advantage of using a more vigorous stock than the variety grafted upon it and not simply a piece of root. Mr. Wm. Nicholson a most successful florist of Framingham, Mass., U. S. A., recognizing this principle, had a house of tea roses, the plants on which were grafted upon the Manetic stock, one of the most robust roses we have, and one which has the most fibrous roots. The result was, that in some occult manner the vigour of the strong growing Manetic was imparted to the weaker growth of the Hybrid Tea roses with the effect of making them as vigorous as the stock itself, therefore producing more and much larger flowers and resisting the attacks of insects and mildew much better. I had another proof, if such were necessary, offered to my mind that the stock has a very important influence upon the growth of the tree, and that we cannot be too particular to select our trees for orchard planting grafted upon whole roots of the most vigorous stocks.

G. M.

FORESTRY

In the United States a great deal of attention is being paid to forestry which might well be copied here.

Trees have been looked upon as a nuisance encumbering the land and too frequently treated as such, but the increased demand for lumber for various purposes for instance for paper, pulp etc., should teach us that to cut every stick for the purpose of clearing the land is a short sighted policy especially in some instances where the land so cleared is useless for agriculture. There are thousands of acres in our Laurentian range of mountains which have been so cleared and presenting a surface of steep, rocky activity are now barren wastes. Dr Fernom chief of the forestry division of the U. S. department of Agriculture is most active in enforcing the necessity for preserving the forests and has been elected director of the new college of forestry at Cornell University with a demonstration area of 30,000 acres. He insists that all tree cutting should be done with reference to after growth, making the tree crop a business instead of exterminating the forest by one cutting. The lumberman has no object but to secure all the lumber the land yields at the present; the

forester manages the wood lot as an investment which will yield a continuous revenue. The Doctor likens the former to the butcher who kills without breeding: the latter to the breeder.

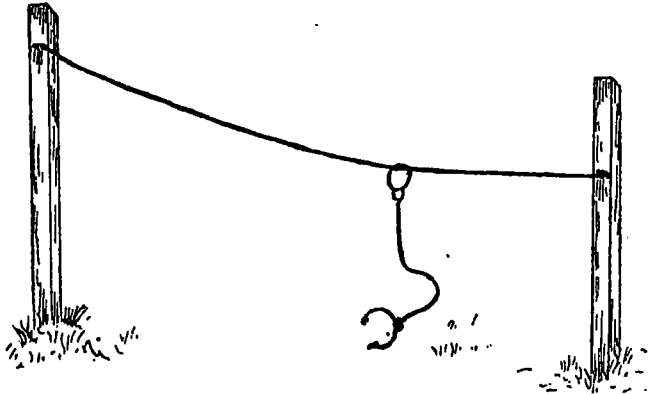
From a patriotic stand point, at least, which is the more useful?

The Germans set a good example in this respect. The State and private forests of Germany yield an income of over \$40,000,000 annually which is on the increase, and will continue to be so under the careful management of the foresters of rural districts and the stringent forestry laws which govern them. It is the duty of all governments and individuals to look to the future as well as providing for the welfare of the present generation, and if we want to make Canada as great and prosperous in the ages to come as it may be, we must

NOTE.—The Jersey and Guernsey people use nothing but an iron pin, driven into the ground, to which the rope is attached. Too hot here to tether. The cows in those Island are moved about six times a day. Land is worth there some \$20.00 to \$30.00 an acre to rent; here only from \$2.50 to \$4.00 at most.—ED.

SOME THRIFTY GOOSEBERRIES.

About an acre of gooseberries is raised by J. W. Rist of Hampden Co, Mass, who has been in the business over 20 yrs. His land is a swamp bottom covered with light soil 6 to 10 in deep. It is fairly moist. In his 20 years' experience Mr Rist has never had a case of mildew among his bushes. He



look to this most important interest and making a knowledge of forestry an essential part of a complete agricultural education.

TETHERING ANIMALS

A simple device for tethering is shown in the accompanying sketch. It has been suggested to fasten the stout wire, upon which the tethering-chain runs to two trees, but this is objectionable on account of the trees which would be liable to injury; therefore stout stakes set firmly in the ground by means of a crowbar would be preferable. The plan is a good one, for if there is a swivel on the rope or chain by which the animal is fastened, there will be a good range of feed and he will not be in danger by winding his chain around the stake as in the old method.

Under some circumstances it is economical to tether.

believes that plants and berries may be brought the nearest to perfection by using 1 to 2 in of fine coal ashes over the surface and in summer applying a hay or straw mulch on the ashes. His experience has been that without ashes, on hot days, the leaves burn. This is ascribed in part to the fact that the roots come near the surface. He has found that an artificial shelter from the sun, as with laths over the plants, improves their appearance.

The gooseberry is nearly as gross a feeder as is the rose, requiring quantities of manure to reach a full and perfect development. Each year, about May 10, plants are swished with white hellebore, three spoonfuls to a pail of water, and applied with a whisk broom. While the plants are set in a strong, well adapted soil, plenty of fertilizer is applied. Work in bone and muriate of potash and put on a thick mulch of stable manure during summer. This year, picking began last Tuesday,

June 28, of Downing and Red Jacket. Other sorts will prolong the season several weeks. The average price paid by retail stores at Springfield during the season is 8c. per qt.—*Homestead*.

Household Matters.

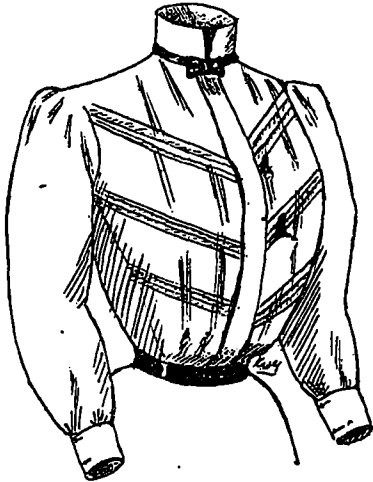
(CONDUCTED BY MRS. JENNER FUST.)

Many, and various, are the means resorted to so as to give a change to the ordinary every day blouse.

The sketch shewn is a mixture of the shirt and blouse.

The back part is made like the ordinary shirt waist, but the front is quite a new departure.

The yoke is cut quite one inch beyond where



the shoulder seam should be, and must be cut with great care so as to give a good curve to meet the collar.

