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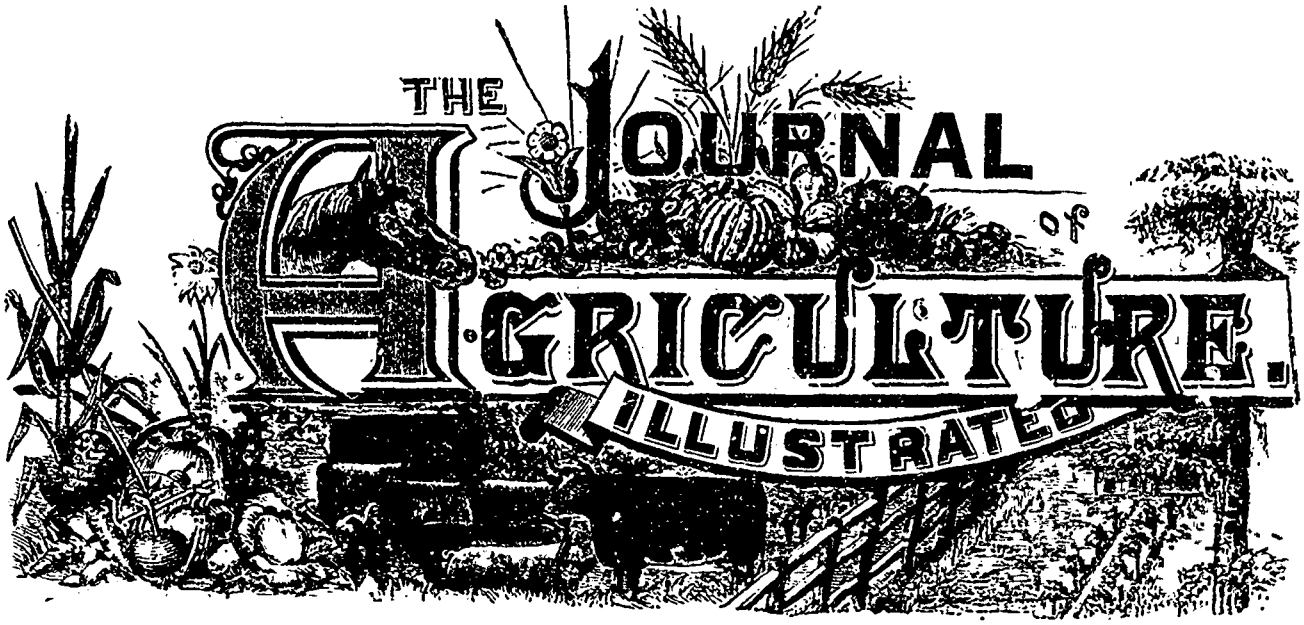

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NOTICE.—The subscription to the *Illustrated Journal of Agriculture*, for members of Agricultural and Horticultural Societies, as well as of Farmers Clubs, in the province of Quebec, is 30c annually, provided such subscription be forwarded through the secretaries of such societies.—EDITORIAL MATTER. All editorial matter should be addressed to A. R. Jenner Fust, Box 109, Lachine, Que.—or to the Director of Agriculture, Quebec.

OFFICIAL PART.

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DE OMNIBUS REBUS.

Sept. 26th, 1888.

Milk competition.—I congratulate Mr. Reburn, of St. Anne's, on his fresh success at the Kingston exhibition. The old cow, *Jolie of St. Lambert's*, still holds her own.

In the scores of the milk competition, given below, it will be remarked that the four principal breeds had an usually diversified contest, and it is worth while analysing it.

The first prize cow, Jolie, beat the second by seven per cent, the latter being an Ayrshire, whereas she beat the last in the list, Mrs. Jones' Daisy Dell, by two hundred and fifty per cent.! Neither of Mrs. Jones' Jerseys seem to have distinguished themselves, as they stand 12th and 14th in the competition, the much-abused Holsteins standing 6th, 8th, and 11th, and two of Mr. Reburn's Jerseys 9th and 10th. The best Holstein beat the worst Jersey by one hundred and sixty per cent, and the best Ayrshire beat the second-best Jersey by twelve per cent. Where were the Guernseys?

"JOLIE OF ST. LAMBERT."

The following are the scores in the milk competition at Kingston, in which Mr. W. A. Reburn, of St. Anne's, came out victorious, even with such notable former prize winners as Mr. Youill and Mr. Harper to compete with —

Exhibitor.	Cow.	Breed.	Scores.
W. A. Reburn	Jolie St. Lambert	Jersey	113.38
Joseph Youill	Portulacca	Ayrshire	105.09
W. A. Reburn	Jolie St. Lambert, 3rd	Jersey	94.16
S. Harper	Rose of Cobourg	Devon	92.15
F. H. McCrae	Merrie	Holstein	84.65
Joseph Youill.	Nellie Gray	Ayrshire	78.26
Wm Stewart.	Lady Minnie	Ayrshire	70.08
B. W. Folger.	Nixie L.	Holstein	69.00
W. A. Reburn	Jolie St. Anne	Jersey	63.15
W A. Reburn	Lady Banff St. Anne.	Jersey	62.10
B. W. Folger.		Holstein	61.08
E. M. Jones	Mulberry	Jersey	44.71
Wm. Stewart.	Princess Minnie	Ayrshire	43.45
E. M. Jones	Daisy Dell	Jersey	32.18

Half-bred Guernseys.—I have just heard from Mr. Gylling, of Sorel, to the following effect: "I am happy to say that, thanks to your notice in the Sept. number of the Journal, I have sold the young stock got by your old Guernsey bull *Rufus* at very satisfactory prices. They go to Toronto to

a Mr. Davis" The bull, from the famous *Vaurbelets* herd, had not met with a purchaser when Mr. Gylling wrote.

