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THE JOURNAL OF AGRICULTURE AND HORTICULTURE

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THE

Journal of Agriculture and Horticulture

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The Farm.

NOTES BY THE WAY.

Barley vs. wheat for pig-food.—Some experiments have been lately made on the relative values of barley and wheat in pig-feeding. As one would expect, the effects of both, weight for weight, were so nearly on an equality, that the difference was hardly worth noting. The barley, we presume, was "grinding-barley," for no one would be mad enough to give a fine sample of "malting-barley" to pigs, the value of that sort, though very likely not weighing any more to the bushel, being at least 50 cents a bushel more than the grinding stuff. We have often seen grinding-barley sold for 24s. a quarter of 432 lbs., when Chevalier barley, from the chalk soils of the S. E. of England, has been fetching 44s. a quarter in the same market.

Warp-lands.—Some of our English readers, who receive newspapers published in Yorkshire, have doubtless seen in the market-reports mention made of "warp-potatoes." A peculiar system of cultivation is pursued on these warp-lands, or rather in their formation—for they are purely artificial,—which may be worth a passing notice.

Warping can only be carried out on flat lands running along the side of a tidal river. The land alongside of the estuary of the Humber fulfils all requirements. A wall is built high enough to exclude the highest tide; at the upper end of the wall, a gate, something like the gate of a lock is made to admit as much water as is thought to be advisable, and another gate is made at the lowest point of the wall, to admit of the discharge of the water when it has got rid of its burden.

Now, this river Humber brings down with it a vast quantity of rich earth from the "red-sandstone" and "mountain-limestone" soils of the interior, and, as will be easily perceived, when the heavily laden water is introduced through the upper gate—the lower gate being closed—on to the flat land, to the depth of, say, 2 or 3 feet, its state of repose from high tide to low tide is long enough to allow of its parting with its earthy contents, which are of course deposited in a nearly equal thickness over the space covered by the water. As the tide goes out, the lower gate is opened by degrees—too rapid an exit of the water would draw part of the sediment with it,—the water, now clear, or nearly clear, flows gently away into the estuary, and a film, of the thickness of a sheet of stout paper, is found to be left on the land. The process is repeated, tide after tide, for months, until the "warp," as it is locally called, has attained the depth of from two to three feet, when the tide is finally barred out, the land left to dry, and when sufficiently firm to bear the tread of the horses, and the passage of the implements, the usual operations of husbandry are carried on. The work is costly, as to time occupied especially; but the gain is marvellously great, as the "warp" is so rich that no manure is required, except, perhaps, on the part of the land furthest from the river, where the deposit is naturally thinner.

Potatoes and wheat are the chief products of these soils, and their yield is very great. As we have not seen any account of the warp-lands for more than 45 years, some imperfect notions may have crept into the above sketch. If such is the case, we should be very glad if any Yorkshireman, acquainted with the locality in question, would be good enough to correct our errors.

Jerking horses' mouths.—There is not much resemblance between us and the great mechanician Watts, the improver of the steam engine, except in one respect: Watts was a most indefatigable reader of novels: so are we, and very few novels indeed have we read in which we did not find something that repaid us for our pains, or rather, for our pleasure.

Some of our readers may have met with a recently published novel, entitled "David Horan." The hero is a queer mixture of banker and horse-dealer; full of quaint sayings, some of which are very full of wisdom, and one of them struck us as very well worth repeating: "No, Sir, I would not do it on any account; *I'd as soon jerk a horse's mouth*"! It is really painful to see how many people *do* jerk their horse's mouths as they are travelling along the road. We are sorry to say it, but women are the chief sinners in this respect. A slight touch of the whip to arouse a lazy horse, if he is too lazy to be aroused by that unspellable sound made by the impact of the tongue against the palate, is far preferable to that annoying tug at the bit so common here.

Rotations.—Professor Robertson, speaking of the rotations practised in England, mentions the old 4-course rotation, commonly called "The Norfolk" course, as consisting of "roots, barley, clover or beans, and wheat," but he does not mention that the beans are only grown on heavy land. In the days of "Mr. Coke," as the old Lord Leicester was called in Norfolk to his dying day, the course was, as described in all the leases at Holkham, strictly: turnips, barley, clover, wheat; no deviation being permitted on any account. As time went on, the clover being repeated every fourth year, the land (*pace* Mr. Wm. Hale) became tired of that crop, and variations were necessarily permitted by the landlords, till, by the year 1850, no farmer in the Eastern counties of England, who knew his business, sowed clover often than once in three courses, i. e., every twelfth year. So, the courses ran like this: 1. roots, barley, clover, wheat; 2. roots, barley, trefoil (yellow-clover) wheat; 3. roots, barley, pease on light, beans on heavy land, wheat; after which the No. 1 course began again. All the Webbs, the Jonases, the Claydens, and others of the best farmers of Essex, Hertfordshire, and Cambridgeshire, held the opinion that, only by the adoption of this extended rotation could the utter extinction of the valuable red-clover-plant be prevented.

Butter yields.—One would really think, from letters published in some of the agricultural papers of the United States, that there were no cows worth keeping for the production of butter except the Jerseys. The following is a list of the highest results of public trials in England:

		lb.	oz.
1. Jersey, Sundew 4th—Dairy-show at Tring,	1899	3	3¾
2. " Baron's Progress, " "	1889	3	5
3. " Em. Tring,	1899	3	4¾
4. Shorthorn, Dairy-Model, Dairy-show	1896	3	2
5. Shorthorn, Proctor, "	1898	3	1¼

Seed-wheat.—We commented, pretty severely if we remember, some time ago on the absurdly small quantity per acre of wheat sown by all the competitors in the trials instituted by the Department of Agriculture last year. Five pecks an acre, we said, are not sufficient seeding for an *arpent* of even fall-wheat, that has the chance of tillering in the spring; much less are they sufficient for an arpent of spring-wheat, that, from our late seasons, is, in 9 cases out of 10, bound to run up its seed-stem in a very few weeks after *brairding*.

Mr. Wrightson, of whom we have often spoken as a thoroughly practical farmer, of the county of Wilts, England, gives the following as the best method of putting in wheat:

Dress with dung.
Plough and press.
Broadcast with the machine.
Heavy roll.
Harrow about six times.

Many good farmers, he says, think they cannot over-harrow, when the seed is drilled; in which case the harrowing is done before sowing, and one tine afterwards finishes the job. "The quantity of seed to the acre at this time of year (October) is about 3 bushels to the *acre*"; i. e. 2½ to the *arpent* If this quantity of seed is considered necessary, on well manured land, for fall-wheat in England, how can 5 pecks be enough for the average land in Quebec province if sown in the spring?

In 1886, we persuaded Senator Guèvremont to let us put in a few acres of wheat on a poor piece of *Sorel sand*, on a hill side. We gave it, as nearly as we could judge, 2½ bushels of very good seed to the *arpent*. The spring was an early one, so we got the wheat in about the 28th of April; after sowing on a well-harrowed surface, the seed was let in by means of a common grubber; the land was harrowed twice afterwards, and rolled with the heaviest implement we could get. When up, the wheat was again harrowed, and the yield of the crop was 23 bushels to the *arpent;* nothing wonderful, of course, but twice as great a yield as had ever been grown on that extremely poor land previously.

The presser (1) is a machine composed of a pair of shafts connected with 3 wheels on an axle, one of which is a common carriage-wheel, and runs in the open furrow; the other two are of cast-iron, bevelled off around the periphery, weighing about 4 cwt. each. The presser, drawn by one horse, takes the work of two ploughs, and makes a groove of some 2½ to 3 inches deep, the bottom of which forms a solid seed-bed for the grain.

"Clover provides excellent fodder for cattle, horses and sheep, and by far the largest part of its nitrogen may be left on the farm in farmyard manure. *I think the part of it that can be used for feeding live stock should not be ploughed under until they have taken their toll of it in that way* (2). As far back as the beginning of the Christian era, it was distinctly recognized by the Romans that leguminous crops were not only valuable as food for animals; but that their growth enriched the soil for succeeding crops, in fact were of value as restorative crops grown in alternation (by turns) with cereals."

We heartily agree with the above opinion of Prof. Robertson. Ed.

Thames-Trout.

Many people, with whom we have gossiped about trout-fishing, have been hard to convince that there are trout in the river Thames. The truth is, there are no finer trout in any stream than the real "Thames-trout." The following excerpt from a London newspaper will give some idea of the number and average weight of trout taken in the dear old river in, probably, the worst season ever known (1899). The artificial fly is useless there; nothing but spinning a natural gudgeon or bleak has the slightest chance of success. As the spinning-flight consists of *eleven hooks*, it may be imagined that a neophyte has not much of success until he has submitted himself to the instruction of a professional fisherman.

The heaviest trout we ever took in the Thames weighed 9½ lbs. It grew to 13 lbs. in the sporting papers of the day (1856).

(1) For an engraving of this valuable implement see No. for April, 1897. It is *invaluable*, on light land, for all grain.

(2) The italics are ours. Ed.

"Sunday last witnessed the close of another Thames trout fishing season. Considering the unfavourable condition of both water and weather results have turned out better than was expected. One hundred and twenty-seven trout are known to have been caught between Teddington and Wallingford, and these scaled 532 lb. 12 oz, and averaged 4 lb. 3 oz. a piece.

"Mr. G. Witherington took the heaviest fish of the season—one of 10½ lb. It was landed late one evening in May at Sonning."

Extracts from Prof. Robertson's *Evidence* on Crop-Growing.

"The variety *Harrison's Glory* (59 bushels per acre) which headed the list for productiveness at Brandon, Man., gave the lowest yield of all the varieties tested at Agassiz, B.C., (22 bushels per acre); and the variety, *Creeper*, (23 bushels per acre) which was at the very foot of the list of all the varieties tested at Brandon, Man., was included in the list of the twelve highest at Indian Head, N.W.T., (43 bushels per acre). These are only instances, and the evidence of the whole of the lists is in the same direction.

It is the most convincing evidence I find anywhere that the variety, in regard to productiveness, varies with the locality where it is grown, or varies in degree as it happens to hit the conditions of the locality, or as it adapts itself to them. Could anything be more convincing?

Varieties of Oats and Barley.