As will easily be seen this front can only be made from striped cotton ;

Three or four tucks are made just the width of the stripe on the cotton, thus the one colour will be shown on the outside and made to look like the sketch. Do not make too many tucks as a very broad band would not look so well as a medium one. Three of these bands serve to vary and make a very pretty front, they are made in the cotton before cutting out on the cross way of the goods and made a little fuller on the bottom than on top.

It is finished just like the blouse and is finished with wristbands and collar, sewn on ; a pair of

medium sleeves, and a little ribbon neck-tie will be all that is needed to finish this simple waist.

The craze for tucks shows no sign of abating.

There are tucks seen at the edge of skirts, but they are not formed in the skirt itself.

With the exception of the top one, which is a genuine tuck the others are made and put on separately, each being placed one above the other on the lining foundation. Tucks would not set well if they were made in a skirt that is shaped.

A Patent Ironing Board mounted on a stand makes easy the ironing of babies' guimps, yokes and sleeves, which is a difficult matter without it. The tiny article is slipped over the end of the board and turned as is necessary.

TO WASH PRINTED MUSLINS

Before proceeding to wet your fancy muslins, give them a good shaking to remove as much dust as possible. Then steep them for a short time in cold rain water. After they have soaked a little while squeeze them gently out of the cold water, and wash them through a lukewarm soap lather. In washing, be careful to squeeze and press them up and down in the lather, but do not rub them either with soap or with the hands. If the articles to be washed are much soiled you will need another lather, but one should suffice if well done. Now rinse the muslins through clean cold water, to which has been added a little salt or vinegar—salt sets the colour, and prevents its running, and in most cases vinegar will revive and brighten the colour. Starch through boiled starch, which has been allowed to get quite cool, hang in a shady place to dry. When dry, damp with hot water, roll up, so that the dampness may be even. Always iron coloured muslins and prints as far as possible on the wrong side, as a hot iron has a tendency to fade delicate colours. The same rule applies to prints with a raised pattern.

APRONS

Our grandmothers always wore aprons when about their work—a custom their granddaughters would do well to imitate. If a woman fancies that an apron is a rather useless invention, let her wear one for a single morning when about her work, and note how soiled it becomes. Then let her

reflect upon the fact that, but for this protection, her dress would have received all that dirt.

"But I wear a black dress always!" says one woman.

But the dirt is there, even if it does not show. The fact that it is present should be an offence to a neat woman. And while certain kinds of dirt may not affect black, grease or dust does, and the sombre dress soon looks worse than would a coloured gown. Then, too, an apron saves the front of a dress a vast amount of wear and tear, and lengthens the period, that is at best too short, before the front breadth of a skirt becomes shiny and worn.

Gingham aprons are invariably worn by a careful housekeeper when in the kitchen. But there are many women who do not always have at hand a large white apron to slip on while the bric-a-brac is dusted, or while they are doing the hundred and one trifles that fall to the lot of the busy house-mother. An apron for this purpose should be plain, or finished with wide tucks, and innocent of elaborate embroidery or of lace.

Even the most fastidious husband will rather like to see the snowy apron over his wife's morning gown as she pours out his coffee and helps the bairns to their porridge. And he will probably like it doubly well if he appreciates that it will make the aforesaid gown last twice as long as it would otherwise.

CREAM OF PEA SOUP

For cream of pea soup use fresh green peas. Shell them and wash the shells. Put the shells with one quart of water into a kettle, boil for fifteen minutes; drain, saving the water, into which you will turn the uncooked peas; cover, cook rapidly for twenty minutes, press through a colander and then through a sieve. Return the mixture to the fire and cook slowly for fifteen minutes. Heat in a double boiler one pint of milk; moisten a tablespoonful of cornstarch in a little cold milk; add it to the milk in the boiler; cook until smooth. Turn this into the pea mixture; add a tablespoonful of butter cut into bits, and half a teaspoonful of salt, and use at once.

CHICKEN SALAD

The day before you want to serve it clean the chicken thoroughly and put on to cook in boiling water. Leave the fowl whole. Cook it until

perfectly tender, salting it when half cooked. The next day remove the skin and cut the meat across the grain into small pieces, using only the light meat if you prefer, but it is just as palatable with the dark meat added and far more economical, though the white parts of several chickens might be used for salad and the dark parts for dinner the next day. Cut celery in the same sized pieces.

SALAD SAUCE

Break three eggs into a quart tin pail and beat very light. Add salt and pepper, a level teaspoonful of mustard rubbed smooth with a heaping teaspoonful of butter, a level teaspoonful of sugar, three tablespoonfuls sweet cream and one-half cup of vinegar. Immediately set the pail in a larger one half full of boiling water. Stir the sauce constantly and cook until the raw taste is gone and it is thick, which will be in about five minutes. Pour enough of this, while yet hot, over the chicken to moisten it well. Stir lightly and set away to get cold. Serve on small, round plates with wafer biscuits.

HOW TO BAKE MACKEREL

Select a nice fat mackerel, wash and soak over night. As this is best for luncheon, change the water in the morning and keep it in a cold place. One hour before luncheon time take it from the water and clean all the black from the belly piece. Chop fine 2 pieces of celery, sufficient parsley to make 2 tablespoonfuls, mix this with half a cup of crumbs. Add 2 tablespoonfuls of butter, a dash of cayenne. Fill this in the thin part of the mackerel, fold it together, and place it in a baking pan. Dust with pepper and put in the pan about half a cup of water. Bake in a quick oven 30 minutes. Baste at least twice. Dish and cover with tomato sauce.

HIGH KITCHEN CHAIR.

There is much work usually done while standing that could as well be performed sitting. No one who has not tried it knows how much sitting lessens the fatigue of the daily labor, particularly when the back is not strong. Have the legs of an ordinary kitchen chair lengthened until the top of the seat is twenty-two inches from the ground. A footstool can be used if necessary. At this height it is possible to iron with ease while sitting, and it gives full command of anything on the table.

The Dairy.

SPRING AND SUMMER TREATMENT OF DAIRY CATTLE

On two leading conditions depend, primarily, the fiscal results of dairy farming, namely on the skill embodied in general management, and on the quality of natural advantages.

Obviously enough to everyone, no doubt, in what some farmers of a pessimistic turn call these gruesome days, the whole question is included in the scope of rural economics, and must be determined in the end by the amount of profit, if any, that comes out of it. Up to within the last

competition has come to an end, and that dairying is now conducted on severely practical lines that were not everywhere found some years back. During the course of this last quarter of a century now hurrying to its close, a widely diffused transformation has taken place in many dairying districts, in reference to the treatment of dairy cows, and this change in management, whatever it may amount to, relates more particularly to the period when the cattle are not out in the pastures. The production of winter milk explains at once the why and the wherefore of, as well as the necessity for a more liberal treatment of cows than was known in our forefathers' days.