Superphosphate.—Messrs. Downes & Co. write to me saying that they have just sent out, to order of the Bank of Montreal, 175 tons of superphosphate. This is to all of us a most interesting price of information, as it betokens, I hope, a future supply of this invaluable manure at a reasonable price. I have not yet found out the real consignee, but I hope to do so shortly. The price free on board at Liverpool was, according to Messrs. Downes, £2. 4s. the gross ton, equal to £1. 19s., or $9.36 the ton of 2,000 lbs. I have just discovered that the importing firm is Messrs. Lomer & Co., Montreal.

Linseed.—I see by the reports in the *Sorelois* that linseed is selling in the Sorel market for 75 cents a bushel = 60 lbs. This is about $24.00 a ton, the present price of linseed-cake at Montreal being $34! The manufacturers of linseed oil must be making a good thing of it. Now, of all butter-making food crushed linseed is the best. A very extensive use of it enables me to state positively that, if properly used, the cows will benefit amazingly in health, the butter will be of the finest quality, and the manure will astonish the farmer by its effects. Compared with linseed cake, 3 lbs. of linseed is equal in the production of good milk, to 9 lbs. of cake, and I see by my English papers that in Ireland Canon Bagot is supplying ground linseed to the farmers who send milk to his dairy-factories.

To use linseed properly, whether for milch-cows, fatting-beasts, or sheep, it must be crushed in some way—at all events, the skin must be cracked.—As we have none of the handy little crushers used in England, we must be content with grinding it between the mill-stones, with the addition of some cereal or other to prevent the oil from choking the mill. In my opinion, as I have stated a dozen times before, cooking, except for cows furnishing milk for sale, is a useless piece of extravagance, so I should give the mixed meal to the cows, at the rate of not more than 1½ lb. of linseed a day, combined with any reasonable amount of chaff previously damped. Should the linseed have a relaxing effect on the stock, as it probably will if given alone, the addition of a little pease-meal will set every thing to rights, but to say the truth, linseed, pease, and oats should be all ground up together in the proportion of 4 bushels of pease and oats to 1 bushel of linseed, and then there will be no fear of the beasts being affected.

On Monday, September 10th, I paid a visit to my old friends at Sorel, to see how they had been getting on in my absence. I found that a great change had taken place in the general tone of feeling among the farming population. Instead of regarding, as they used to do, all things new as fanciful, the desire of most of them seemed to be to imitate as nearly as possible the practice of those who had taken advantage of my instruction during the time of my residence at Sorel, and I must be allowed to say that I never in all my life met with such outspoken gratitude as was evinced by those whom I had been enabled to assist by advice and practical example.

My young friends, Séraphin and Baptiste Guèvremont, bought last spring a farm of 140 arpents = 118 acres, near the Catholic church, for which they paid $6,000. The land was in a rough state, having been wofully treated during the preceding ten years by the previous proprietor. No internal fences, though the boundary fences were good and sound. Entering into possession on the 20th of May, the natural conclusion to which one would be led would be that very little could be done the first season, as no fall-ploughing had been done, and no dung carted out from the yards, though the brothers had been hard at work all the winter drawing dung from the town, where it can be bought for ten cents a load. Altogether they managed to get together about 700 one-horse loads.

On May 24th and following days, 20 acres of oats were sown on a 4 year-old ley. Judging from the crop as I saw it on Sept. 11th, the harrowing had been thoroughly done, but unfortunately the pressure of work was so great that the rolling was neglected. Still, I could not estimate the crop at less than from 45 to 50 bushels an acre; in fact, it was the best piece of oats I saw this season.

Of the root-crop there were:

Potatoes	9 acres.
Swedes	6 "
Turnips and cabbages	1 "
Mangels and sugar-beets	1½ "
Carrots and parsnips	1 "
Corn	0½ "
	19 acres.

With the exception of 3 acres of early potatoes, the tops of which had died and allowed free scope to the weeds, the whole of the root-crop was perfectly clean, the land thoroughly stirred with both hand- and horse-hoe, and it is not going too far to say that it was impossible to find a miss-plant all over the field. After the horse-hoeing was completed, the headlands were re-ploughed, dunged, and sown with yellow-turnips, which will fetch their price at Montreal, the Sorel turnips and carrots being unequalled for sweetness and juiciness. Thus, every square-foot of land was under crop, and the sight was indeed a pleasing one to me, considering that when I first went to Sorel, in 1884, there was not an acre of roots in the whole parish, and the cultivation of the potato-crop was a disgrace to any place.

Twelve acres of buckwheat at the upper end of the farm had been slightly touched by the frosts of the 6th and 7th of September, and as I am no judge of this crop as far as its probable yield is concerned, I can only say of it that it was thick enough on the ground.

Thirty-nine head of cow-stock, at $8.00, and eleven horses, at $10.00, have been taken into graze this season = $422.00, which alone will more than pay the interest of the purchase-money of the farm even at 7 %! Prudently, no cattle are taken in to graze until the money is paid.

Two very striking features of the root-crop are, 1. that the mangels will yield at least twice the amount of bushels to the acre that the sugar-beets will yield; 2. that the outside rows of sugar-beets and mangels as well as the plants at the end of the rows of those roots, are strikingly superior to the inner rows and plants, particularly in the case were the adjoining piece is in carrots or parsnips. Does not this clearly show that, as in the case of alternate rows of tobacco and cabbages which I have so often spoken of, the alternation of high- and low-growing crops must be advantageous. The carrot and the parsnip dive down deeply into the subsoil and feed on what they find there; the mangel gets its food nearer the surface. Besides, the free admittance of air and light owing to the 4 feet intervals between the high-growing plants must be of some value. I remember an experiment, conducted by the Duke of Beaufort's steward at Badminton, in which long-red mangels and Belgian carrots were grown in alternate rows. The yield was enormous, but I have not the figures to refer to.

All the roots were sown with the *Planet Jr.* seed-drill, and most beautifully regular was its work.