An examination of the records of the tests of varieties of oats gives similar results to those of peas and wheat. Out of the 65 varieties grown at the five Experimental Farms in 1898, no less than 41 varieties appear in the five lists of the twelve most productive varieties. The variety *Danish Island* (42 bushels per acre) which yielded lowest at Ottawa was the very highest at Agassiz, B.B. (85 bushels per acre). The tests of six-rowed and two-rowed barley point in the same direction. There is nothing to indicate a variety which is sure to be the most productive, or even likely to be the most productive, in any locality without an actual trial of it there; and if it happens to hit the conditions aright, its superior productiveness can be maintained only by selection of the best seeds of it for sowing from year to year. Selection and sowing of the heaviest and largest seeds of any variety, from the crop on the piece of land where it has given the largest yield, will increase its productiveness from year to year in that locality.

Does Seed Run Out?

"That brings me to say a few words on the subject of whether a strain of seed, or a variety, will deteriorate in productiveness by being grown on the same farm from year to year. I submit some furthr evidence from the report of the Experimental Farm of Guelph, Ont. If the different varieties of grain grown on that farm continuously for eight or ten years have deteriorated in productiveness, then there should be some evidence in a gradual decrease in the yield, independently of the fluctuations due to the season. On the contrary, the records of yields show that there is a progressive increase in the yield per acre of the varieties which have been grown for the longest periods on the same farm. There are variations and slight exceptions to that, but that is the rule as shown by the records of yields.

Large and Small Potatoes.

Before I finish, let me say one word about potatoes. Mr. Zavitz carried on an experiment in using large marketable potatoes and small potatoes (not very small—1½ inches in diameter) for planting. He has done that for four years. The large potatoes for planting every year are selected from the produce of large potatoes planted the previous year. The small potatoes are from the produce of small potatoes. The average yield for the four years 1895-96-97-98 was 201 bushels per acre from the large potatoes and 131 bushels per acre from the small potatoes. That was a gain of over 69 bushels to the acre annually, on the same soil, in the same seasons, for four years, from planting large potatoes. This was due probably to some extent to the inherited vigour, and also to the larger amount of nourishment for the young plant in the larger potatoes planted."

Thoroughbred males.—We really thought that the desire to employ half-bred stallions, bulls, etc., had vanished, even among the most unenlightened farmers of this province; but it appears, from a paragraph in the Journal d'Agriculture

ET D'HORTICULTURE, that several agricultural societies have sought leave, from the Council of Agriculture to offer prizes for half-bred bulls! "Many farmers," says the JOURNAL, "have in their herds fine half-bred bulls; and why? because their club or society has put pure-bred bulls at their disposal.

"Had there been no thoroughbreds in their neighbourhood, their herds would not have been improved. Now that they have fine half-bred bulls, they seek to get prizes offered for them. A horrible blunder, indeed! It would be a return to the old-style of doing things," i. e., the production of a lot of mongrels.

"The existence of fine half-bred bulls proves that the Council was right in favouring the purchase of thoroughbred bulls."

Beasts for the Berthier distillery.—Being desirous of fattening a certain number of beasts annually on the draff of their distillery, the *Melchers'* Co. have been trying to buy a sufficient number, about 300 a year, in the county of Berthier for that purpose. Unfortunately, Berthier, like a good many other counties of the province, cannot at present furnish anything like the number of cattle such as are required, i. e., bullocks, or maiden-heifers, weighing, in a lean state, about 1,000 lbs.

Consequently, the firm has been obliged to go further a field, and to seek for their beasts in the Eastern-townships, whence, chiefly from Richmond, Danville and their environs, 89 half-bred Shorthorns and Herefords reached the distillery in June.

La Gazette de Berthier is, and justly, pretty severe on its county-people:

"Berthier, like most of the counties of our Province, has not yet realised the importance of renewing and improving its herds. Its farmers have not yet forsaken their love of routine, and until they reform their ways, capital seeking investment will flow to other districts."

Raisins are likely to be pretty plentiful this season, as the "Raisin-Trust" of California, with its 2,000 members, proposes to feed hogs with those for which it cannot find purchasers at a certain fixed price! We should like to buy a 64 lb. hog (dead weight) that has been fattened on raisins, barley-meal, and milk! Such pork would fetch an extra price on the London market.

Clover-hay is still worth five pounds a load (2,016 lbs.) on the London market.

UNTILLED LANDS.

The theory of our unscientific ancestors was, that land wanted rest; and that, after leaving land for a while to the restful processes of Nature, the soil recovers its ability to bear the fatigue of once more bearing crops. Certainly, whatever may be said of the practice, the explanation was not a sound one. There is not any evidence to prove that land ever wants rest; but there is a very great deal that goes to prove that land which has been allowed to clothe itself with the natural vegetation of the district, which either grows and rots upon it unremoved, or is removed by animals growing on it, and resting upon it, does regain something which it had lost by cropping, and that it does become again capable of bearing cereals and roots. In fact the conclusion that this is the case, has been so universally admitted: and this after a series of trials, so numerous and so widely spread, that the result of them, is as well established, as it is that friction produces heat, and of persevered with long enough, produces fire. It remained for the "advanced" farmers of the latter part of the nineteenth century to discover that land thus resigned to Nature, becomes dirty—"filthy" is I believe the proper expression—and quite unfit for producing any crop until it shall have been under a process called cleaning, skinned and scarified by various implements, invented some for one object and some for another, of which none, nor yet all together are capable of restoring fertility to the soil. If it be pointed out to these latter day philosophers, that land in the backwoods when first broken up, after growing, from time immemorial, trees, brushwood, native grasses, etc., invariably yields a crops, and continues to do so, till it has been "run out" by cultivation—the reply is, "that's all very well for the backwoods, but land which has once been under cultivation for a long time, if not tilled becomes "filthy," and must be cleaned by various processes which undoubtedly do always disintegrate the soil, but which, save in a strictly limited number of cases, do not make it one bit

the more suitable for plant life," whereas, what is called "filth" does make it richer. Plant-growth is as insensible to the charm of cleanliness as is a Hottentot; and finds the means of living in comfort in the decay of the generation which has gone before.

Some years ago, I knew of a case, in England, of a farm of light land which had been "run out" by the tenants selling everything off, and restoring nothing of what was sold, and which fell out of cultivation by reason of a law-suit.

Whilst the lawyers were disputing which of the two parties to the suit was in the wrong, Nature took it upon herself to clothe the fields with vegetation of one kind or another; and at the end of litigation, the farm had about as rough an appearance as land could possibly display. It was voted by the agent to be "filthy": and the steward of a wealthy owner, who had been trained to believe that to make "things look tidy," anyhow and at any cost, is to be a scientific farmer—undertook to make the farm fit for a tenant by "fallowing" the whole of it for two years in succession.

Then, having got crops of some kind or another, by the help of artificial manures, he proceeded to claim of his employer the credit of having brought the land back into cultivation.

No doubt he had done so: but the cost of doing it was as much as the land would have sold for, and, by sun and rain together, the land had about as much virtue in it as dessicated tea leaves. The question arises: Is this a good management of land as was that of five centurfes ago? when the land would have been left to lie as sheep walks, at no expense of cultivation, for a period of years; would next have been broken up afresh; would have been cropped for a year or two, and once more allowed to pass into the keeping of Nature. Untidy farmer as Nature is, she does somehow manage that land left to her care regains the power of producing the food of man.

Now is the fallowing of the whole land, for two seasons in succession, irrespective of the nature of the soil really a scientific mode of recovering fertility; or is it likely to replace farms in the condition of being a source of livelihood for the owner?

Of course it is admitted that with heavy land, an occasional bare fallow may be a necessity, and that one is frequently the means of so breaking up the soil as to make a fine seed bed for a cereal crop, which finds its support in the stores of plant food, which have been unlocked by sun and air. But it does not follow that all soils respond to fallowing; or that fallowing—prolonged beyond one summer—is a judicious course to adopt on on any soil. At all events, this is not the course by which Nature gradually prepares all the land under her charge to become capable of supplying the wants of her more elaborate organisations. It is certainly not the function of Nature to teach us how to work the four-course system of cultivation; but she really is a teacher—and one worth the following—in showing us how land recovers the faculty of producing superior vegetation. Out of the decay of a lower class, the way is prepared for the growths of a higher class. The different forest growths—which grow, wear out and rot—do not make the soil "filthy" but mak. it fit to yield something higher than grew on it before. The lower organisations die out only to supply food for a higher one, out of their decay.

W. R. GILBERT.

HOME PRODUCTS.

Ed. Hoard's Dairyman.—Dwarf Essex rape, if properly produced, may safely be enumerated among that list of farm products, that make it possible for one to adhere quite closely to that old time and primitive custom of producing upon the farm all that is required to maintain the farm, family and its animals.

In other words, Dwarf Essex rape comes along at a time when the one who is raising much young stock, as calves, pigs and lambs, must, of a necessity, furnish some succulent food, or be quite dependent upon the by-products of the mill, (which at present are out of sight).

Having for some time practised raising a large bunch of calves, together with a good many pigs, I became apprehensive lest the maintaining of them through summer months and long droughts, would soon place the balance in favor of the cost of production; so accordingly felt my way with a small plot of the above named feed.

The experiment has been highly productive of good results. This season, with a bunch of ten calves and twelve shoats, we have gone through this unprecedented drought, with comparatively no outside cost, and, as neighbors have remarked, calves and pigs looking fine on turnips, or, rather,

rape. Our plot was sown on clean land and quite rich, about May 10th ; the middle of June we had a luxuriant pasture, and since that time we have fed the rape down a number of times, and at present it shows signs of another growth.

Next season, it is our purpose to sow a long plot and make it into small fields by temporary panel fences, and then turn into it alternately. We feel like saying, great is the feeding power of rape (1) C. H. WHITCOMB.

Niagara Co., N. Y.

EXPERIMENTS IN THE NORTH OF ENGLAND.

We have received the report of experiments carried out for the county councils of Cumberland, Durham and Northumberland by Dr. Somerville in 1899. They are too numerous to notice in detail, the report being a book of 116 pages. If a price were marked upon it, including postage, it might be recommended to farmers outside the counties immediately interested, in which, we presume, it is distributed gratis to farmers who desire it. Some experiments on swedes are curious, because they show that it did not pay to increase the use of dung beyond 10 tons per acre, or to add 1 cwt., of sulphate of ammonia and 5 cwt. of superphosphate, which caused very small increases in the yield, but the addition of 2½ cwt. of superphosphate to 12 tons of dung at two other stations paid. Potash made an enormous difference to the yield of a plot dressed with sulphate of ammonia and superphosphate, without dung, in one place, and in another apparently diminished the yield by 5 tons per acre. In a trial of different phosphatic manures on swedes superphosphate did better than bone meal, slag, or dissolved bones ; but slag gained the day on old grass land. The experiments on the effect of manures on the production of mutton were described in the R. A. S. Journal in December, and noticed at the time.

A FEW SWEDES AMONG THE MANGEL.