In the good old days when there were no rail-



The Dairy Maid at the English Dairy Show.

year or so, profit has been a constantly vanishing quantity, and as a sequel we find but little dairying for pleasure now a days, while fancy farming generally has ceased to be a favourite and fashionable pursuit. Twenty years ago, on the contrary, there was nothing in the whole domain of agriculture that did not pay, if conducted on reasonable lines: and even dilettante dairying was a pastime in which a good many people, who were not farmers at all by any sort of use or training, could afford to indulge.

These were the people who—it was said at the time—making money in something else went into farming for pleasure, and ran up the market for rents: but it will be admitted that this kind of

roads, and very little urban demand for rural milk, our forefathers used to dry off their spring calvers before or about Christmas, just to give them a nine or ten weeks chance of "getting their backs up" for the next season's milking, and this they were expected to do on home-grown straw and hay, without any corn. Farms in those days, were self supporting so far as food for live stock was concerned, and there was no consumption of cake and corn like to that which is so general now. They were also self supporting almost, in regard to manures, and as a consequence of that, home-grown hay was then inferior in quality to what it is now on farms that are well helped by both manures and feeding stuffs from the outside. And

so it follows that as a general rule, the treatment afforded to dairy cows is now much more generous than it generally was, though the inference that might be drawn from this, to the effect that farmers are now more liberally rewarded for their outlay, is not by any means necessarily correct. Direct competition in dairy products—in cheese, butter, condensed milk etc., and through these indirect competition in fresh milk—is now a stupendous fact, whereas it did not exist when a good many of us were born who are only middle aged now.

Competition is so strong all over the world, cheese and butter being exported from Canada, butter from Australia and Denmark, bacon from Denmark, beef and cheese from the States, condensed milk from Switzerland, that it has caused the adoption of new lines of business, new methods of production, and, generally new treatment of dairy cows. All this is an interesting study in dairy evolution, and it is an open book to those who were interested in dairy farming when the first half of the century closed, and have been more or less interested in it ever since. The change however has come about so gradually, that it has not commanded more than a tithe of the notice it is entitled to receive.

It is to be feared, now, that the depression which within recent times has fallen upon the retail milk trade in England, has brought in its doleful retinue some modification of the liberal treatment of cows in milk and in calf, treatment had become general to a degree that was very satisfactory. For when you find dairy farmers whose cows are constantly in good condition, you may take it as a sure and certain sign that matters generally are fairly comfortable all round. This however will not be generally found where cheese and butter are the salient products, nor indeed will it be found where milk is sold, unless it is sold direct to consumers. When a man has a dairy farm near a town, and has built up for himself a profitable retail trade with private customers, and perhaps a sort of semi-wholesale trade with hotels and other large institutions, he will surely be found to possess a herd of cows, whose condition, winter and summer alike, is something more than store condition. No milk seller, indeed, who has to keep up a good supply throughout the year can afford to starve his cows at any time, be it summer or winter. To all such

men it is a sine qua non that their cows should always be in good condition, if they wish to make the best and most of their businesses. This is well understood in the trade. Wholly different from old time dairying, the milk trade of to-day means high pressure farming, so far in any case as the treatment of the cows is concerned : and in this way it has come to pass that the elements of the soil fertility sold off the farms in the form of milk have been more than compensated for in what has been brought on in the form of manures and feeding stuffs.

(To be continued)

W. R. GILBERT.

TREATMENT OF DAIRY CATTLE

(Continued)

Winter Milk

So far as the winter supply of milk for the trade can be a guide, we may take it for granted that the cows producing it will be in good condition—or to pay the least in fair condition. It will hardly pay a man to produce a lot of milk in winter unless he uses a good deal of corn, either purchased or home grown, and not always will it pay him when he does : and where home grown corn is extensively used for the production of milk it will follow as a matter of virtual necessity that purchased manures will be wanted to grow it with. This indeed is how the matter stands : corn of some kind must be used ; either purchased, or home grown stimulated by purchased manures. On all ordinary dairy farms this declaration will be found to be not very wide of the mark ; and while there may be a few exceptionally good farms here and there whose quality is naturally so good that but little of either manures or feeding stuffs must of necessity be purchased, whilst there are many naturally inferior ones that require a good deal of one or both. A prosperous milk selling farmer cannot avoid improving his farm. Look around even among the small farmers, and we find this to be the case : and we know it must be the case if the farmer is to push his trade, and realize whatever advantages there may be within his reach. For all this however it is to be feared that in many instances dairy cows are not now as liberally treated as they were not long ago.

AUTUMN CALVERS

Assuming that cows have been "well done by," as it is termed, throughout the winter, they come

out to grass in good condition, and grass alone at all events for a time at first, will not suffice for them.

Quite independently of the consideration that for cows highly fed in winter, the change to soft and succulent grass is greater than can be considered desirable, if made abruptly, it will be seen that cows may easily fall away in condition if they are suddenly deprived of the corn they have been so long accustomed to, and that the supply of milk will correspondingly suffer.

True, the falling away of such cows' milk is of less consequence, when winter comes to an end than at any other time, for milk is always abundant in the early spring and onward through the summer if grass is plentiful. And again autumn calving cows that have been in the flush of milk throughout the winter, and are timed to be "on note" again for the autumn, may well be let down easily of their milk, until the time arrives, when they must be let dry in views of the coming period of parturition. But as a general thing, milk selling farmers let their cows down easily to grass by continuing concentrated foods for a week or two, in this way gradually bringing about the change from dry food to green. Nothing can surpass in suitability the midsummer grass, if it be plentiful, for the production of excellent milk; but all the same even this milk may be improved and increased by the use of a moderate quantity of meal made from oats or peas. Cows treated this way on grass will yield a large supply of excellent milk, if they are naturally inclined to be good milkers at all.