Altogether my visit to "my children," as the *Sorelois* calls them, was highly satisfactory. When I first undertook their instruction, four years ago, I little thought they would arrive at so high a degree of practical perfection in such a short

time, as every one used to tell me that it was utterly useless to attempt to improve the agricultural practice of the country; or as my favourite French author puts it in his usual quaint and succinct fashion :

> Que c'est une folie à nulle autre seconde,
> De vouloir se mêler de corriger le monde. (1)
>
> *Molière.*

Wine from the wild grape.—Mr. O'Flaherty, the Station-master at Lachine, tells me he has long been in the habit of making wine from the wild-grape of the country. The Indians bring them over from Caughnawaga, in barrels, in such quantities that Mr. O'Flaherty has sometimes made as much as 110 gallons in a season. Unfortunately, he could not let me taste the wine, as he had none left, but as he was offered, by a Montreal wine merchant, $2.50 a gallon for it, we may take it for granted it was not bad stuff.

The Escutcheon.—The Jersey cow, Malinda 4th, is reported to have given more than 15,000 lbs. of milk in a year, to have tested (officially 21½ lbs. of butter in seven days, and to have given an *estimated* yield of 909 lbs. within the twelve months. All this without forcing! And yet, as a heifer she was nearly being discarded from her owner's herd on account of the inferiority of her escutcheon! So much for that theory. *Jersey Bulletin.*

The *Farmers' Advocate* states that "bare and thin spots in meadows can be remedied by sowing on grass or (*and ?*) clover seed, and sprinkling it (*them ?*) over with a light coat of fine manure, and if well scratched with a fine-toothed implement, the process will be aided very materially." Well, I tried the experiment again this spring for the fifth or sixth time, and, as before, entirely unsuccessfully. In order that there should be no mistake as to the quality of the clover- and grass-seed, I broke up a small piece of the faulty grass-plot, raked it fine, and after sowing, rolled it down tight. The grass-plot itself I raked over twice as deeply as possible, sowed the seed, raked twice again, and rolled. All the work was done on the same day May 20th. What was the effect? On the 20th July, the broken up plot presented as fine an example of mixed clovers and grass—the latter predominating—as I could wish to see, whereas it was impossible to discover the slightest sign of any of the seedlings among the unbroken plot. The latter was of course improved by the raking and rolling, and nothing more.

Bread.—Bakers do not trouble me much, as I have "baked at home" for the last 20 years, and, owing to circumstances which it is unnecessary to dwell upon, I get my flour at wholesale prices. I do not quite understand the calculation of profits in the subjoined article from the N. Y. Journal. According to my figures, the barrel of flour at $5.00 turning out 260 lbs. of bread at 4 cents a pound should give a gross profit of more than 100 %! 260 × 4c = $10.40. These things are worth attending to, believe me, for we are in for a run of high prices that we have not seen for some years. I have not had any account of the progress of the Montreal joint-stock bakery for some time. The building was burnt down a little while ago, but I hope it is rebuilt and the reported quarrel between the manager and the shareholders set at rest.

(1) Nothing is more, foolish than to imagine, that one can improve the way of the world.

Profits of a baker.—A baker will toss a barrel of flour into a trough. Then he tosses 104 pounds of water on top of it. A quantity of yeast is added, and then the jolly baker has 300 pounds of dough to operate on. The 300 pounds cost him $5. In short order the dough is turned into "twists," high loaves, and other styles of the same quality. The oven's heat reduces the 300 pounds of dough to 260 pounds of bread. The baker sells his bread at the rate of four cents a pound, or at an advance of 30 per cent., over what it cost him. There are 1,400 bakers, great and small, in this city, and to them is committed the trust of supplying bread for 1,300,000 persons. There are many bakers in this city who make 1 300 loaves of bread per day and sell it for from $80 to $105, or at a net profit of about $40. Little money is lost in the business, and most bakers do a cash trade. It is very seldom that bakers fail. The business is steady, reliable, and attended by very few risks, unless from incompetent workmen.

N. Y. Journal.

Clover.—Mr. Waldo Brown, of the *Country Gentleman*—and extract from whose article on clover in that paper will be found below—is very much mistaken if he supposes that the voice of warning against the frequent sowing of clover emanates from the scientist alone. As I showed in this periodical in 1887, the too frequent repetition of this crop had begun to cause its failure in England nearly a hundred years ago; and when such men as the Claydens, the Jonases, and the Webbs, of the Eastern counties of England, all of whom live by farming, find that they dare not sow red clover more than once in twelve years, I think I am justified in warning people against Mr. Brown's rash recommendations.

"I am about as ardent as advocate of clover as friend Terry, although I have managed it somewhat differently. I am not disposed to argue with scientists when they lift up a voice of warning, proclaiming that by the continued use of clover we are simply accelerating the exhaustion of our soils. I simply look back over fifty years, and make a note of the fact that the farms of this locality on which clover has been grown with the greatest regularity, are to-day the farthest from exhaustion. Clover is such a great help in solving the problem of available plant-food, that I believe it to be a work of benevolence to help in the management of it."

Mr. Brown, elsewhere, speaks of sowing clover every other year, but the passage is not worth quoting. Shall we ever get to the bottom of the clover-mystery? All artificial manures fail to increase the crop, and yet farmyard dung, which contains enormous quantities of all the constituents of artificial manure, increases the yield greatly! Nitrogen, in nitrate of soda or in sulphate of ammonia, which acts so powerfully on the grasses, has no effect on clover. Lime, in the form of carbonate, as in chalk, or as a hydrate, as in slaked lime, affects clover in England to some degree, but in the form of sulphate—plaster—has no influence on it in that country, though on worn out land here, we all know how beneficial a dressing of it sometimes is.