At sowing time a little swede-seed is well scattered among the water, ashes, and other portable manure which usually accompany the mangel seed to the ground. One drawback, which is almost universal, is the blank spaces which are so generally observable even in good crops of mangel. The seed is not peculiar for easy germination, and, even when sufficient seed is sown, blanks still appear, sometimes extending for yards along a drill-row. They are partly due to unsuccessful germination and partly to faulty hoeing, for in keenness to earn money hoers often cut out plants ruthlessly and bury others past hope of recovery. It is one of the functions of swede-seed to mark the row and prevent these blanks. Such swede-plants will attain a large size, and are useful for sheep when the crop is secured. They should be left on the ground, and are much relished by the sheep.

Another remark made by a correspondent last week affects this feature of blanks in rows. It is his suggestion that the rows are often too far apart. When mangel is drilled 25 inches wide, blank spaces in the row are more serious than when the drilling is kept within narrower limits. The correspondent does not give a width, and it seems to me that 18 inches may be mentioned as very suitable for this crop. Hoers are, as already hinted, somewhat ruthless, and are always disposed to leave plants too far apart in the rows. This tendency is best counteracted by putting in more rows, and 18 inches is not too wide. It is a dimension which allows of sufficient growth for a 14 lb mangel, and this is quite large enough, if not too big. In a perfectly regular crop it might be objected to as rather narrow, but as things go it will be found that the plants are not left opposite to each other, and that there is plenty of room. The practical outcome will generally be seen to be that the plants are at least 18 in. from each other in both directions. Now, this gives four plants to the square yard, and an average weight of 4 lb per root, which is easily realisable, and means a crop of 35 tons per acre.

SIZE OF MANGELS.

Four pounds is not a bad average, and 35 tons is not a bad crop. Mangels will easily attain double this average, and instances are on record in which more than 100 tons per acre have been grown. It is the average which pulls back the weight per root, but 4 or 5 lb is not a bad result. It is in fact doubtful if any mangel root is better for being more than 8 lb weight, for after that the proportion of water largely increases.

(1) A lesson to be learn here. ED.

SOY BEANS.

(*Press Bulletin, Kansas Experiment Station*).

There are a number of varieties of soy beans, but the early yellow soy has proved the best. They are erect growing, with from one to six or more stems branching out from near the ground, and reaching a height of from one and one-half to three and one-half feet; seldom falling down, except in very rich, loose land. The branches are thickly studded with pods from the surface of the ground to the top; a single plant having sometimes as many as two hundred pods, containing from one to four beans, the usual number being three. The soy bean is a remarkable drought-resister, and will do comparatively well on thin land. However, they respond very readily to plenty of moisture and good soil. Being a legume, if the bacteria which produce the tubercles on the roots are present in the soil, they leave the land richer in nitrogen, the same as clover does. The land may be inoculated by getting earth from a field that has the bacteria in the soil, and planting it in the rows with the beans. We used a fertilizer attachment to a hose drill this year, with good success. Planting should not be done until the weather is warm—after corn planting. They will make a fair crop after rye or wheat, if the season is favorable. The ground should be well prepared, and the beans planted near the surface. We plowed the ground last apring, going over what we plowed each day with Campbell's Sub Surface Packer, and planted the beans immediately, with a press drill, stopping holes so as to plant in rows thirty inches apart, and from one to two inches in the row. This required thirty pounds (one-half bushel) to the acre.

They may be cultivated as other crops; keeping the soil in good shape, and the weeds down, is all that is required. We used the spring-tooth cultivator, except in a few places where the weeds obtained a start, on account of the wet weather. The crop can be handled so as it will not be necessary to use the hoe at all. Land that has been lately manured is liable to give trouble, as it is usually weedy. (1)

Until this year the harvesting has been the great problem, but we found that there are machines manufactured for the purpose, and have tried several of them, and found them to be successful; so the harvesting no longer stands in the way. The yellow does not shell readily, and so can be let stand until well ripened. We began harvesting when most of the pods had turned brown, and a few of the top leaves were sticking on. The bean harvester has large knives which cut stems just under the ground, cutting two rows at a time, and throwing them together in a windrow. An ordinary one-horse hay rake will take two of these windrows at a time, and the horse walks between them. We raked and shocked immediately after the harvester, and left them to cure in the shock. Threshing was done in the field with an ordinary separator, using all blank concave, and running no faster than necessary to keep the machine from clogging in the shakers and riddles, so as not to crack the beans.

The following is the cost of production on the College farm this year. The work was conducted as nearly as possible on a commercial basis, the object being to find what could be done on a large scale. The sixty acres from which the following is taken comprises several fields, which vary widely in many respects from good land to very poor, on the whole perhaps below the average of farm land. Labor is computed at $1.25 per day for a man, and $2.50 per day for a man and team. The cost per acre for the various items was as follows: Preparation of land, $1.35; planting, $0.30; cultivating, $2.00; hoeing, $0.70, which was confined to a few patches; harvesting, $1.40. The harvesting is considerably above what it will be when the regular harvester is used, but we did not receive the harvester in time to begin, and the old method is much more expensive.

The threshing required four teams and six men, besides the machine force, which was hired at $15.00 per day, board and coal not included. The total expense for threshing the sixty acres, which took four and one-half days, aside from the cost of coal, was $155.25. The yield of the sixty acres was 932 bushels, making the cost of threshing 16 6-10 cents per bushel. The sixty acres of beans averaged fifteen and one-half bushels per acre, making the cost of production 55 cents per bushel or about $8.40 per acre.

Soy beans as a feed take the place of oil or gluten meal and in composition are richer than oil meal. In feeding them to milch cows, fattening cows and hogs, they have given astonishing results. In two experiments carried on last winter in feeding hogs, the addition of one-fifth soy bean

(1) Because the dung has not been fermented. Ed.

meal to kafir corn gave practically double the returns from kafir alone. The ten hogs fed kafir meal alone, during a period of fifty days, ate 2,872½ pounds, and gained 441 pounds, the ten fed kafir meal four fifths and soy bean meal one-fifth, ate 3,766 pounds of the mixture, gained 866 pounds, and sold for 10 cents more on the hundred than the other lot.

When the beans are let thoroughly ripen in the field the straw is worthless, but if cut and cured while green it makes excellent hay. They make excellent hog pasture and are a good crop for soiling.

Household Matters.

(CONDUCTED BY MRS. JENNER FUST).

Owing to the many causes for disquietude during the last few months, both by sea and land, Christmas is creeping upon us apace, and we begin to say dear me! I had almost forgotten it.

Not so with the young people, whose minds are sufficiently elastic to let them soon forget a great disaster in a coming pleasure.

It is just as well that it should be so; for what possible good can be done to any cause by carrying round a gloomy face?

It sounds inhuman to forget our brave fellows who are sacrificing their lives, to compel the tyrants to do justice to their fellow beings. We must hope that the severe measures dealt out to them will show that there are brave-hearted fellows ever willing to sacrifice themselves in a just cause. So, we must hope that this great matter will be settled quickly, and to the satisfaction of all concerned, then the survivors of the battle will be able to return to their separate homes to rest content with having done their share in helping to settle a much vexed dispute.

In the mean time, Christmas will be upon us, and the annual visit of the venerable Santa Claus will take place. He never forgets his mission of cheer and good-will to every body.

This sweet delusion of youth, let us hope, will never be forgotten. It will give many a happy thought to brave hearts on the battle field to know that his little ones will be cared for, although a sad heart may be carried round by reason of his absence, there being nothing but the empty chair left for consolation.

A few reasons why many people fail in making a good plum-pudding is that they will mix in too much flour, not enough bread-crumbs, and are stingy with the eggs.

One-fourth pound of flour is ample to ½ pound of bread crumbs; indeed, some people only use 2 oz. of flour to this, but eggs must be in plenty, and the whole thing must be well mixed, this part of making the pudding is so great a factor in securing good results, that the process will tire out two or three strong arms.

It is scarcely possible to boil it too long, as it is a solid mass and takes a long time to cook to the very centre, and thus make it a wholesome dish for everybody.

CHRISTMAS FARE.

By this most of my readers have got their Christmas puddings and mincemeat ready for the approaching festival, and will be thinking of the cake so dear to the hearts of the youngsters, who will soon be home from school, rejoicing to think their holidays have commenced. Some people I know say in these days it is absurd to think of making cakes at home, when they can be purchased so cheaply at the confectioner's over the way or round the corner. It saves time and trouble to buy them. They forget, however, that even when bought at the best places, where such things are made in quantities, they often contain unpleasant surprises, in the shape of gritty substances, raisin-seeds, currant stems, etc., which imply hasty handling. The home-made cake is manipulated with well-washed hands, and keen eyes for all contraband substances, while none but the best materials are permitted to enter into its composition; and, if less showy in appearance, as professionals have ways that are dark in the matter of icing and general finish, it can at least be eaten in perfect confidence.

A RICH PLUM PUDDING.

The following recipe for a rich Christmas pudding is a famous one handed down from mother to daughter in a certain family, and it certainly makes a very rich pudding indeed. I have been thinking that some of my readers may like a richer

pudding than the one I advocated the other day. Take ½ lb. suet, ½ lb. well-cleaned currants, ¾ lb. stoned raisins (these may be purchased now ready stoned at your grocers), four tablespoonfuls fine bread crumbs, three tablespoonfuls of sifted flour, 5 oz. sugar, three eggs, nutmeg and spice to taste, one tablespoonful of brandy, and enough milk to mix well; boil six hours.

CHESTNUT SAUCE.

This is an excellent sauce to serve with game, poultry, or roast beef. Shell the nuts and throw them into boiling water for four minutes, then drop into cold water and rub off the brown skins. For two cups of nuts have one quart of stock, and let them simmer over a fire until the nuts are tender, and then mash them finely. Put two tablespoonfuls of butter in a pan over the fire, and, when it is melted, stir in a tablespoonful of flour; keep stirring until it is browned, then add the mashed nuts and stock, season with salt and pepper, and one cup of cream, and when the sauce is again at boiling point quickly strain through a sieve into a heated dish and serve. A rich brown sauce for a fillet of beef is improved by the addition of roasted chestnuts.

MINCEMEAT.