ARABLE DAIRY FARMING

The European Continental practice known as "arable dairy farming" which is seen to advantage in some parts of Germany, Denmark, Switzerland and also in France, Belgium and even Holland, has not recommended itself very extensively to English "dairymen." There can, however be no room to dispute the fact claimed for it viz : that it will produce more milk—considerably more milk—than will permanent grass land dairying, which supply means pasturing the cows in the spring, summer and fall, out on the land: but it is open to question if the extra cost of arable dairying, as compared with open grazing by the cows, will be more than returned in the extra milk produced save on land that is well adapted to arable crops. But it may be admitted that a

sound and friable loam—two horse land, we may call it, inasmuch as two horses in front of a plough are masters of an acre a day—if the land be naturally high in fertility, will pay well in arable cultivation for the growth of green food, and grain, and root crops, and of grass crops for "soiling" as well as for haying. In respect to arable dairying, almost all depends on the character of the soil and of the climate; and if these are both what they ought to be, there can be no question that the system may be advocated.

So far I have written from a milk selling point of view, but it is immaterial from which point of view, in reference to the treatment of dairy cows, for whatever will do for the milk trade will also do for the production of butter and cheese, through in the latter it may be rather less remunerative. The encouragement to treat cows liberally in spring and summer is hardly so brisk now as some years back, but it may be said at the same time, of the two, illiberal policy will not pay at all when liberal policy pays but poorly. One—and the greatest—of the means to come "out on top" in these days of competition is the liberal treatment of cows in spring and summer as well as in winter. Better cows indeed are wanted in many instances—better for breeding as well as better for beef and milk; but after all is said, the cows want better treatment than they receive in the great majority of instances.

W. R. GILBERT.

DEVONSHIRE BUTTER.

The Dairy-Farmers excursion party lately visited the estate of Colonel Tremayne, who was one of the heroes of the charge of the Light Brigade at Balaclava. He has an estate extending over fourteen parishes, and is noted as one of the best landlords in Cornwall. The home farm, park, and grounds are 450 acres in extent, of which the farm covers 150 acres. In the park the beautiful herd of thirty Jerseys was inspected. The Colonel never exhibits out of Cornwall, but in the shows of that county his Jerseys have often taken prizes, one remarkable cow having been first in the Royal Cornwall Show last year. All the cows were bred at Cardew. The bulls in service are Golden Masher by Masher, and Mountebank by Springheel Jack. The prize cow referred to above is now yielding 4½ gallons per day, from which

2½ lb. of butter are obtained. The average ratio of butter to milk for the whole herd is 1 lb. to 20 pounds. The milk is all scalded to make clotted cream, and some of this cream is churned, instead of being merely stirred, to make butter. The butter is of excellent quality, as several of the visitors could testify. In cold weather the evening's milk is kept twenty-four hours, and the next morning's milk twelve hours so that both can be scalded together; but in summer none of the milk is allowed to stand over twelve hours before the scalding, which is limited to 170 deg. F., as tested by a thermometer. After that process, the milk and cream stand twenty-four hours before the clotted cream is removed and the butter is made. In a trial made last November between the separator and scalding systems in the dairy, the quantity of butter made from 80 pounds of milk put through the separator was 4 lb. 3½ oz., while the butter made from the same quantity of milk scalded was 4 lb. ½ oz. On the next day the same quantity of milk yielded 4 lb. 8 oz., with the use of the separator, and 4 lb. 2½ oz. under the scalding system. Thus, from 160 pounds of milk, there was a gain of 8½ oz. in favour of the separator system. Colonel Tremayne has a flock of South-downs, which were seen in the park. There are 120 ewes, and including wethers and lambs, the number is 470. To Colonel Tremayne's steward we are indebted for most of this information. After seeing the stock and the dairy, the visitors enjoyed a walk in the beautiful gardens, in which great camelia bushes, rhododendrons, and acacias were blooming splendidly, while several kinds of semi-tropical trees and shrubs were flourishing, including the very handsome Chinese fire tree (*Embothrium coccineum*), covered with brilliant scarlet blossoms. After luncheon had been served in the mansion, and Miss Tremayne had photographed the party, a move was made to Restrovynet Farm, occupied by Mr. J. M. Hilman, a tenant of the Colonel. Here a small herd of half-bred Shorthorns and Cornish cows was seen, while the model farm buildings recently erected by the landlord were admired.

THE KIND OF BUTTER WANTED IN ENGLAND

The following letter to the Elgin, Ill., *Dairy Report* from Hodgson Bros., Liverpool, England, will be of interest to Canadian dairymen :

We have pleasure in acceding to your request, and if you can persuade the farmers or factorymen in your centre, or where your paper circulates, to adopt our suggestions, we think they would find the result in the end very satisfactory. In the British market there is an almost unlimited outlet for dairy produce, especially butter. In latter years Denmark has been the chief source of supply for finest qualities, augmented by shipments from Australia, and by the home make in Ireland, and—to a smaller degree—by imports from Canada. The Canadians, during the last few years, have been specially catering for this trade, and they have had a large measure of success. They are learning the lesson that if they are to gain the top price they must send their produce forward week by week, while it is strictly choice and fresh. The package that is most in favor is the square box containing fifty-six pounds net, and the butter should be put up parchment lined, lightly salted (just sufficient to preserve the butter), and of *very pale color*.

The great objection to States butter, especially for finest grades, has been the large percentage of coloring matter, and we cannot too strongly impress upon Americans that the English public must have pale butter, the paler the better, though not dead white—and, of course, must have it perfectly fresh. We are so well looked after here that we can afford to be particular, and will only have the best of goods, for which we are willing to pay. Butter that is held over, and when it arrives here shows any staleness in flavor, is at once depreciated in value 10 s. to 20 s. per cwt. from the price of absolutely fresh-made goods.

At the present moment values are low. Fancy Danish quoted only up to 90 s. to 92 s. and Canadian up to 84 s. Of course, later in the season better prices will prevail.

For medium grade butter we have learned to look for a large source of our supply to the States, and it looks as if we shall have to continue importing from thence for some time to come. Most of this undergrade butter is used for confectionery purposes, such as biscuit and cake making, and large quantities can be taken. It is a matter of indifference whether the goods are put up in boxes (as mentioned above) or in the tub containing from sixty to sixty-five pounds net. This grade of butter can take a little more salt, and the color is not a matter of so much importance, although on the whole the pale butter is the more

saleable, but people on your side must learn to make an article containing less water. The authorities are becoming more particular here, and look like fixing a standard as to the percentage of water that butter will be allowed to contain. The great thing is to send the butter sweet and solid. These are two points to remember, solidity and sweetness, and the man who pays attention to them is the one who will get most for the article he puts up.