Sheep-raising.—A really sensible article on sheep-raising will be found at page 174 of this number of the Journal. Barring that Mr. Adams advises sowing yellow Aberdeen turnips—the worst yielders in the world—and does not mention rape, I do not see much to amend in it, except the balance-sheet which I confess puzzles me. As far as I understand the figures, the interest on the outlay, the cost of keep of ewes and lambs + the depreciation of the former should be form the debit, and the price received for the lambs and wool the credit; as :

Dr.		Cr.	
To one acre of grass.	$ 5.00	By 7 lambs at $3.00..	$21.00
" one acre of maslin.	14.00	" wool	7.00
" interest	2.25		
" depreciation	3.00		
" balance	3 75		
	$28.00		$28.00

But why charge the ewes with $3.00 for depreciation? Surely a ewe is more valuable as a two-shear than as a shearling, at least for all practical purposes. However, this is a mere trifle compared with the body of the article with which I am entirely in accord, namely, that "a young man with pluck and energy could soon make money, and if of good business habits, with a good head, could in time become rich, by raising Down sheep on the hilly lands of both Quebec and Ontario;" but do not let him sow turnips, which do no good without horse- and hand-hoeing, when rape, which requires neither, will produce better sheep-feed.

Dairy-produce.—The butter from our dairies and factories is not popular in England, and, to tell the truth, I should be surprised of it were. I do not know whether I am peculiarly unlucky, but I do know that I cannot get any butter fit to eat. The dairy-butter is streaky and bitter, the factory-butter is flat, *fade*, *éventé*, and will not keep. Moreover, I am not alone in this my very harsh opinion: what says the Farmer's Advocate on the subject?

"There has been very little Canadian butter shipped to England this summer. English merchants say they can't sell it, it is not fresh, sweet, and the people won't have it. Perhaps our factory-men have not studied this question as carefully as they might have done, but it is now well known that the consumers in Britain want their food-supplies all as fresh as possible, clean and sweet in flavour; stale cheese and butter are not wanted, and when forced on the market it must be at a great sacrifice in price." It is the old story of all the eggs in the same basket: if we devote ourselves entirely to dairying to the neglect of all mixed farming, we shall soon find out that a few acres of grain would be a very desirable possession; if we devote all our dairy-knowledge to the production of cheese, we shall soon find out that a few tubs of butter of good quality would be an advantageous commodity.

On Saturday, September 15th, my daughter, who had just returned from Métis—where good butter was to be had, from one farm, at 20 cents a pound—enquired at a shop in St. Catherine's Street for some really first-rate butter, and was offered some of fair quality, for which the price asked was *Forty-five cents a pound!* I believe that any energetic young man, who would take up butter-dairying in earnest, would have no difficulty in securing plenty of West-end customers at 35 cents a pound all the year round, and by giving the skim-milk, with barley- or corn-meal to well-bred white pigs under 60 lbs., a fully satisfactory amount of profit from his cows would be insured.

Silage.—I observe that I am not alone in my desire to persuade farmers to weigh the silo question carefully before plunging into it too deeply. Professor Sanborn, of Columbia, whose reputation as a practical man is so widely extended, speaks very sensibly on the subject. "Unfortunately," says he, "I have been regarded as an opponent of the silo, when in truth my only effort has been to hold it to the hard facts, and confine its growth to its merits."

There is one thing I observed particularly in the addresses on ensilage read at the meeting of the Dairymen's Association at St. Hyacinthe last winter: hardly anybody seemed in the least degree to grasp the fact that fodder-corn is a *Fallow-crop*. M. Couture's corn is sown broadcast and harrowed in; M. Casavant drills his at 13 or 14 inches between the rows, and sows 2 bushels an acre; M. Brodeur 2 bushels at 18 inches, but his rows are 6 or 7 inches wide, leaving only a space of 12 inches for hoeing; M. Marsan, broadcasts his, 6 pecks to the acre: and M. Chartier is the only one who, making the drills wide enough to admit the double-mould-board plough as a coverer of the seed, keep the horse hoe at work until the corn attains the height of two or two and a-half feet high Almost every speaker seemed to think that if the corn was got in quickly and cheaply, and grew so thickly that weeds were kept under, all was done that was desirable, entirely forgetting that fodder-corn is a preparatory crop, the first crop of the rotation, and that if pulverisation, and aeration are of any use at all, it is during the growth of the preparatory, or fallow-crop, that they must be put in practice. What is the good of our long summer-fallow in Britain, and in the North-west of France, where the land lies without crop from the time the wheat is cut in August till wheat is sown again in the following October twelvemonth, or barley in the March after that, in which latter case 20 months elapse between harvest and seed time? It is not the long rest that benefits the land, but the constant stirring, ploughing, harrowing, rolling, grubbing, backwards and forwards, along and across, that a careful farmer gives, each in its season, by which various operations its parts are more minutely divided, the air gets access to every particle, it is rendered lighter, more open, and more permeable to the roots. The vegetable matter it contains decomposes more rapidly, so that wherever the roots of the sown plants penetrate, they find organic food provided for them, and an abundant supply of atmospheric oxygen to aid in preparing it. The production of ammonia and nitric acid, and the absorption of one or both from the air, take place to a greater extent the more finely the soil is pulverised, and the more frequently its different particles have been exposed to the air. All soils contain, too, an admixture of fragments of those minerals of which the granitic and trap rocks are composed - potash, lime, magnesia, &c.—which, by their decay, yield new supplies of inorganic food to the growing plants. The more frequently they are exposed to the air, the more rapidly do these fragments crumble away and de compose. Such is a fallow, and such are the effects that en sue from its proper execution, and, in a minor but still an important degree, such are the effects to be derived from the judicious management of a fallow crop; as thus:

Land to be ploughed 8 or 10 inches deep in the fall; cross-ploughed, or twice grubbed in spring, with harrowings and rollings (if required) to bring it into a fine tilth; drilled up with double-mouldboard plough, dunged, and the drills splits; drills rolled with light roller, and sown; drills pared down with horse-hoe, so that all the earth is stirred except the plant-bed of at the utmost two and a-half inches wide, which narrow part, in the case of the root-crop, is the work of the handhoe; the horsehoe kept going, shallow at first, but deepening every time, until the growth of the plant arrests its passage: this is the treatment the fallow-crop should receive, and, where faithfully carried out, both the then growing crop and all the subsequent ones of the rotation will bear witness to its efficacy.