Some people I know, from conscientious scruples object to the use of alcohol in the making of mincemeat. This, I think, is a great mistake, for it will not keep for any length of time, but ferments and then becomes unfit for use. The alcohol is introduced to prevent this fermentation, whilst the ingredients are in a raw state, which it does admirably, but when the process of cooking takes place, the alcohol evaporates, so that the most scrupulous abstainer may partake of the same without let or hindrance. Here are the ingredients for a good mincemeat, which will keep for months, 1 lb. of suet, chopped very finely, 1 lb. of sultanas, 1 lb. of raisins, ½ lb. of mixed peel, ¼ oz. of mixed spice, cinnamon and mace, 1 lb. demerara sugar, 2 lbs. of apples, half a nutmeg, grated, juice and rind of two lemons, and half a pint of brandy. The fruit must be most carefully cleaned and dried, the latter is most essential and each and every ingredient except the currants, carefully chopped. Mincemeat wants making some time before it is wanted, so that all the different flavours may be well incorporated by lying together. Put the mincemeat into jars and tie down with bladder. If this quantity makes too much, it can be halved, and if not enough doubled.

A CHRISTMAS CAKE.

Rich cakes like this want great care both in making and baking. and unless you are prepared to take a lot of trouble you had by far better buy your Christmas cake, instead of attempting to make it. Still, I know many ladies who pride themselves on their cake-making would scorn to have a Christmas cake not made by their own hands, and to them I would recommend this delicious cake. The requirements are, 1 lb. of fine flour, 1 lb. of butter, 1 lb. of currants, 1 lb of castor sugar, quarter-pound of citron, one teaspoonful of baking powder, 8 eggs and a little almond flavouring. Method of making: Beat the butter to a cream: do not warm it at the fire if hard, but let it stand in the warm kitchen for an hour or so before using. When the butter looks like cream, add the sugar, beating all the time, then the eggs beaten to a froth. Now sift in the flour, which has been mixed with the powder and passed through a sieve to make it light. Then put in the currants and peel. Be careful that the currants are dried and floured, and the cake batter not too thin, or the fruit will sink to the bottom of the cake. This cake wants a lot of beating. Butter the tin or tins, according to the size of the cake, line with white buttered paper, put in the batter, and if baked whole it must have 2½ hours baking. Try the oven with a bit of white paper. If in the course of a minute or two it turns yellow the heat is right for the cake. Do not open the oven door for at least half an hour, and be careful in doing so not to slam the door, which may cause the cake to fall. It is a good plan to lay a piece of paper over the top of the tin at first to keep the top from hardening too soon, and so stop the rising. If you wish your cake to look extra Christmassy, ice it with almond or royal icing.

FOR THE CHILDREN.

A GOOD CARD GAME.

The dealer gives each player four cards and puts four more, faces up, on the table. The player to his left can take from the table any card which matches one in his hand—that is, a two-

spot takes a two spot, a queen takes a queen, and so on. The pair he lays aside towards the game. If he cannot mat h, he must put one from his hand with the four cards on the table. And so the game goes on, each player taking a turn, a new deal being made as often as the hands are exhausted. The one who has the most cards is the winner.

AN INNOCENT PLOT.

Take an ordinary drinking glass and fill about three-quarters full of water or any other liquid. Let the rim of the glass be quite dry. Place on top of it, as if to protect from dust, an ordinary playing card, with its face downward. The card should be large enough to project slightly beyond the edge of the glass at each side. Let the card remain thus for about half an hour. At the end of that time you will find that the humidity arising from the liquid has caused a slight depression in the middle of the card and curved the edges so that they no longer rest upon the glass. This is the stage at which your experiment is supposed to begin. Lift the card carefully by one corner and place it, face upward, on the glass. Have ready a small cork stopper, in the top of which you have inserted a litt'e paper manikin. Place this stopper carefully on top of the card just where the surface appears to be swollen. Let it rest a few minutes until, by the action of the humidity of the air in the glass, the effect first produced on the card is reversed. With a sudden, sharp sound the slight elevation on which the manikin sits enthroned sinks into a hollow, and both cork and figure are projected into the air. The spectators, having no clew to the trick, are mystified at this apparently inexplicable phenomenon.

The Grazier and Breeder.

VENTILATION OF STABLES.

Our cattle will soon leave their pastures where they enjoyed during the summer, if not always an abundance of food, at least plenty of fresh air and sunshine, and will seek in our barns a shelter against the approaching gales of the winter. This shelter, the careful farmer endeavors to make as thorough as possible—so thorough in fact that often the other extreme is reached.

Wishing especially to exclude the cold air in order to insure the comfort of their cattle, many farmers seem to forget that a certain supply of fresh air is constantly required in order to maintain good health, and that ventilation cannot be overlooked with impunity. Yet, few are the barns well ventilated. In the majority the renewal of air is accomplished very imperfectly and in a very irregular manner.. Too often it is effected only by means of doors and windows which are open in mild weather and hermetically shut during cold days and cold nights. When these are open they create draughts, from which the cattle suffer ; when closed for any length of time, foul air accumulates to the great detriment of the health of our cattle. Continual breathing of vitiated air speedily weakens their constitution, thus making them fall an easy prey to the first contagious disease which finds entrance into the barn. It has been said, and it can yet be repeated, that the application of correct principles of ventilation would, by preserving health do more to augment our national wealth, than all the resources of veterinary science by curing disease.

Many causes tend to vitiate the air in our stables, chief among which is the process of respiration. The air which enters the lungs in order to purify the blood comes out loaded with carbonic acid, organic matter, and water vapor, all impurities which render it unfit for further use. Furthermore, the evaporation of gases from the fœces evacuated contribute also in a large measure to the pollution of the atmosphere of the stable.

A certain quantity of carbonic acid is always found even in the purest of atmospheres, but the air which an animal breathes out differs from that inhaled by containing 100 times more of carbonic acid and highly deleterious organic matter. It is generally recognized that this gas—which always increases in proportion to the organic matter—should not attain greater proportion in the atmosphere than 6 parts in 10,000, the quantity at which it becomes injurious to health. The disagreeable smell which pervades the barn after a winter night during which all openings have been carefully kept closed, often indicates that this dangerous proportion has been largely exceeded. Such a state of things can be no more pleasant to our cattle than it is to ourselves.

But if the evils of bad ventilation are thus easily pointed out, it is harder to design means by which perfect ventilation can be effected. By perfect ventilation we mean that system by which fresh air is constantly supplied, while foul air evacuates as soon as formed and the warmth of the stable is kept at the same degree. The two first conditions can be secured by providing two apertures, one for the entrance of fresh air, the other for the evacuation of foul air. The latter is by far the more important of the two, and yet the more neglected. It is easy to understand that if foul air is not allowed to escape, pure air will not enter, but if a sufficient aperture has been provided, the formation of a vacuum, as foul air escapes, will lead outer air to enter, even by adventitious apertures such as chinks of doors and windows. As foul air, being warmer than the surrounding atmosphere, rises after exhalation, the air flue destined for its removal should start from the ceiling of the stable and run up in a straight line through the barn above and through the roof.

Foul air being disposed of, the question of a steady supply of fresh air comes next in order. The most serious inconvenience we meet with is that such a supply coming directly from outside may lower the temperature of the barn below the point at which comfort requires that it should be kept, i.e., 55° or 60° F. But a few advanced farmers have now adopted a method which seems to overcome in a large measure these disadvantages: the underground fresh air flue. The air-flue consists of a pipe put out of reach of the frost, underneath the stable, and rising at a certain distance from it, the total length being 100 ft. The fresh air entering the pipe outside, loses its chill in passing underground, and is distributed evenly through the stable by means of sub air flues, arising from the main pipe. The supply can be regulated at will. The chief advantages of this system are: an even temperature, an even distribution of air, and a total absence of draughts. It is also said to be very economical.

C. MORTUREUX.

Correspondence.

ARTHUR R. JENNER FUST, Esq.,

Dear Sir,—I am in receipt of your kind and instructive letter for which you have my hearty thanks. In reply I have taken the liberty of enclosing your letter to the Quebec Board of Trade, advising them that for any further information they may require on the subject to communicate directly with you. Allow me, dear sir, to say that it is quite a gratification to me, in the evening of my days, to know that as good an authority as yourself hold the same views in regard to the improvement of cattle adapted to this Province as I do. Trusting I have not taken too much liberty in referring the Board of Trade to you and again thanking you for your information,

I remain,
Dear Sir,
Your most obt.,
S. N. BLACKWOOD.

West Shefford, Nov. 20th 1899.

THE QUEBEC BOARD OF TRADE.

QUEBEC, 13th November 1899.

S. N. BLACKWOOD, Esq.,
West Shefford.

Dear Sir,—Your favor of the 1st instant is received and I avail myself of your offer to help my "Board" in their effort to ameliorate the condition of our farmers.

The influence of your friendship with Mr Arthur Jenner Fust I appreciate, and shall be obliged if you will ask him to consider the problem broadly and write his views to me. (1)

The dairy industries have been the greatest blessing to this Province and will continue so until a time arrives when the British market becomes over supplied with cheese and butter. The export of cheese has already approached its limit, and though the butter trade may continue to increase for a time, there will soon be a limit to that. What will then happen? The natural consequence will be over-production, and competition which will reduce prices to an unprofitable point, and a return to hard condition.

In nearly every county it is customary to kill calves at birth because there is no profit in raising them, *and it is officially stated that 460,000 are annually slain at birth.* (2)

(1) This we did in a letter to Mr. Blackwood, advising the importation of a lot of "Dairy Shorthorns," to be put to pedigree-bulls of the best families of "milking Shorthorns." ED.

(2) Monstrous folly! ED.

Except in Montreal and Quebec it may be said there is no market in this Province for farm products, consequently every branch is limited to local needs whether it be in hay, oats, hogs, sheep or cattle. Reports from nearly every county say "we have no market" and add that farmers would grow more of everything if a market was provided.

Our present grade of cattte general in the Province is not suitable for export either alive or dead, but, could not calves by judicious crossing be produced which would be of merchantable quality, worth raising, and in a few generations be good beef producers, which would consume the surplus hay, grain, etc. the farmers could produce, over and above the requirements of the dairy cows? Will you write me upon this part of the subject.

If a dead meat trade with Great Britain could be begun, is it not possible that by the time the cheese and butter trades have reached the limit at which a fair price is obtainable, that an additional source of income may be provided and a permanent industry established capable of greater expansion than either cheese or butter, and without any interference with those industries during the period of development?

I am, yours respectfully,

T. LEVASSEUR,

Secretary Quebec Board of Trade.

SHORTHORNS.

We have just received the catalogue of a sale of Shorthorn cattle; appointed for December 20th; to be held at Troutbeck Creek, the farm of Mr. W. D. Flatt, of Hamilton, Ont.

We have read over the list of bulls, etc., and find amongst them several imported specimens, descended from the herds of the Cruikshanks and other breeders of Scottish Shorthorns; from Lord Ducie's Tortworth stock, the Booths, and Bates lines of blood, etc., etc.