There has been considerable outcry lately in this country as to the use of preservatives in butter, and it looks as if we are likely to have shortly a law passed which will prohibit the use of preservatives altogether, and the use of boracic acid will have to be discontinued.

There is a demand here for medium-grade butter from 50 s. up to 70 s., with an almost unlimited outlet. The chief place for the trade is the port of Liverpool, which is in close touch with all the large manufacturing districts and the great centres of population, and is far and away the best place for the distribution of the goods.

If you can induce the dairymen of your district to pay attention to the points to which we have referred, we have little hesitation in saying that the result will more than pay them for the extra trouble in putting up a first-class article suitable for the requirements of the English market.

HODGSON BROS.

Liverpool, Eng., June 1st 1898.

LUCERNE.

MORINFLATS, June 10, 1898

Mr. Editor:—Sir, please let me know where I can get 25 lbs. Lucerne seed and the price. I suppose the Department keeps it but I don't know whom to address, or where the office is. I have a little growing; and it is doing well; which encourages me to send for more. How would you advise me to sow it; in drills? or broadcast. I should like any information you can give me about its cultivation and oblige,

ALLEN HAMMOND.

Morinflats, Argenteuil.

Answered by letter.—Ed.

Lucerne.—Mr. John Craig, late of the Experiment-Farm at Ottawa, seeing our correspondence with Dr. Fletcher and others, concerning the bare places in Mr. Bouthillier's lucerne field, is good

enough to suggest that they might be caused by frost. Now, against this, we have to say that there was no injurious frost in the spring of this year. The previous season, 1897, the whole of the lucerne was destroyed by the frost, and the entire piece was re-sown a few weeks later and took very well. At all events if frost had been the cause of the partial—the very partial—loss of plant in patches this season, we do not think we should have had to trouble Dr. Fletcher for an elucidation of the reason of the loss, as, so far, we flatter ourselves we are quite competent to decide the question without troubling men of science.

The Poultry-Yard.

A question re Early Moulting.—What is meant by the moulting season—How early moulting may be brought about—Some rules to adopt. What experience has taught.

A. G. GILBERT.

I have a letter from the managing editor of one of the leading Agricultural journals of the U. S. in which he asks "Is there any way in which I can care for a flock of 75 vigorous hens so that they shall get through their moulting early and go to laying again in late October?"

The question is a very important one. It opens the whole subject of early moulting and its discussion at this period of the year will not only be timely, but I hope, also of benefit to your numerous readers.

What is meant by moulting?

What is meant by the moulting season? The moulting period is the time taken by the hens to shed their old feathers, to be replaced by new ones. It occurs every year and usually occupies from 2½ to 3 months. Moulting generally takes place sooner or later in the summer or autumn months, according to the age, care and management of the laying stock. During their moult hens do not lay. It is really a season of non-production and it is important then to shorten if we can, this season of non-revenue making. We will see how that can be done presently, but meanwhile to show that the moulting process is, to a certain extent, a critical one in the life of the hen, and that she requires extra care and attention while passing through the ordeal, I quote from Dr

N. W. Sanborn, a well known writer on poultry diseases in the W. S. He says :

"So many birds pass through the moulting process with difficulty, if not disease, that it is well to call attention to it. Moulting is done during the late summer and fall months when the weather is warm. A moulting hen is easily fattened. Hence, at this time of the year, feed lightly of those foods which produces fat. Corn, commel, midlings, potatoes, must be used sparingly. Increase the amount of green bone, bran and skim-milk. A run in a field of clover will be of help in moulting. Keep all males by themselves during the moulting season. If hens are not well fed at this period of their life they may learn the habit of feather pulling or egg eating. They should be housed so as to give them shelter from the hot sun or cold storms. Hens during moult lay few eggs. Birds should go into moult not fat, free from lice and with no red mites in the house."

From the foregoing quotation it will be seen that the laying stock during their moult require more attention than is usually bestowed upon them. In too many barn yards the sight may be seen of hens dragging through the late fall or early winter with few feathers on their bodies and the birds themselves very much out of condition. Hens in such a plight are not likely to be early winter layers, but are more likely to be non revenue producers during the winter months of high prices.

Shortening the moulting period.

To have hens begin to lay in late October, or beginning of winter and continue to do so during the season of high prices should be the aim of the farmer. And such can only be attained by *fowls which have moulted early and gone into winter quarters in perfect condition*, that is neither too fat nor too lean. By the month of November all the fowls should be over their moult and beginning to lay. Such a desirable result can only be arrived at by complying with certain conditions. What are they? We enumerate them as follows :

10. The hens must not be over two years of age.

20. They require a run in a field, or fields, where they can find grass, clover, insect life, etc.

30. Cut bone, cooked livers, beef heads (the latter broken up) etc. etc., should be fed at regular times. Where the laying stock are confined to

limited quarters it is imperative that they be supplied with meat in some shape.

At the Experimental Farm, for three or four years past, early moulting has been secured and in the year 1896 we had 943 eggs laid in November and 1466 in December from an estimated number of 120 hens, of proper age. We had 204 hens in all, but some were kept for breeding stock and reliable setters. We calculated that we had at the beginning of November 120 layers, consisting of early pullets, and one and two year old hens. All expert poultry keepers will at once realise that only fowls which had gone into winter quarters in proper condition could have laid the number of eggs mentioned in the months named.

How early moulting was brought about at the Experimental farm.

The treatment of the farm laying stock so as to secure an early moult, for some years past has been as follows :

10. At the beginning of July, the breeding hens were broken up and the male birds were removed to a separate building. The hens were then allowed to run promiscuously in small fields in rear of the poultry buildings.

20. During the month of July the hens were fed twice a day, with an occasional light feed at noon. Wheat was principally used. When buckwheat was fed it was mixed with oats.

30. During August a mash composed of ground grains and deodorized blood meal, the latter in the proportion of one ounce to every ten hens, was fed three mornings of the week, with a light feed at noon, and a more liberal grain ration for last meal. It should be stated that the blood meal was tried as an experiment and did not seem to be so satisfactory as cut bone. Occasionally a feed of cut bone was given. The mash was sometimes mixed with milk.

40. Towards the end of October the feeding of cut bone was resumed in the proportion of one pound to 15 hens, three times a week. Previous to this period the noon ration had been dropped, as the new feathers had fairly well grown and to prevent the hens from getting too fat.

5. In November a small quantity of cut bone was fed every day, principally in the morning. Vegetables or roots were always before the fowls. After the cut bone was fed in the morning, a few full hands of grain were thrown into the litter on the floor, so as to start the layers exercising in searching for it. Grain was fed at noon ration.