Linseed Oil.—Some five years ago, an agent for the sale of the "new-process linseed cake" was good enough to take infinite pains to persuade me that oil was of no value as an article of food for cattle! He was one of that numerous class which it is useless to argue with, so I held my tongue, he said his say, and I bowed him out of my room. I had not so long used linseed with all its 33 % of oil without finding out its supe-

riority to cake with its 10 %, and I am glad to see from the subjoined extract that if I erred (which I didn't) I erred in good company. The truth is, that long practice in feeding is worth all the theoretical rations in the world, whether of America (*E. W. S.*) or of Germany (*Dr. Wolff*).

Feeding sheep in Winter.—The celebrated English experimenter, Sir J. B. Lawes, is a great advocate of old process linseed meal and cotton seed meal or cake for sheep, while many feeders in this country are rather afraid of using such strong food. Dr. Lawes attributes much of the freedom of his sheep from disease and their capacity to thrive even in the severest weather to the oil in the cake or meal. The linseed cake he feeds contains 12 per cent. of oil, which is a high percentage even for good old-process linseed meal. He further says: "I do not think feeders of stock as a rule appreciate as they ought to do the oil in linseed meal. They do not consider a difference of three or four per cent in the amount of oil as of much consequence, especially when the seller informs them that with less oil they get a larger amount of their important food ingredients." His experience is therefore strongly against the use of the new process linseed meal which contains much less oil than the oil process. *Ex.*

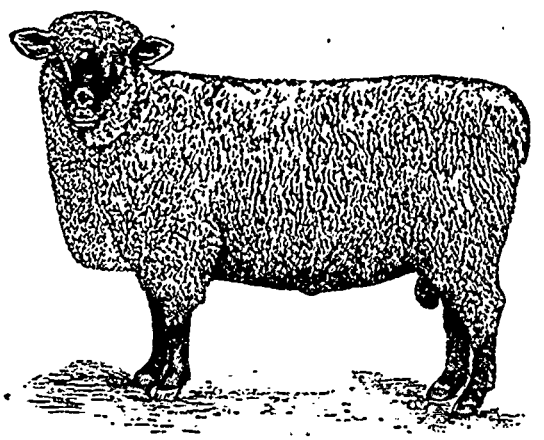
Deep vs. Shallow ploughing.—Another long article in the *Country Gentleman* on this subject, and the conclusion the writer arrives at is remarkable for its irrefutable logic. But if I, or any other Englishman, had hinted at such a thing, we should have been told that we knew nothing of the farming of the States, and if the yeomen of that country did only grow 12 or 13 bushels of wheat to the acre, they were better off than the English tenant-farmer with his average of 30 bushels.

The question of deep or shallow work is simple enough; so simple that I am almost ashamed of having to treat it so often. Bring up a lot of raw soil in the spring and sow corn or any cereal in it, and you will probably be punished for your folly. Plough an inch or two deeper than usual in the fall, and sow roots or potatoes, with manure, in the spring, and you will probably be rewarded for your judgment. You dig your garden 9 and 10 inches deep, and you plough your farmland 4 and 5 inches deep! Can you tell me why what is beneficial in one case is injurious in the other? Mr. J. W. J. replies that "in the spade husbandry of Britain, which has been practised for ages with good results, the land is spaded deeper than it can be ploughed, but great care is taken to keep the surface soil at the surface, and the subsoil under ground, where it belongs." Not so, please; it is only when land is trenched two or three spits deep, that pains are taken to keep the surface soil a top. In ordinary spading, or preferably forking, 9 or 10 inches deep, the soil is perfectly inverted.

At last, J. W. J. hits the right nail partially on the head by saying what he ought to have said at starting, that "deep turning of the soil is a positive damage to the land unless it is well manured." I should alter this into: "injudicious deep-ploughing is injurious to a grain-crop sown immediately on such work, but decidedly beneficial *to the land* for more reasons than one.

"That moderate crops of grain can be raised by stirring a few inches of the surface soil, is shown by the practice of the farmers in India and Egypt, where all the ploughing is done with a crotched stick of wood, with one of the prongs armed with a piece of iron to run in the ground. With this rude, unsightly implement which does not turn any furrow, they scratch the earth, cross-scratch it and re-scratch it many times until the top soil is mellow enough for a good seed bed. That this system of scratching is about as good as plowing is proved by the yield. The average yield of wheat in India is about 11⅔ bushels per acre, and the average yield in the United States is but 12.2 bushels."(1) J. W. J.–Sugar Run, Pa.

Grasses for cheese.—I am at last convinced that the quality of cheese depends more on the maker than on the pasture, though of course the latter governs the quantity of milk produced. I confess it has always been a puzzle to me how very close Canadian cheese ran the cheese of our own rich Vale of Severn in the English market; but I see now clearly that the Canadian maker, who works on understood principles in a well arranged factory, must necessarily produce a better article than the wives and daughters of our tenants who have not long abandoned the use of the hand as a thermometer! In the subjoined extract from the English Agricultural Gazette will be found an interesting investigation into the question of the effects of certain pasture-districts on the peculiar quality of the



YEARLING RAM "CYCLONE."

cheese therefrom produced; and I think the deduction is undeniable, that though the Cheddar-cheese differs from the Stilton as much as the beef of a Kyloe heifer differs from the beef of a Devon working ox, it cannot be the peculiar grasses of the soils that create the difference—ergo, it must be caused by the peculiar art of the maker. My readers, those of them at least who have been interested in the articles on permanent pasture which have appeared from time to time in this periodical, will observe how very large a proportion of the grass I recommend so strongly—PACEY'S perennial rye-grass—is found in both the Cheddar and the Stilton grazings. I regret to say that a parcel of this grass, together with one of the *trifolium pratense perenne*—perennial red-clover, the *true cow-grass*—was lost in transit. Still, I hope and believe that Mr. Wm. Evans will have plenty for sale next spring.