Not having seen the herds, we cannot speak of its individual members, but the pedigrees are highly satisfactory. ED.

"CUBIC AIR SPACE" AGAIN!

In his interesting report of an "Inquiry into the Prevalence of Tuberculosis in Dairy Cows," published in the current number of the Journal of the British Dairy Farmers' Association, Professor Wortley Axe has arrived at the conclusion that the main factor in the spread of the disease is summed up in the word "housing." The orthodox theory, as voiced by Sir William Broadbent and Professor McFadyean, that sufficient air space was the grand panacea for tuberculosis in cattle, received a nasty knock in the detection of thirthy four cases in the Windsor Park herd of forty cows, which we may presume were, in this respect, "royally" housed. Perhaps I should say "the *late* orthodox theory," for, since the publication of Professor McFadyean's investigation at Windsor, we have not heard quite so much about cubic air space. It receives a further blow in the fact that the highest percentage of reactions in the ten sheds examined by Professor Axe was found in the shed with the greatest cubic space. Nevertheless, we are apparently to be treated to a further application of the theory, for we are now given to understand that it is not the theory that is wrong, it has been only not carried far enough. We are no longer told that 700,800, or 1,000 cubic feet must be provided, but that nothing less than "all the winds that blow" will suffice to keep our cattle healthy. We are not to let them enter inside four walls, under penalthy of a visitation of the pleague. In fact, we are warned that even an exclusively out-of-door life is not capable of assuring immunity from the disease, unless combined with "judicious management." But as to what such management exactly consists in we are at present offered no hint.

There is one point regarding the facts on which Professor Axe's conclusion are based that seems to the writer to call for explanation. Of the nine herds examined, that in which the highest percentage of reactions occurred (90 per cent.) was housed "in a double shed, which gave to each animal about 500 cubic feet of air space. The system of management was to buy fresh cows from time to time, keep them forward in flesh, and at the expiration of their milking period sell them out fat to the butcher." Now, as the *profitable* milking period of this class of cows is generally about seven or eight months only, we are left to infer that in every case the disease has been contracted in this time. It would be interesting to know whether the 10 per cent. that did not react were the latest additions to the herd, or whether they had survived the 500 cubic feet for their seven or eight months. Professor Axe's conclusion,

that "the high percentage of reaction in this herd is due to continued housing," would not appear to be wholly warranted until it be shown that the cows were all sound when bought, or that they had been subjected to similar continuous housing *before as well as after purchase.* Of course Professor Axe *may* have this information, but the data before us do not show it. Without definite knowledge on this point, it is certainly not fair to argue that the animals all contracted the disease in the few months they were housed in this shed.

My object in writing, however, is not to question the data so much as the soundness of the conclusion itself. For, however plausible the out-of-door theory may at first sight appear, whatever weight must be attached to Professor Axe's observations, and however desirable it may be to *agitate for better hygienic conditions for our dairy* stock on general grounds, the statement that "an exclusively out-of-door existence and judicious management is capable of assuring absolute freedom from tuberculosis" does not tally with all the fact, though it may with some. If it were universally correct, how could the dairy cows of New Zealand, leading such an existence, be affected to the extent of 25 to 30 per cent, as has officially been stated to be the case? How could a mob of fat bullocks (not dairy cows, whose constitutions might presumably be weakened by early maternity and the strain of heavy milking) that never in their lives had been under a roof, be found tuberculous by post-mortem and bacteriological examination to the extent of 80 per cent.? How explain the fact that in a herd of half-wild "run cattle," living in the sunniest and healthiest climate in the world, unhoused, even unhandled by man, save on rare occasion for branding and similar purposes, 45 per cent. have on slaughter been found affected. These are facts, vouched for by not one but many members of the Royal College of Veterinary Surgeons, the proof whereof are to be had for the asking. Yet, how can they be made to fit in with the out-of-door theory, unless, indeed, it be held that the "management" of these half-wild cattle, which consist practically in leaving them alone for Nature to take care of, is not "judicious?"

C. W. SORENSEN.

Manchester, October, 17th. *Ag. Gazette.*

The Dairy.

THE EIGHTEENTH ANNUAL CONVENTION OF THE DAIRYMEN'S ASSOCIATION OF THE PROVINCE OF QUEBEC.

The eighteenth annual convention of the Dairymen's Association of this province will be held, this year, at St-Jérôme, Terrebonne, on Tuesday and Wednesday, the 5th and 6th of December next. There will be three sessions each day: morning, afternoon and evening, at 9.30 a.m.; 2 p.m., and 7.30 p.m.

The official opening of the meeting will take place on Tuesday evening, when the Hon. the Ministers of Agriculture, both of the Dominion and the Province will be present.

The following gentlemen will address the meeting:

MM. G. A. Gigault, ass-commissioner of agriculture, Québec; J. H. Grisdale, agriculturist at the experiment-farm, Ottawa; J. de L. Taché, J. C. Chapais, Dairy-Commissioner; P. Macfarlane, of the federal department of agriculture; Gabriel Henry of the provincial department of agriculture; J. H. Scott, Dr. J. A. Couture, M. V.; L. T. Brodeur, J. B. A. Richard, laurésts of Ag. Merit; Dr. W. Grignon, Arth. Vaillancourt, J. D. Leclair, Elie Bourbeau, J. A. Plamondon, Emile Castel.

With such a list of lecturers, the farmer-public cannot fail of being interested; consequently, the Association has no hesitation in inviting all butter and cheese-makers, as well as all dairy-farmers, to attend this convention: all, every one, will be benefited there. The railroad companies will, as uaual, issue tickets at reduced rates; in connection with this point, we request the delegates to read with attention the notices given in the programme of the meeting; for want of attention to this, many of the delegates suffer a loss every year.

DIFFICULTIES IN THE RIPENING OF CHEESE.

Of the complex character of the process known as "ripening of cheese" few people, even of those to whom it is, or ought to be, a subject of deep and abiding interest, have at present any

thing like an adequate conception. This is obviously unavoidable for the time being, for the men who have been studying the subject scientifically for years have not as yet by any means mastered all the hidden mysteries by which the process is at it were impregnated. It is a puzzle, this ripening of cheese, a more intricate puzzle, perhaps, than even the ripening of cream or the coagulation of milk, and some of its features have, up to the present time, refused to reveal themselves to the investigations of scientific men who have made of dairying a special study for years, and have profited by the studies of men anterior to themselves, whatever they may amount to. There are conditions, happily present in all first-rate dairies, under which cheese ripens uniformly and satisfactorily, and there are also conditions of a different character, unfortunately patent to many anxious dairyers, under which cheese ripens anyhow but the right one. In this latter class of cases there are, we know now well enough, various pernicious ferments at work, and the results is seen in cheese that swells, and has running sores, rnd is of abominable flavour, and goes early to decomposition. What these ferments exactly are, and how to checkmate them, is not at present sufficiently well known, though a great deal of light has been thrown thereon in recent times. It is, however, to be hoped, and indeed expected, that the problem will for the most part be solved before many more years have passed over our heads.

The chief constituent of a newly-made cheese is the substance that is known as casein, which, being only to a slight degree soluble in water, and, indeed, being immature and unripe, is not at that stage a desirable or popular article of food, and, in fact, is not in an easily digestible condition. Its palatable and digestible state is secured by perfect ripening, and this ripening is accomplished by certain bacterial ferments which mellow down the casein, and promote the development of the desirable flavours which are characteristic of the different sorts of cheese with which we are all familiar. This ripening, as in the case of fruit and of many other things, is part of the process of decomposition, (1) at a given point in which the cheese or the fruit is most of all acceptable to the palate of him who eats them. The curd of the new cheese is changed by ferments into different compounds, the character of which is determined by the predominant ferment or ferments which, having somehow or other taken possession of the curd, do the work of ripening it. How these ferments—some of them, at all events—get into the curd of the newly-made cheese, or into the milk from which it is made, is only less difficult to determine than is the individuality of the ferments themselves. But as the proof of the cheese is in the eating of it, we become acquainted with certain flavours in it that are good, bad, or indifferent, as the case may be, and which reveal the fact that desirable or undesirable ferments have been at work in the process of ripening. The ferments have been and still are at work in the cheese; this is obvious to the palate, and the inference to be drawn is that they got into the milk somehow, or into the curd, from the atmosphere of the dairy or of some other part of the premises.

It is in the casein—very little indeed in the fat—that the metamorphosis of ripening is effected. The small proportion of lactose, or sugar of milk, which is retained in the cheese, the greater part of it by far having passed off in the whey, is converted into lactic acid (from which other forms of acid may develop, under conditions favourable thereto), or into some other form of fermentable sugar; and then commences the process of ripening the cheese, which is accompanied by the evolution of gas, just as digestion is in the stomach. This gas, unless the physical structure of the cheese is favourable to its ready escape as it is formed, causes cheese to heave and swell, and in many cases to crack and discharge moisture. And the special form of gas which is form is dependent in each case on the particular acid or ferment that is at the work in the cheese, which also influences the physical structure of the curd. If only the *bacillus acidi lactici* be developed in the curd, or if this ferment be predominant over any other there be may present—sufficiently predominant to stamp its character on the product—the result will be a satisfactory cheese. And here it is that pure cultures of the bacillus named come in with so pronounced and beneficent an effect, not in cheesemaking only, but in butter making too. Spongy curds and frothy cream are well enough known to need no description, and they are demonstrations of the presence of ferments that are inimical to fair flavours in cheese and butter. Demonstrated in the form of floating or

(1) *Teste* the *medlar*, a fruit that is not fit to eat till it is, so to speak, rotten. Ed.

spongy curds, which are likeliest to occur in hot weather, it is clear that a pernicious ferment has obtained possession, and that the cheese will be imperfect not in flavour only, but also in texture.

Many dairyers have passed through much tribulation on account of microscopical microbes, those members of the infinitely little and of the infinitely numerous in vegetable life, which so commonly bring about very considerable results elsewhere, and which indeed are the ferments that promote decomposition in many organic and inorganic bodies. The opinion that many dairymaids have miserably failed to make good cheese, and failed through no fault of their own, may be held with confidence in its substantial accuracy. The cause of failure is always attributable to some pernicious ferment or other which has obtained a lodgment in the milk or in the curd, or in the formed cheese in the ripening-room. And so, also, the cause of success is never inseparable from the action of a beneficent ferment which brings about a satisiactory ripening of the cheese. In the dairies of France and Germany, not to mention other countries, where certain kinds of special kinds of soft cheese are made, an old ripening-room, the air of which is impregnated with the special fungoid or vegetable germs that ripen the cheese in the way desired, is considered to be of very considerable monetary value, and was so considered long anterior to the time when the microbic theory was beginning to emerge from the darkness of ages. This applies specifically to soft cheese, no doubt, for hard cheese, once pressed into form, in less open to outside influences. Hard cheese, indeed, may be said to acquire the ferments which eventually ripen it distinctively —acquire them in the milk, or in the curd before it is pressed into form, and once acquired they go on increasing prodigiouly in numbers, whilst their activity, under favourable conditions of temperature and moisture, ceases only when their work is done and there is nothing else to decompose.