During all the period mentioned above, care was taken not to overfeed and so get the laying stock into winter quarters too fat.

The results of the foregoing treatment in the three past years have been very gratifying. The yearling hens were first over their moult and were laying, while the older stock, although well advanced in their moult, did not commence laying until later in the season. The moral is obvious. The young hens begin to lay in November when winter prices are paid.

I will resume the discussion of the subject again, for it is of importance and my present letter is long enough. (1)

Experimental Farm
Ottawa, 11 July 1898.

NOTES IN PASSING.

Green cut bone is the best animal food that can be given in the winter but if the fowls have range in summer they will not need any.

Never allow the drinking vessel to be exposed to the sun during hot weather. Put it in the coolest place possible.

Continually moving hens from one pen to another stops their laying. Do not keep old and young stock in the same flock. Yard as near as possible all of the same age. It is better to kill the old stock before moulting than afterwards. Never market on the eve of a holiday. A week or so before or after is more apt to give better prices as very often the market is glutted. The moment a fowl is ill remove it to separate and dry quarters, no matter how slight the ailment.

Exposing fowls to storms is a sure way of bringing roup to your flocks. Do not try turkey or geese culture unless you can supply them with a good grass range.

Ducks are very profitable if marketed when ten weeks old, after that they grow too much to bone and muscle.

Do not confine your fowls to a fixed bill of fare. Let there be as much variety as possible.

J. ANDRES.

POTASH SALTS.

In your impression of April 11th, you quote muriate of potash at 3s. 6d., and kainit at 3s. 4d. per unit. The former being four times as rich in potash as the latter, relative costs of carriage would probably make them same price per unit in the field, or give an advantage to the former. Can you tell me why, this being so, kainit is invariably chosen as the potash salt in agricultural experiments? also whether the unsatisfactory results obtained from its use may not justify one in suspecting that in the 88 per cent. of non-potash material which it contains some deleterious substance might be found by an enterprising chemist? —H. J. M. [Kainit contains no injurious compound, but it is a cheap source of potash. *The reason why potash so often fails is because it is seldom needed by soils.* Unless you have special means of knowing that potash is needed for your soil your money would be better spent on other fertilisers, such as superphosphate or nitrates. The values given per unit are commercial and not agricultural values, and it by no means follows that potash is worth either 3s. 4d. or $\frac{3}{4}$ d. per unit when applied to land.]—*English Ag. Gazette.*

The Grazier and Breeder.

SWINE BREEDING AND FEEDING

(From a paper read by W. M. McFadden, at an American Farmers' Institute.)

My observations along the line of raising hogs have convinced me that there are several popular ideas on the subject that are erroneous. I do not expect to convert you to my way of thinking, but I hope I can draw out a discussion that will be of value to all of us. We are raising hogs for the money there is in the business. Of course, I expect all to agree with that. It is, however, on the question of the best way to get the most money out of it that I may cause some contention.

All have noticed a few hog growers in every neighborhood who are away ahead of their neighbors in the success they secure in producing pork. These men but prove that the average man could adopt much better methods than those he practises. I believe a large number of the most successful hog men (and I speak now of the strictly pork producers) are those who do not accept many of the popular ideas on the business,

(1) At all events, it is not a line too long.—Ed.

who think for themselves, and who work on lines that a majority would denounce if asked to give an opinion. Now one remark we hear most frequently about our hogs is, perhaps, that they are too fine boned and lack size. From my standpoint nothing about a hog is easier to produce than size, that is, a big meaty hog. Hogs that possess these characteristics are by no means the most profitable pork producers. What we need is quality. It is generally thought we cannot get quality without reducing the size, but it can be secured and all the size necessary retained. The art of combining these two marks the successful hog man. A good, flinty bone is what we want, and not the coarse, soft leg. The bone need not be large, if it is the right kind and shape.

In view of the increased profits to be secured, I think it worth any farmer's while to make a study of the matter with a view to determining how he can best produce a hog of the right type. We frequently hear farmers declare they care nothing for the so-called fine points that breeders of purebred herds seem to place so much stress upon. Now, I believe a man who is raising hogs for pork is interested in a neat head and ear, a nice coat of hair, and other points that are generally considered only "fancy." While these things will add nothing to a bunch of hogs on the scales, so far as weight is concerned, they are valuable to any one raising hogs for two reasons. First, a bunch of this nice, neat, stylish kind, with lots of quality, will generally bring a little more on the market, and in the second place, and by far the most important one, they indicate good breeding, or, if you please, what I have termed quality, a thing that is something of a hobby with me.

I am aware that the tendency is to reduce the size when a great deal of attention is paid to quality, but this is not necessary. The secret of the whole business is to know what to select for breeders that will maintain sufficient size and yet secure the kind of animals that will give the very best results for feed consumed. This can be done, not by selection for size and so-called bone, but by intelligent selection, with quality as the first consideration. There is not a scarcity of this kind of breeding animals. Simply, we do not select them when we get them.

Another popular idea that I want to combat is that to get a good brood sow we must select a long,

loose, coarse roomy one. Now, a good brood sow is one that will produce a fairsized litter of the right kind of pigs. Some of the best brood sows I ever had were of the rather neat and stylish kind. I have bred a few state fair winners, and they were nearly all from sows that showed plenty of quality, and I never had results that were satisfactory to me from a big, coarse, roomy sow. Of course, there are some good brood sows of that type, but not by any means of the sows that are valuable as breeders of that kind.

As to feeding, I can sum up what little I know about in a very few words. It does not matter nearly so much what you feed as how you feed it. The best part of any improved breed is the corn and pea crib cross. One difficulty is that the average farmer does not feed regularly, and with a view to constant gain on his hogs. Variety of feed and balanced ration are all right and of great advantage, but require an intelligent use of them just at the right time. Success in pork production demands, as does every other business in three days of close competition, constant and intelligent thought and attention, and can be secured by independent thought and methods as often as in any other way.