ARTHUR R. JENNER FUST.

Grasses in the Best Pastures.

The *Times*, after referring to Mr. Martin Sutton's grass experiments, which we recently described, says:—In the meantime, another very interesting series of grass experiments has been commenced, having been suggested by the correspondence which took place early last year in the *Times* on "the Cheddar cheese of the world." It will be recollected that it was affirmed by one correspondent and denied by another that there were in pastures certain herbs or grasses which gave a character to the cheese which could be obtained

(1) Ah! But the average yield of England is 29.2 bushels.

in no other district. It occurred to Dr. Fream that the botanical composition of good meadows of the different districts would form a most useful inquiry, and so he asked for samples of the turf of these to be sent him. In reply, he obtained twenty-five samples of the best grass land from seventeen counties, and these were planted in isolation in the botanical garden of the College of Agriculture, Downton. The growth of these plots was carefully watched during the summer, and the various grasses, clovers, and weeds noted every day or two. The plots were then carefully cut, and the produce weighed and carefully sorted. The whole results will be given in the forthcoming Journal of the Royal Agricultural Society, but in the meantime the facts relating to two good cheese pastures—a Cheddar pasture on the estate of the Marquis of Bath, near Frome, and a Stilton pasture from the farm of Mr. Thomas Nuttall—may be given (1) The following were the percentages of grasses, clovers, and weeds on the two pastures :—

	Stilton Pasture.	Cheddar Pasture
Grasses	58 per cent.	88 per cent.
Clovers	42 "	6 "
Weeds	0 "	6 "
	100 "	100 "

Of the weeds, the only one found in the Cheddar pasture was the buttercup, which was present in the large proportion of 6 per cent. Of the clovers the whole of that in the Cheddar pasture and 99 per cent. of that in the Stilton pasture was the common white Dutch clover (*Trifolium repens*), 1 per cent. in the Stilton pasture being *Trifolium pratense*. So far as the grasses that compose these pastures are concerned, the following shows the varieties present and their proportion:

	Stilton Pasture.	Cheddar Pasture.
Rye-grass	67 per cent.	86 per cent.
Cocksfoot	26 "	— "
Bent grass	6 "	1 "
Timothy, Dogstail	1 "	10 "
Yorkshire Fog	— "	3 "
Total	100 "	100 "

Here we have no indication of any special composition of the Cheddar or Stilton pasture. Both are good, the Cheddar pasture having the finer grasses and the Stilton pasture the larger quantity of clovers. But there is absolutely no weed and no special grass in either which would be likly to affect either the flavour or the quality of the cheese made in the two districts.

But by far the most interesting feature of these experiments is the side light which they throw on what is known as the rye-grass controversy. Over the whole of the twenty-five plots the average shows that at least 65 per cent. of the grasses is rye-grass. These pastures, it must not be forgotten, were selected by as many farmers in different parts of the country as examples of the best bits of grass land they could find. If, therefore, the best grass land of the country contain this proportion of rye-grass, the question as to the value of this grasss may be taken as settled. But as most of these lands have been more grazed than mown, the analysis also clearly proves the perennial character of this grass, this also having been denied. It is sincerely to be hoped that this investigation will be repeated another year, as it throws a most valued light on what are our best grasses. The indications are that these are in very few numbers, only sixteen varieties having been found on all the twenty-five plots, and that of these rye-grass is the first.

(1) I do not think Lord Bath's land can be called a "Cheddar" pasture. I should rather call it a North Wiltshire pasture.
A. R. J. F.

OUR ENGRAVINGS.

West Highland Cow.—Kyloe. See p. 168
Hampshire Down sheep.—See p 165. 169
Devon Cow, Moss Rose.—See. p 173.

Braewold Flock of Hampshire-downs

SEASON OF 1888.

I offer Ram Lambs fit for service and now ready for shipment.

They were sired by "Cyclone," imported by me last year, and bred by F. R. Moore, Littlecot, England.(1) He was half-brother to "Merry Hampton," the most noted Hampshire of 1887. The lambs are out of ewes imported by me in 1882 and 1884, or from ewes bred by me from those. They have very black faces and legs, and are of excellent quality. They were dropped in March, have had no grain since they were put to pasture with the ewes, until the past month. They now weigh something over 100 pounds each. Price, $25 in crates on the car.

Hampshires surpass all other breeds for raising market lambs and for "grading up" common flocks. Mr. J. S. Woodward, Secretary of the New York State Agricultural Society, last spring published the following.—"We have again this year raised lambs from South-down, Shropshire, and Hampshire males, crossed on the Michigan Merino ewes, and we are more than ever pleased with the Hampshire as a sire. His lambs are stronger when dropped, grow more rapidly, and get to a shipping size quicker, and, besides this, their faces and legs are more deeply colored, of a more uniform color than those from the South-downs, and doubly more so than those from the Shropshires. Besides this, for growing lambs up for feeding when coming one year old, these grades show greater superiority, as they will weigh nearly 20 per cent. more at one year than either of the crosses."

Mr. Woodward, at his farm near Lockport, is the largest early market lamb raiser in this State.

Mount Kisco is thirty-five miles from New York City, on the Harlem R. R. Those desirous of seeing my sheep can do so at any time.

JAMES WOOD.

Mount Kisco, N. Y., September 1, 1888.
All right. A. R. J. F.

Devon cow Moss-Rose.

There is no doubt that while no attempt is made to "boom" the Devons, they are steadily gaining in public favor wherever they are known. Handsome, hardy, the best of working oxen, excellent beef cattle, rich though not very deep milkers, maturing early and fattening readily, their intrinsic merits deserve a front place in popular regard. Not so large as the Short-horn or Holstein, the Devon is more active, hardier and a much better forager than either, while its beef in the London market fetches a higher price than that of the former, and its milk is richer, though less abundant, than that of the latter. What form of a beef beast can be produced better than that of the Devon cow Moss Rose, page 173, re-engraved from the London Live Stock Journal? Yes, the Devons are pretty sure to make friends wherever they are known.
R. N. Y.