The value of cleanliness, in conjunction with the employment of scientific cultures of microbes suitable to produce excellent cheese and butter, is now understood in a way that is modern. Cleanliness in dairies—cleanliness even as to the air in them—is required to dispossess pernicious microbes, and to give beneficent ones the predominant power which brings about a given result. Hence it is that we may infer that want of cleanliness in the dairy and imperfect ventilation with good air, or perfect ventilation with bad air, which is even worse, have been the cause of failure in thousands of dairies. To those who find difficulties still in the ripening of cheese, and there are many who do, we can only say that the question of ferments is at the bottom of all, the mischief, and that the only way to get rid of the difficulty is to get rid of that which causes it. Marked instances have come under our notice, not only as to the presence of pernicious bacteria, but also as to the absence of those that would have been beneficent. The problem is coming nearer to solution—the problem of microbic ferments—and within almost measurable distance of time all dairyers who will take the pains to become instructed, and to put into practice the instruction so obtained, will be able so to control the art of cheese-making or of butter-making that the result will be almost uniformly satisfactory, limited chiefly by the capacity of those by whom the art is practised J. P. S.

Ag. Gazette.

DISCUSSION ON THE MANAGEMENT, Etc., OF DAIRY-COWS.

We borrow the following discussion of a lecture, given by Mr. J. H. Grisdale, Agriculturist of the Daminion Experiment-farms, at the Annual Convention of the Cheese and Butter Association of Eastern Ontario, from the *North-West Farmer*. We hold that, if, as Mr. Grisdale says in his lecture: "The system of rushing every animal for all she is worth is the system that pays, when dairy-produce is the sole object," that system, almost of necessity, demands utter repose during the winter months for the cows, and as much repose for them in the summer as is compatible with the acquisition of a full belly when on pasture. But, as the lecturer sensibly remarks: "If pure-bred stock are kept, of course other considerations enter in with which I may not deal"; by which I suppose Mr. Grisdale means that the taking exercise on the part of the cow tends to improve the condition of the fœtus.

We do not turn fatting beasts out for exercise, but keep them in close quarters. They extract protein, fat, etc., from roots, cake, etc, more easily when at perfect rest in small loose-boxes

than when running about a yard; will not cows convert the same constituents, into another form of human food, more easily under the former conditions that under the latter?

DISCUSSION.

Q. What do you think of exercise for cows? Do you approve of the method advocated by some in Germany?

A. The summary of the experiments there are to the effect that the working of cattle will decrease the yield of fat in milk. The exercise in Germany is genuine work, such as hauling a plow.

Q. If the cow is making a lot of milk each day, do you not think she is having lots of exercise? What do you think about a cow travelling around in the snow?

A. Having the cows come out in the winter and take moderate exercise is, I believe, conducive of health, and unless your animals are in good condition of health you cannot expect a large flow of milk or a high range of butter fat, or anything else. Well, a man needs exercise as well as rest and so also does a cow. It does not do for a man to exercise violently in the summer and then lay up all winter and do nothing. And I am of opinion that a cow requires exercise to a reasonable degree in winter as well as any other animal.

Q. Do you think it is necessary to turn out cows every day in winter for exercise in order that they may be in a healthy condition and so be able to give large quantities of milk?

A. No; not every day. There may be days when it would not be wise to turn them out. But frequent exercise, I believe, is essential to health.

Q. That is different to what we have been telling the people for some years. We have been urging them to built better stables, properly warmed and ventilated, to feed the cows well, and not to let them out for exercise in the winter. Now, let us get at the heart of this thing. If you agree with Mr. Grisdale, that it is well to let your cows out in winter for exercise, say so; and if you don't believe that, say so, too. If I have a stable properly built and ventilated I would not turn an animal out from November to May. That is my personal view.

(And ours, too. ED. J. A.)

A. Prof. Roberts, of the Cornell University, has been conducting experiments with this end in view, and he has found that giving them sufficient exercise for health has increased the yield of milk about eight per cent.

Q. How does he exercise the cows?

A. He built a small stable with just barely room to feed and milk them. After the cattle are fed they are allowed to go out in the yard, which is a large covered affair, and which contains a lot of litter and roughage. They are not rushed around by a dog, but are allowed to move around or lie down at their pleasure. It has been found conducive to milk secretion. This place is well boarded and well lighted. The cows are put back into the small stables for the night. The place for exercise is practically a large covered shed, with windows in it.

D. M. Macpherson: At Cornell, according to Mr. Grisdale, Prof. Roberts has a small stable for his cows, and that means a lack of ventilation, which would have a deteriorating effect upon the cattle kept therein. A cow should have plenty of pure air. I have had eight years' experience, keeping from 70 to 80 cows and steers, and find that it is good for them to be tied in for six or seven months. They never come out from the 10th of November until the grass starts in the spring. My cattle do well under that treatment. They have a bright eye, sleek hair, and are never sick. I have a wooden floor in my stable.

Prof. Dean: I think that perhaps a happy medium would give the best results. I am afraid that if you advocate "exercise" it might be carried to an extreme by many. The average farmer seems to think that exercise is turning out cattle for the whole day. Surely that kind of exercise can have no advantage on the health of a cow. I think that on a mild, sunshiny day during the winter the cows might be left out with advantage.

Q. Will exercising the cow by letting her out into the open air have any effect upon the progeny?

A. I think the effect would be to make the progeny stronger. I would not let the animals be exposed to bad weather, but would let them take a little exercise or outing every fine day.

Prof. Hart: The question of watering stock in the stable is an important one. If the water is chilled when the cow drinks it we will not get as much milk from her as if the chill was off the water. If the cattle take this ice-cold water they will be chilled, and will not respond as fully in giving milk, for the cow has to give some of her energy in warming up the water she has taken.

It does not pay to use good food to warm water. I visited a stable the other day and saw where the water was put in a large covered tank, and kept at about ten or twelve degrees higher temperature than that of the other water brought directly in. This meant a good deal to the cows. They were not so likely to get chilled, and the plan is a cheap and practical one. The tank being covered the water was not affected by stable odors.

NOTE.—The plan followed by some of our more progressive stockmen in the west of having a water tank above the stable, but closed in from the air in the upper story and open to the stable below, is a good one. The warmth of the stable takes the chill off the water and also prevents any possibility of it freezing.—ED.—*Nor' W. Farmer.*

THE BEST MILK-PRODUCING PASTURES

A valuable collection of evidence on this subject appears in the current number of the Journal of the British Farmers' Association, in the shape of replies to questions which were addressed to gentlemen in various parts of the country, whose experience in milk production and cheese-making is well known. It appears from these replies that, in the first place, there is a consensus of opinion to the effect that herbage or condition of pasture land greatly influences both the quantity and the quality of the milk produced. Some of the replies, coming, as all do, from practical and experienced dairy farmers, are very interesting. Thus:—"The richer the herbage the richer the milk, but quantity the of milk is regulated by the succulent nature of the grass." One correspondent thinks that "most milk and the richest in quality" is attained from cows grazed "in deep fertile soils." Cows fed on equal amounts of clovers and grasses grown on poorer lands will not produce the same results. Others write that the condition of the land has very material influence "on the quantity, but not so much on the quality." A general preference is shown for a "short bite of grass" for milking cows, but the pasture should be good. Full pastures are not so essential now as formerly, as feeding stuffs are so cheap, but this correspondent adds that he prefers "a fairly good bite, with an accumulation of grass by September." Again, some prefer a medium pasture, "but never allowed to go to seed." Nearly all correspondents prefer old-established pastures to newly-laid-down land for the production of milk and cheese, some preferring "old turf for cheese-making and new for milk selling, as a greater yield of milk per cow is obtainable from the latter." There is strong belief in the operation of draining, as calculated to improve the herbage and add to the productiveness of the land, and, consequently, to the yield of milk obtained, as it enables a greater head of stock to be kept. It, moreover, enables owners to turn out their cows earlier in the spring and allow them to remain to a later date on the pastures in the autumn, thus increasing the summer season, as it were, and reducing that of the winter. In reply to the inquiry as to what manures are best for pasture, the greatest preference is for bones; basic slag and superphosphate coming next. Yet one gentleman writes that he does not find the results from these latter to be so satisfactory as to encourage him to continue them. He relies more upon farm general manure and the improvement effected by feeding cattle with cake. Another correspondent uses bones on old turf, and superphosphate on new, and limes any portion where bones fail to give a good result.

COTTAGE CHEESE.

What to do with the skim milk, is about the biggest unsolved question before the dairyman at the present time.

Not everyone has the conditions or the market for disposing of his product in the manner described in the following article, but there must be a few who could find a profitable market by following the methods here given:

In a previous letter, mention was made of the butter making operations of Leslie Fuller, Bramans Corners, Schenectady County, New York. In a letter received from him since then, he gave an account of his method of converting skim milk into cottage cheese, which he is able to dispose of at a good price.

Mr. Fuller uses a portable creamery and practices the Swedish system of cream raising, therefore his skim milk is sweet and in the best possible condition when drawn from the creamery and from under the cream, thus producing the final separation of the cream from the milk.

He has a small, almost miniature cheese vat, made on nearly the same general plan of large self-heating vats used in large dairies and small

cheese factories. The milk vat is made of tin and sets in a galvanized iron water vat.

The heating is done by a kerosene oil lamp with three burners, but to save time the water to fill it is first heated on the cook stove.

The skimmilk from the portable creamery is put into the milk-vat before breakfast, and a kettle of hot water is poured into the water vat. The morning's skimmilk is allowed to stand in the milk-vat till evening, then the skim milk of the milk set in the morning for cream raising, is drawn from under the cream and put into the milk vat, and at the same time the buttermilk from that day's churning is also put in. Then another kettle of boiling water is put into the water vat.

By the morning the contents of the milk-vat is curdled, then the water is drawn off from the outer vat into kettles and used for heating, and by the time the milking is done the water in the kettles is boiling hot, and is again poured back into the water vat.