FORAGE FOR SHEEP

By Prof. Thomas Shaw

The question of growing summer forage for sheep is yet in its beginnings. For the past two seasons we have pastured sheep at our State farm on forage grown thus, and with very much success. On ten acres of light soil with a sandy and gravelly subsoil we pastured eighty-six head of sheep and lambs from May 1 to November 5. The major portion of the soil had not been given any manure for years, although cropped every season for at least six successive years. In addition to the forage thus furnished, nine ton of curred food and six tons of green food were taken from the same land. The sheep had plenty of food, insomuch that they kept in fine condition, and the lambs made a good growth. The latter weighed 130 lbs. (1) on an average when sold at less than one year old, and they brought at the experiment station five and a half cents per pound live weight. One of the lambs legs served at the diningrooms of the Commercial Club in St. Paul, was pronounced by good judges of the very highest quality, as good as the best that England can produce.

(1) Probably 76 lbs. The 4 quarters.—Ed.

The chief of the foods grown were clover, winter rye, corn and rape grown together, sorghum and dwarf Essex rape. The sheep were pastured on these in turn. The winter rye furnished an excellent bite for fall and spring. Next came a plat of peas, oats and rape sown together. This plat was eaten down three times. After these came corn and rape. The corn and rape furnished an excellent food. The sheep were put on to it when it was about a foot high. The weak point of this pasture was that it did not come again. After the corn and rape, sorghum followed. And rape followed sorghum. Thus the sheep had abundant supplies of food during all the season. When the forage was wet from rain the sheep were pastured on the grass. Movable fences were used.

This system of growing forage for sheep will some day be adopted in all arable sections of the United States, that is to say, it will be adopted in a modified form. Farmers who keep sheep will sow one more kinds of pasture for them to tide them over the dry period that usually follows the spring months. The advantages of the system include the following: (1) It enables the farmer to keep a much larger number of sheep than it would be possible in the absence of such forage. (2) It enables him to grow a better quality of mutton because of the succulence of the food. (3) The system is death to every form of weed growth. (4) It does not impair the fertility of the land. and (5) The crop that follows such depasturing is sure to furnish an abundant growth in a normal season. Minnesota alone by adopting such a system generally could grow all the sheep in the United States without using one acre of land now under cultivation.

FARMING.

STEER AND HEIFER BEEF

Widely different opinions are held as to the comparative value of steer and heifer beef. American packers rate steers at from 25 to 50 cents per hundred more than heifers of the same age, breed and general qualities. On the other hand, the opinion in England is the reverse, heifer beef being rated higher than steer beef.

For some years feeding experiments have been made at the Iowa Stations to study the comparative value of steers and heifers for fattening. In the first trial one lot of steers, one lot of spayed heifers, and one lot of open heifers were

used. They were all grade Shorthorns, as nearly alike in breeding and development as possible. There were five animals in each lot. The lots were fed and treated in the same manner. Seven of the heifers calved during the trial, which interfered with the comparison. The steers made a larger gain and sold for one cent per pound, live weight, more than the heifers. During the whole test, which lasted about eleven months, the steers made an average gain of 806 pounds; one open heifer, clear of calf, gained 775 pounds; four open heifers that had calves made an average gain of 628 pounds; two spayed heifers, clear of calf, made an average gain of 736 pounds; and three spayed heifers that had calves averaged 645 pounds gain.

The steers were sold at 5.75 cents and the heifers at 4.75 cents per pound, live weight. Allowing 3.5 cents per pound for the steers and 2 cents for the heifers at the beginning of the trial, there was a profit of \$64.39 on the steers, \$30.51 on the unsplayed heifers, and \$13.76 on the spayed heifers. The average proportion of beef in the carcass was 63.2 per cent. for the steers, 62.4 for the unsplayed heifers, and 62.8 for the spayed heifers.

When slaughtered, the carcasses were cut and judged by an expert. The heifers gave a larger percentage of prime cuts (ribs and loins) than the steers, so that, on the basis of the meat and by-products obtained and the price paid for the steers, the heifers were worth from 0.57 to 0.62 cent a pound more than was paid for them.

Crediting each lot with the actual value of the different cuts and the by-products, and not including the expense of killing and handling, it is calculated that, at the prices which the butcher paid, he made \$20.45 on the steers, \$58.12 on the unsplayed heifers, and \$64.84 on the spayed heifers. In other words, the returns made by the heifers would have justified a purchase price of \$5.37 per hundred for the spayed heifers and \$5.32 for the open heifers, instead of \$4.75 for each, and still have left the same profit as with the steers.

The results of a second trial to compare steers and heifers for beef production have been recently published. The test was made with 15 pure-bred or high-grade Herefords. The animals were divided into three equal lots, one of steers, one of spayed heifers, and one of open heifers, and all were fed alike during fourteen months.

The results of the experiment are briefly summarized in the following table :

RESULT OF FEEDING STEERS AND HEIFERS FOR BEEF.				
	Average weight at end of test	Average daily gain per head	Dry matter eaten per pound of gain	Average cost of food per pound of gain
	Pounds	Pounds	Pounds	Cents
Steers.....	1,338	1.71	8.70	4.08
Open heifers....	1,300	1.86	7.67	3.65
Spayed heifers...	1,337	1.70	8.60	4.05

As shown by the experiment, the heifers made a slightly greater average gain from correspondingly less food and at a less cost than the steers. Carefully conducted slaughter and block tests did not reveal any material difference in the character, composition, or quality of meat from steers and heifers, although the percentage of high-priced cuts, ribs and loins was greater in both lots of heifers than in the case of the steers.

It has been claimed that the principal cuts in heifer carcasses contain more fat than those of steers, and are, therefore, less profitable to the consumer. The average cost of the beef to the firm purchasing the cattle raised in these experiments was 6.51 cents for the steers, 6.21 cents for the spayed heifers, and 6.14 cents for the open heifers. The average selling price received by them was 6.59 cents, 6.26 cents, and 6.24 cents, respectively.

It was observed in this and other investigations that under similar conditions heifers are inclined to take on flesh a little more readily than steers. Larger gains by the heifers may not be shown, but there is a tendency to finish at a little earlier stage in the process of fattening. The difference between steers and heifers in this regard, when fed under the same conditions, has also been noted by practical stockmen feeding on an extensive scale.

The fact is emphasized that heifer beef has been much underestimated, since in both trials the heifers have returned a higher net profit on the block than the steers, notwithstanding the fact that the steer beef was rated higher than the heifer beef. So far as could be learned from these experiments, spaying had no particular influence on the gains made.—*Bulletin, U.S. Department of Agriculture.*

To an Englishman the idea of a comparison between heifer and steers is absurd; but we always prefix the word "maiden" to "heifer,"

Fancy a "spayed" heifer calving! A maiden "home bred" heifer always fetches the highest market prices.—Ed.