(1) *Cote* was the small hut in which the sheep used to be kept at night, some 300 years ago, in order that by sweating their wool might be kept fine. Hence, the *Cotswold* Hills, in Gloustershire.
A. R. J. F.

We copy this week (re-engraved, in reduced size) from the North British Agriculturist, the portrait of what our contemporary calls—

"The famous West Highland cow Proisag Dhubh (783), the property of Mr. J. Stewart, Bochastle, Callander, a very successful breeder and exhibitor of this noble breed. She is altogether a very fine specimen, and is known by reputation, at least for several years, as a prominent exhibit and prize-taker at our national shows. In addition to local honors, she has won the following prizes at Highland Society Shows:—third at Stirling in 1881, first in Glasgow in 1882; second at the Centenary Show in 1884; and first at Aberdeen in 1885. She has proved herself no less successful in a breeding capacity than in the showyard, and has left a number of valuable stock in the Bochastle herd." The West Highlanders, or Kyloes, are the hardiest of all cattle, and make the best beef in the world Some of my readers may remember a cross bred heifer—by Royal Commander out of a Kyloe cow—exhibited by Mr. Cochrane at Montreal some six or seven years ago. The thickness of meat on her loin and first three ribs was something astonishing. A. R. J. F.

The Fungi and Insects that affect Dairy-products.

LECTURE BY M. L'ABBÉ PROVANCHER.

Mr President and Gentlemen,

I am sorry that I have been chosen to begin this series of lectures; I fear greatly that the audience will soon be tired of hearing about insects so little known that their very existence is unsuspected, so difficult to be seen that convex glasses must be used to detect them, and with names so strange, and sometimes so whimsical, that one almost despairs of remembering them. But, as, at a dinner-party, the taste of an ill concocted soup is often dispelled by the flavour of the *entrées*, so in this case I fully believe that those speakers who succeed me will blot out the memory of my *début*.

This age, as you all know, is the age of *microbes*.

Five years ago, the name of this enemy of ours was unknown; and to-day it is said to be the cause of almost all the evils under which we suffer. Small-pox, diphtheria, whooping-cough, fevers of all sorts, inflammation, fermentation, putrefaction, and almost all the kinds of corruption which destroy our provisions, are the work of microbes. It is worth our while, then, to understand them, at least to be well informed as to their development, their propagation, their reproduction: for, as you well know, the first step to be taken in any war, is to thoroughly understand the enemy with whom one has to contend.

As our association devotes its attention more especially to the products of the dairy. I will talk to you of the particular microbes that infest those products. Up to the present time, I am told, the injury caused to the matters in question has not been very great, since, generally speaking, the disposal of them has been so rapid, that one has not to reckon with a long detention in storage. To this add, that the temperature of our winter enables us to escape for nearly seven months from the attacks of a great number of these enemies. Still, it may happen that these causes all of a sudden change about, and when we have to face an enemy, it is always wise to take as many precautions as possible against his attacks, however little to be feared we may suppose them to be.

And, to begin with, when we speak of microbes we do not necessarily mean to speak of insects. The word microbe comes from two Greek words, *micros*, which means little, and *bios*, life. They are living beings, in size infinitesimally small. But, as there are two lives, the vegetable life and the animal life, to which of these two does the microbe belong? To both, I might reply, and, very probably, more to the first than to the second.

The microscope has revealed to us mysteries of whose existence, before its invention, we had no conception; and it has not yet said its last word on the crowd of problems which await solution.

Thus, convex glasses have enabled us to show that the cell is the essential element of all life, animal as well as vegetable. The tissues of our body, as well as the tissues of plants, are made up of nothing but cells. Their growth, and development are caused solely by the production, the addition, and the multiplication of already existing cells.

What, now, is a cell? It is a tiny, an infinitesimally small sac, of the simplest form, without articulations, appendices, or partitions, filled with a liquid to its utmost capacity. It is these tiny sacs that, united in one mass by thousands and by millions, form the flesh of our members, the hair, the horns, the bones of animals; as well as the trunk, the bark, the roots of the hardest trees, the spongy substance of the fungi, and the animalcules, invisible to the naked eye, but which the microscope shows us in almost every liquid, whether it be lying on the ground or inclosed in living bodies.

But, you will ask, if these little sacs are closed on all sides, how can the liquid they contain pass from one to the other, and thus sustain the vital motion? By virtue of a well-known physical law, *endosmosis*, which means that as often as two liquids are separated by a permeable partition they have a tendency to place themselves on the same level, by exchanging their particles, according to the relation of their densities. The food taken into the stomach clearly furnishes the blood, the chyle, and the other liquids necessary to the support of our bodies, without their having any other conduits for their passage than capillary attraction, or endosmosis, to transport them to vessels which belong to them as of right; and so it is in the case of the communication of one cell with another.

If we submit to the microscope cells mixed with a suitable fluid, we see them, under a proper temperature, rapidly undergo certain movements; they swell, elongate themselves, displaying often the partition that divides them; they produce buds, by means of which they multiply; the partitions separate to form complete cells, which, in their turn form partitions for themselves; the buds break off to produce fresh buds in their turn, and so on continually, the bulk always increasing.

On the object-plate of the microscope we see the cells produced, sometimes globular, oval or elliptic, sometimes prolonged into filaments, sometimes armed with little hairs like the infusorial animalcules: where shall we draw the line of division between animals and vegetables? The truth is, that the problem is as yet unsolved in a multitude of cases.