Then the lamp is lighted, the burners turned low, and the lamp placed in position, at which time the family go to breakfast. Soon after that meal is finished—say ten or fifteen minutes—the temperature of the water is up to 110 degrees, and the lamp is then turned out. But before that time, or as soon as the milk-room is reached, after breakfast, the curd is cut in inch cubes, which allows the whey to separate from it. The whey is dipped into a large pail and emptied into a flour sack. The latter is held over a large pail till most of the whey runs out, when the sack is hung up two hours to allow the whey to more completely drain out.

Now it will be seen that the milk vat is again empty. The skim milk from the portable creamery, *i. e.*, that from the milk set for cream-raising the evening before, is put into the milk, and the operation gone through six times each week.

On Friday, the day before the cheese is to be delivered, there will be six sacks of curd. They are then cut into small pieces and worked by the hands, something like mixing bread, as Mr. Fuller expresses it, and salt is at the same time mixed in. The salting is done by taste, but by weight would, to the writer, seem a better way. Mr. Fuller thinks a machine for grinding the curd would be an improvement.

After the curd is salted and mixed, it is moistened just enough with sweet-milk to make the bits of curd stick together, when it is formed by the hand into balls, though Mr. Fuller is thinking of getting a mould for that operation.

These balls of cottage cheese weigh a little more than three-quarters of a pound each—or about ten pounds to the dozen.

They are then packed into boxes four inches high inside, with hinged covers, nicely painted outside. Each time, before packing the balls in, the boxes are lined with white wrapping paper. A large printed label is pasted on the cover of each box.

Mr. Fuller has four customers at Amsterdam, N.Y., eleven miles from his home, to which he delivers the cheese every Saturday, and finds the demand greater than the supply. One of his customers keeps a meat market and the other three are grocerymen. One of his customers wanted the entire production, but Mr. Fuller prefers to distribute it through the city.

Mr. Fuller estimates that his skim milk made into cottage cheese brings $1 per hundred pounds. Then he has left the whey, which, mixed with middlings, makes excellent feed for hogs and hens, and by putting in a little oil meal makes a fine feed on which to raise calves. He can truthfully be called a manufacturing farmer.—*Metropolitan Farmer.*

THE LOW TEST.

At nearly every institute attended last week by Professor Cottrell and myself, the question was asked: "What it is the reason our milk tests 2.6 per cent one month and the next month, under exactly (?) the same conditions, it test 4 per cent or more?"

There are a great many things that affect the test so that we can no point to any one thing as doing it. In the first place, the conditions are never "exactly" the same; the pasture may be better one month than another, the weather may be cooler or warmer, perhaps you encourage the cow less with the milk stool, or perhaps the boy who brings them in does not get them so much excited. All these things, and many more, influence the per cent of butter fat. Kindness is sure to be rewarded by an increase in both the per cent of butter fat and also in the milk yield; whenever you abuse the cow either by a sharp word, the milk stool, or by running her, you are taking money out of your pocket by decreasing the per

cent of butter fat and also the yield of milk. Whenever the cow suffers for lack of food, water, or proper care there is a decrease in the amount received from her.—*Hoard.*

PASTEURIZED MILK FOR CHEESE MAKING.

Thus far the cheese maker has not been able to use pasteurized milk in his business, owing to the fact that the heat in some way changes the nature of the casein, and consequently the rennet does not act on it in the usual manner. This fact has prevented the cheese maker from making use of pasteurized milk to improve the quality of his product, as the butter maker has been able to do so successfully. The *Milch Zeitung* publishes the results of some experiments, which were made to see if this objection could not be overcome, as follows :

"This investigation was suggested by the practice of pasteurizing milk for butter making and the resulting difficulty of utilizing the skim milk for cheese making. Three series of experiments were made, including a large number of trials in each. In the first series the separated milk was heated to 167° F. for fifteen minutes ; to 185° for ten minutes in the second series ; and to boiling point for two minutes in the third series. In each experiment about five gallons of separated milk were used, varying proportions of calcium chloride being added in some cases, and none in others. A small cheese was made in each case.

In the first series, where the milk was heated to 167° F., it was found that there was little difficulty in making cheese from the milk, either with or without the addition of calcium chloride, but the investigators recommend adding to such milk about fifteen grains of calcium oxide (lime) per two and one-half gallons of milk to facilitate the curdling.

The cheese made from milk heated to 185° F., and treated with calcium chloride, resembles in many respects that made in the first series of experiments. The yield of cheese was in all cases greater where the calcium chloride was used than in the control experiments. The green cheese also contained more water, but even on the basis of dry matter the yield was greater. The greatest difficulty in making cheese from this kind of milk was found to be the time required for the complete separation of the whey from the curd.

The use of calcium chloride was also found to restore the ability of milk heated to boiling point to curdle, but to accomplish this in the same time two and a half times as much calcium chloride was required as in the first series. The separation of the whey was very slow and difficult, and the curd itself was unsually rich in water, and was changed to a greyish-white appearance and a finely granulated condition, with very little tendency to adhere together. The addition of larger quantities of calcium chloride improved the adhesive qualities of the curd, although it did not entirely remove the difficulty. Experiments made subsequently, scalding to 104° F. to hasten the separation of the whey, and to make the curd more adhesive, resulted favorably, and this is to be the subject of further investigation.

In a later note in the *Milch Zeitung* it is stated that all difficulties in making cheese from milk heated to 185° have been overcome, and that the process is rendered as simple as ordinary cheese-making."

If these experiments are successful, and it is found that pasteurized milk can be used in cheese-making, it will be a long advance towards the ideal, fine-flavored cheese that we are all looking for.—*Hoard.*

The Poultry-Yard.

(CONDUCTED BY S. J. ANDRES).

ARTIFICIAL INCUBATION.

Cooling the Eggs.

Cooling the eggs, or aerating them, as it is generally termed, is a very important part of incubation, and careful attention to it will be repaid by an increased percentage and stronger chicks.

"I do not need to cool the eggs," says some one, "my incubator has all the ventilation it needs." It may have plenty or too much ventilation, yet, for best results, the eggs should be cooled once a day, beginning on the second day and continuing to the eighteenth day, both inclusive.

The hen leaves her nest once a day, if allowed, and, in exceptional cases, where she does not do so voluntarily, she should be taken off once a day.

The hen that leaves and returns regularly to her nest, hatches much better than the one that does not. In moderate weather, in the spring, the hen does her best hatching. She leaves her nest for a limited time and returns. The eggs do not get chilled, but are properly cooled.

In hot weather, the hen is often driven from the nest by lice or mites. The eggs get plenty of cooling but do not hatch well. This is partly due to neglect of *the hen* and to lack of vitality in the eggs.

It cannot be laid to too much cooling, because eggs will stand considerable exposure in hot weather. And it is so with eggs in the incubator. They may be left out much longer in hot weather than in the spring or winter. In early spring and winter the hens sits closer; she moves the eggs from centre to outside and they are cooled quicker than in warm weather. When she leaves her nest once a day for food, she returns quickly. The same course must be pursued with the incubator, i. e., the eggs must not be exposed so long in cold as in warm weather. Once a day, beginning with the second and ending with the eighteenth day, the eggs should be cooled to about 80° Fahrenheit: not lower. This can be done after turning them in the morning. One soon learns to tell the degree of heat by laying the hand on the eggs, or by holding an egg against the face. When the surface of the egg indicates 80°, the inside is of course warmer.

The incubator should be closed while the eggs are out cooling, for it is not desirable to cool the machine. When the hen leaves her nest she does not dive into the water or sit upon a cake of ice. When the eggs are out of the incubator, it takes more heat to keep the egg chamber at the proper temperature, and the regulator if it is a good one (and an incubator without a regulator is behind the time), will turn on extra heat and when the cooled eggs are replaced, will turn on still more, automatically, which is turned off again in the same way when the egg-chamber recovers its proper temperature.

Nine-tenths of the succesful users of incubators cool the eggs; so do the manufacturers of incubators when they want to make a good hatch. Cooling the eggs is one of the important items in incubation, but *not the only one.* You will not succeed if you neglect the others.

Testing Eggs.

This a very important part of the business, and if properly attended to will throw a flood of light upon many perplexing problems in natural as well as artiffcial incubation. It not only elucidates but proves the truth or fallaciousness of our *Theories in the line of hatching.* Men are frequently heard to say that they never bother with testing eggs! That they cannot replaced the infertile eggs with others and therefore nothing is *gained.* They are told by the best authorities that boiled eggs are not good food for chicks, and as for themselves of course they would eat only fresh eggs!

Then there is a risk of taking out *hatchable eggs;* so they run all the eggs *through together.*

They say that they can break the unhatched eggs when the hatch is over, and see which were infertile and who cares whether they were or were fertile if they not hatch. To those men we can only repeat "Where ignorance is bliss 'tis folly to be wise."

To obtain the best result it is absolutely necessary to test the eggs in process of incubation. If the eggs all come from one farm or yard and they prove a large percent infertile, weakly fertilized or stale, you will notify the party from whom you got them, and he can look into the matter and rectify it if he will, and afterwards serve you with vigorous fresh ones. If he will not do so, then you can avoid him and procure better (or worse) ones. If the eggs are from your own stock, and you know that they are fresh and prove infertile or lack strength, you will know it, and can proceed at once to remove the cause, and thus *save time,* eggs, and complaints from your customers, to whom you sell eggs for *hatching.*

If you have several yards you should mark the eggs from each yard so that you can tell which are the best and which the poorest and then treat the stock in each yard according to the requirements indicated by the testing of the eggs. There is a cause for each imperfection and you should discover and remove it. S. J. ANDRES.

(To be continued).

SAVE THE DROPPINGS.

Chemists assert that hen manure analyzed is composed of the following ingredients:

Phosphoric acid, 3.43 per cent; potash, 2.26 per cent; nitrogen as ammonia, an organic matter, 2.35 per cent.

The manure of birds is valuable from the fact

that it contains the urates and other highly nitrogenous substances, which in other animals pass away with the urine. Hen manure is superior to the ordinary barnyard manure, as the following shows, giving the number of pounds of the three most valuable elements in a ton of hen manure and a ton of well rotted barn manure:

	BARN.	HEN.
Phosphoric acid.....	6	48 60
Potash.....	10	41.05
Nitrogen.....	11	67.00

Thus it will be seen that four hundred pounds of pure hen manure contain nearly as much nitrogen as contained in a ton of common barnyard manure.

The amount and value of poultry manure are seldom taken into consideration, nor are the fowls credited therewith, with the summing up the poultry account at the end of each season. If this were regularly done, it would be found that poultry return a very satisfactory profit each year.