DIPPING SHEEP FOR TICKS

The injury inflicted by the sheep tick upon the flocks of this state can only be roughly estimated. Ticks do not cause death directly, nor injure the wool, but cause untold torment by their biting and wandering about over the body. This saps the vigor of the old sheep, retards the growth of the lambs, and makes both susceptible to disease. The tick is a wingless fly about a quarter of an inch long, having a large, strong, reddish-gray body, and six legs. The most opportune time for killing ticks is just after shearing, as the case of handling and the cost of dip is reduced to the minimum. Nearly all the ticks will leave the sheep for the lambs, so that the work will be very effective if only the lambs are dipped. It is better, however, to dip both old and young. The sheep should be examined carefully about three weeks after dipping, and if any eggs escape destruction the sheep should be re-dipped.

The apparatus necessary may consist of only a box or barrel, into which the animal may be submerged, and a table (1) upon which they may be allowed to drain. Such temporary arrangements necessitate considerable labor and loss of dip. A special tank may be purchased or built if a large number are to be handled, as one will soon be repaid for its use. The tank should be about eight feet long at the top and two feet wide. It should be four and a-half feet high, and one end made vertical. The sides should slant so that the bottom will be from five to eight inches wide. The bottom should be about three and a-half feet long, and one end made to slant so that the sheep may walk out. The tank should be set into the ground and a chute made so that the sheep may be driven into the tank. On the whole, it is more economical and satisfactory to use some of the good sheep dips offered upon the market. These dips usually contain arsenic, extract of tobacco, or products obtained from creosote or tar as the destroying agent. As the latter dips are effective and less dangerous in the hands of most people they are to be preferred. The following is highly recommended and may be prepared by any-one: Tobacco leaves, 50 pounds; sulphur, 10 pounds;

(1) A sort of tray made of slats, with a space between them, is what we used.—Ed.

water, 100 gallons. The tobacco is steeped for an hour and a-half, the leaves are strained off and the sulphur added, and again boiled for an hour. Keep well stirred and use while warm.—*A. W. Bitting, D. V. S., Indiana Experiment Station.*

Science.

PAPER I.

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

INTRODUCTORY

- 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 is 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. Pinhole 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 appendages 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.

INTRODUCTORY

The necessity for accurate information on the subject of bacteria is apparent. The relation of germ action to agricultural processes is becoming more and more apparent day by day. Hence, a plain exposition of what bacteria are and what they do, will be of direct value to the farmer, not only as a matter of education, but for the aid which it frequently offers in the solution of practical agricultural problems.

To make this series of discussions of most service to all the readers of the DAIRYMAN, it will be presented in as non-technical language as possible. It is, however, frequently impracticable to use common language terms exclusively without becoming diffuse in style. To obviate this difficulty, and at the same time to encourage the correct use of certain scientific terms that are coming into frequent use, the following plan will be adopted. To each article a glossary will be prefixed, defining those terms that are used for the first time in the body of the text.

The general scope of this series is to treat the various questions that arise concerning the action of bacteria in relation to different phases of agriculture, as dairying, diseases of animals and plants, soil processes, etc. The purpose of these papers

is not to give an exhaustive discussion of the subject of agricultural bacteriology, but merely to consider, in a general way, those problems concerning which information is frequently desired.

I

WHAT ARE BACTERIA, HOW THEY LIVE AND GROW

So much misconception exists in the minds of the general public, as to the nature of bacteria, what they do, and how they do it, that a brief description of some of the more prominent characteristics will undoubtedly be helpful.

Bacteria are Plants.—Everyone recognizes them as living things, but the public-at-large consider them as animals rather than plants. In all probability, this arises from the fact that they are the cause of disease processes, and, inasmuch as animal forms (bugs, vermin, etc.) are known to be able to cause various maladies, the bacteria have been connected with this class. The bacteria are also able to move and, to the general observer, motion is usually considered an animal characteristic. In the microscopic world, however, motion is no proof of animal life, although with the more highly organized forms, this may be regarded as a general rule.

The bacteria are classed with the plants because their method of nutrition is plantlike rather than animal; their structure and method of growth also ally them with the simpler plants, rather than animal life.

Size.—It is quite difficult for any one to get any adequate conception of size where objects are enormously large or extremely minute. The bacteria belong to a group of living things so small that the most perfect microscopes are needed to determine their form and size. Measured in inches, they range from 1-25000th to 1-10000th of an inch long, and from 1-50000th to 1-25000th inch wide. This gives but a faint idea as to their minuteness. If they could be laid side by side, it would take about 250 of the average sized kinds to equal in thickness a sheet of this paper: 250,000,000 spread out in a layer one row thick would cover an area about the size of a postage stamp. Yet these tiniest of living things may affect our weal or woe in the profoundest manner.

How They Grow.—The single individual is reduced to the simplest possible conditions, simply

a single cell, a speck of living jelly. As the cell grows, it lengthens in one direction, then divides into two equal sized cells. Under favorable conditions of growth, proper temperature, moisture, air and food, a cell may divide as frequently as once in 30 minutes. This rate does not continue long, for, as they accumulate in numbers, the cells on the interior of a growing mass are starved out because food cannot reach them. Then again, the environment is never wholly favorable to the growth of any single species. Competition between different kinds is indeed fierce. The chemical reaction of the medium in which they live, may often retard development; sunlight and drying destroy many; so that the actual growth is far from being what is possible under favorable surroundings. Indeed, it is well that this is so, for, if unhindered growth were possible, it has been estimated that the progeny of a single germ would be able to people all the oceans of the globe within five days.

How They Move.—If we examine a drop of stagnant water under the microscope, a microscopic menagerie is seen in full procession. Animalculæ of all sorts are to be seen disporting themselves in various moods. For our purpose, we may neglect these, and note the simpler and smaller plant forms. While there exists but little difference between the various kinds as to form, many of them have a peculiarity of movement that distinguishes them at once. Here come some stately bacilli with a slow swinging movement, relatively; they possess aldermanic proportions, and have quite such a swagger. Scuffling along, at a much more rapid rate, comes a troop of nervous, irritable, smaller forms, while here and there a spirillum bores its way through the throng in a straightforward, business-like way.

This ability to move is due to very delicate threads of protoplasm, called *cilia*, that protrude from the cell wall. By lashing these to and fro, the cell body is propelled through fluids. In some cases, only a single cilium is present, as in the cholera germ; then again, they may be very abundant, being spread over the entire surface of the cell.

(To be continued)