There are but few flocks of fowls that produce as much manure as they should, which is not the fault of the bird but of the poultry-breeder, who does not make a point of properly saving and using the manure. The floors of the hen houses should be kept liberally supplied with dry sand, or chaff, which not only helps to keep the manure from caking in large lumps, while it facilitates in cleaning the house. S. J. ANDRES.

(*To be continued*)

POULTRY-RAISING FOR THE AVERAGE FARMER.

The poultry industry is fast becoming a most important one in this country. Its future development will depend largely upon the attitude of the average farmer towards it. If he takes hold of the matter as he should and as he as ample opportunity for doing, there is no question that our dreased poultry and egg trade can be enormously increased. But there are many signs that go to show that the Canadian farmer is more interested in the question than ever before. Realizing this and believing that some definite and practical information would be helping at this juncture, we submitted the following questions to a number of experienced poultrymen:

(1) How many fowls, including turkeys, geese, ducks, etc., might be kept on the average Canadian farm without interfering very much with the other farming operations?

(2) What kind of fowl would be most profitable for the farmer to raise for egg production? for fattening purposes?

(3) Can fowls be profitably kept on the farm without a proper hen-house?

(4) In fattening poultry, would the average farmer be able to produce all the feed repuired on his farm?

(5) What would be a fair income for a farmer to realize every year from his poultry?

(6) Will the average farmer be able to successfully fatten poultry for the British market?

To the Editor of FARMING:

I have pleasure in answering your questions as follows:

(1) A farmer should be able to keep 100 hens, besines a small flock of turkeys and a few geese. Some will make more money out of one than the other.

(2) Barred or White Plymouth Rocks, or a variety of Wyandotte, with preferenoe for the first named.

(3) The dairy cow has to be comfortably housed in order to be profitable. So must the hen receive consideration in the same manner. A suitable poultry house is indispensable. It need not be an expensive or elaborate affair.

(4) The ordinary farmer should certainly be able to produce the feed necesary to fatten his poultry. Finely ground oatmeal is the principal agent in fattening and oats are largely grown on most farms.

(5) A farmer should realize from one to two dollars per head per annum according to management and circumstances.

(6) The average farmer is not likely to breed, fatten and ship his own birds, unless he makes the business a speciality. In the latter case he he should have proper buildings, facilities, etc. In England it pays the farmer well to rear chicks to sell to the fatteners, who have establishments of their own wherein the birds are fattened. Our Canadian farmers will find it best to do the same. At present there is a demand in our home markets for the superior quality of poultry, which our farmers do not yet produce and which they cannot do until they keep Plymouth Rock, or other breeds which make early and superior chickens.

It is only wasting time and opportunity trying to fill the home of foreign demand with "scrubs."

It might be added to the reply No. 5 query, that experiment has proved that if hens are properly fed, managed and housed, so that they will lay well in the winter season of high prices, and their product is sold at winter figures in the cities, and a certain number of eggs in spring are converted into chickens, that the hens paid, over and above their feed, a profit of $1.75 to $2.00 per hen. Investigation has shown that when hens are running at large, or comparatively so, there is a large percentage of eggs, even at the low summer prices. Careful enquiry into the whole subject will prove to the farmer that there is no better paying branch of farm industry than poultry. But, as with the dairy cow, it requires brains, adaptability, energy and perseverance in order to make your money. A. G. GILBERT.

Ottawa, 10th November, 1899.

The Horse.

RAISING HORSES FOR PROFIT.

(BY ALEX. MCCASKILL).

I want to impress upon the minds of farmers and breeders the great importance of producing the two following classes of horses: First, the carriage or coach horse with size, action, and all the qualities that the market demands at the time. And, second, the heavy draught horse, with all the shape, quality, style and action that can possibly be produced. These are the leading horses in our markets to-day; they are the most saleable, are in the strongest demand in all markets, and are the most profitable kinds to raise. In all American markets there is a trong demand for them, and with the revival of business throughout our country the demand for good horses is increasing, and we believe will continue to do so for many years to come. These kinds are also the classes that are demanded by the export trade, and this trade is the life and leading future of our market. It has been increasing every year for the past four years, and has already become larger than the supply. And I believe from every indication that this export will continue to grow for many years to come.

These two classes have already advanced very much in price, and will sell for double the amount of money to-day than they did in 1895. In the first place a breeder needs to get a good brood mare to begin with, whether it be for carriage or draught purposes. If he is going to raise carriage horses let him get a good carriage mare and then use the services of a carriage stallion. If he is going to draught horses get a good draught mare and use the service of a draught stallion. By raising the draught colt well the first winter and by keeping it growing right along, when it is three years old it can be broken to work. It should then do any ordinary work on the farm, and after that its work will pay for its keeping until it is fit for the market. Sell off the older horses when they are four or five years old; they will then be ready for the market. I think a person could raise draught horses on a farm with as much profit as any other kind of live stock. I think there will be always a demand for draught horses. The lumbermen want them, the city trade needs them, and they are wanted in the British market. I saw a report a short time ago where McDonald, Fraser & Co., Glasgow, Scotland, sold 50 Canadian horses at prices ranging from 20 to 44 guineas each. If a farmer gets $90 to $100 for a horse it will pay him all right We cannot do without the horse on the farm as most of the farm work is done by machinery and horses. We must then keep on raising them.—*Farming.*

THE BREEDING AND CARE OF HORSES.

(*By I. P. Roberts, Professor of Agriculture, Cornell University*).

"In breeding horses, don't try to breed the largest—their limbs give out and they go all wrong. Exceptions, draft horses, and in smallest ponies. A 2,000 pound draft horse will bring twice as much as one of 1,300 pounds; but is very hard to breed. Never get overstocked with horses, keeping twenty to forty, where eight to ten are enough for your land. Remember that half the success of farming lies in the business part of it. If you lack in the business sense, you will probably be a financial failure. Have a plan in your breeding. There is as much in having the right kind of a horse in the right place as in the hired man. If you love horses, breed coach horses. If not, breed draft horses, which are easy to break and train. Roadsters come from the trotting class of horses. The hackney naturally belongs to the truck farm, and every farmer ought in a way to be a trucker. Low horses, and even ponies, are good for orchard cultivation.

"It is quite possible, by scientific feeding, to make horses grow large and tall, or the reverse. One successful horse-raiser I know feeds plenty of bone meal to give his horses fine, bony structure. The land has much to do with their quality. The little city of Lexington, Ky., sells annually in her streets $2,000,000 worth of horses. The blue grass country produces horses because of the phosphates in the soil. In caring for horses, remember that the farm horse does not want his skin made too sensitive by over-currying (1). He sweats freely. What he does need is to have his feet and legs taken care of. Put your chief care upon him at night, after his day's work is done. Clean out his feet thoroughly, leaving no mud to dry in. He gets rheumatism from it. You only need simple tools to work with; first, an old broom, and finish off with a wisp of straw, rubbing legs and feet well, hard and quick. Cut off the fetlock if you like; the feet, without it, dry off more quickly. To keed the horse clean and free from dust, a light blanket of cotton or jute costs less than the time for cleaning. Then, too, the blanket keeps the hair straight, and helps to keep it from growing. Never blanket a horse in the stable while he is warm, unless you give him a dry blanket shortly after.

"The driving horse must not be fat, but lean and hard, be well dressed, sensitive in mouth and skin.... The first great mistake in caring for horses is feeding too much hay; the second is not feeding often enough. A horse should be fed four times daily, and half the day's feed should come after 6 o'clock at night. More horses are hurt by overfeeding of hay than grain. A horse should not work over five hours without feed, and different horses require different food. Some horses do better on straw than hay."—*Farming.*

WORKING BROOD MARES.

"Killing two birds with one stone" is a performance which is perhaps more necessary to be done by farmers nowadays than it ever was. Every possible economy has to be practised in order to compete with foreign competition, meet the landlord, and pay the everincreasing labour bill. Therefore farmers who have not already done so should combine work with breeding, for it is at least more likely that a mare which earns her living in the collar for, say, seven months in the year, and suckles a foal for the other five, will give a better return than one kept solely for the purpose of breeding, provided they are equally good and registered, for otherwise the offspring will never be so readily saleable.

It is a mistake to suppose that working mares breed less frequently than idle ones. If anything, the workers are more certain, and a great deal more likely to get safely through the foaling, because they are necessarily in a more healthy and natural breeding condition.

Of course no sane horse-breeder would think of putting mares in foal between shafts for three months before foaling, or sending one along a slippery road with a heavy load on her back at any time. But even when these precautions are neglected, one often hears of satisfactory foalings taking place. Opinions differ as to the advisability of working mares when nursing. Personally I prefer to work them right up to the time of foaling than to shut up the foal and work them after. Many a promising youngster has been lost through having free access to the milk of a dam just returned in a heated state from work (1). Horsemen know that if the "foal is left with the dam it sucks at very frequent intervals," and therefore it is not surprising that a fast of several hours is almost certain to cause ill effects.

If the youngsters are intended for sale at weaning-time, the loss of bloom occasioned by working the dam means a corresponding loss in the price realised when the sale takes place.

It seems to me that the question of when they shall foal has to be left pretty much to chance and circumstances. If arrangements are made for an early foal, the mare will, in all probability, break service several times or miss a season. And there is no doubt that early foals cause a good deal of trouble and expense before they can be turned out to shift for themselves, and it is doubtful whether they make a sufficiently high price to compensate for this at the other end (2).

On the other hand, experience proves that foals which arrive from the middle to the end of April can hold their own against all comers. The sensational Shire, Rokeby Harold, champion at one year old, may be mentioned as an instance (for if I remember right he was foaled about April 19th). There is a further reason why the grass should be in view before the foals arrive; viz., that mares boxed up and fed on dry food are infinitely less likely to breed at first service than those out at grass, and breeders know that there is no better time to catch a mare than at nine or ten days after foaling. It is also worth considering that mares, although getting heavy, can perform a lot of very useful work in claims in the early spring, such as harrowing to prepare the seed bed, and also after the drill, and chain harrowing on the pastures. Thus they are able to lend a helping hand—if such it may be called—at the two busiest seasons on a corn-growing farm, spring and fall.

The demand for high-class draught horses is improving, and the improvement is likely to be helped by another revival in the export trade. Therefore farmers who wish to profit by it should breed as many good ones as possible.

Eng. Ag. Gazette.

(1) Never curry at all. The curry comb should be used to get the dust out of the brush, and should never touch the horse, except to clean the dried mud from the fetlock. Ed.

(1) As we know from experience. Ed.

(2) Racing mares must foal early, as the age of thoroughbreds is important as regards the 2-year old stakes. Ed.