But we must not suppose that all the microbes are necessarily injurious. The Divine wisdom, which gave the world to the use of man, permits him, in numerous cases, to utilise the work of his enemies to his own advantage and profit. Thus, the microbe which causes the decomposition of butter and cheese, will serve to cause the acetic fermentation of vinegar, the alcoholic fermentation of wine or beer, and, still more advantageously, the butyric fermentation of milk, &c.

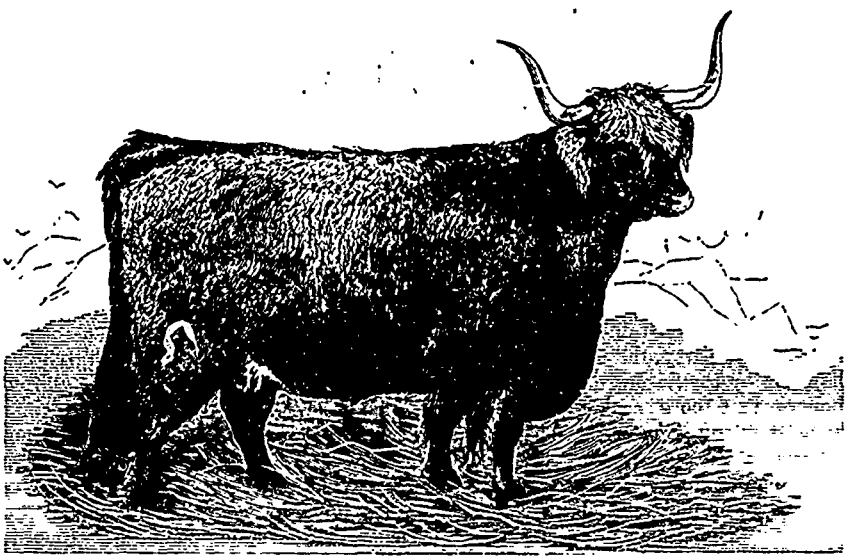
These premises being established, let us proceed to consider more particularly those enemies which attack our dairy-products, and which, if left to themselves, would in a short time have power to destroy those products. These enemies are of two classes, animal and vegetable, the former being, generally, the more to be dreaded.

Of all the hurtful vegetable microbes, the *mildew* is the worst, not only as regards its attacks upon our cheese, but because it infests all our food, our bread, and meat, our fruit, &c.

The mildew-fungus which attacks butter and cheese is known as the *Pencillium crustaceum*. Let us study its origin and the manner of its evolution.

The English call this fungus the *mould*, the French call it, simply, *moisissure*. But the scientific name is also important for us to know, for it is by that name that you will find it described when you seek for information on the subject in the books of those writers who have devoted themselves to the study of these creatures.

The mould is always found on the surface, showing itself in small bluish-green spots on such animal or vegetable matters as offer the conditions proper for its development, viz., heat and moisture. These spots, examined under a microscope, or even a strong magnifying glass, display an assemblage of white filaments, extremely loose, bearing at the ends *spores*, or little heads, resembling grains of a bluish-green dust. If these spores are spread on any substance of the same chemical composition as that whence they sprang, they will go on reproducing themselves generation after generation. But, drop them on distilled water and they swell immediately, burst, and let fall a vast number of little bodies, called *zoospores*. These set to work at once; they elongate themselves, and separate themselves by partitions, these divisions become mothers in their turn, and so it goes on, until in a few hours their continued multiplication has resulted in the production of an indefinite number of them.



WEST HIGHLAND COW.

Hallier, who especially studied the microscopic fungi, states that every night a considerable number of these fungi may be found in the mouth and throat of the organs of digestion under the form of divided filaments like little chains.

But, if, instead of throwing the mildew-spores on distilled water, we place them on a liquid rich in nitrogen, like the white of egg, gluten, &c., they soon swell up, drop their zoospores, each of which produces a bud which detaches itself to become a mother and reproduce others, and so on in a process of multiplication without end.

To this form of spore, the name *micrococcus* is given; it is to the budding of this fungus that the putrid or putrefactive fermentation owes its origin.

If the cells of the micrococci are spread on a substance poor in nitrogen, they then multiply by another sort of budding, producing the alcoholic fermentation, and take the name of *cryptococcus*.

If the spores of the pencillium are dropped into milk that has been boiled, to destroy any foreign germs it may contain, the same effect will be produced as if we had dropped zoospores or micrococci on a substance rich in nitrogen, and in less than two days the milk will sour and become curdled. When a small quantity of lactic acid has thus been formed, the fungus has assumed a new condition: the cells of the micrococcus swell up, as if to change into the cryptococcus, (1) but with an entirely different result, for they elongate themselves into quadrilateral cells, frequently with square ends, and, having a peculiar lustre, and multiplying by subdivision of little chains, they thus form the *arthrococcus*, or divided cells, as we see them in the lactic acid of sour milk (2)

If we now mix the spores of the pencillium with wine or beer which has undergone a thorough fermentation, by which all the sugar has been converted into alcohol, we have another sort of ferment, the form suitable to the production of vinegar.

Whence it follows, that the *pencillium crustaceum* is capable of furnishing 6 forms of cells differing from each other in accordance with the substances to which their spores are applied, and each form producing a constant effect, always the same, on the medium in which it finds itself. So great is the rapidity of reproduction, that in less than 24 hours, one single cell can produce 400,000,000 micrococci.

After what has been said, it is clear that the seed of the pencillium can develop itself under six different shapes, that is:

1. By the multiplication of its own cells.
2. The cells produce zoospores or micrococci.
3. The micrococci, in matters rich in nitrogen, multiply themselves, by budding, and produce the putrid fermentation.
4. The micrococcus, in matters poor in nitrogen but containing sugar, multiplies itself by budding, and produces the alcoholic fermentation.
5. The micrococcus produces partitioned filaments, which multiply by division, and produce the lactic fermentation.
6. The micrococcus applied to liquids the sugar of which has already been converted into alcohol, develops itself into little chains, and produces the acetic fermentation or vinegar. (3)

At the same time we must observe that certain *savans* assert that these different fermentations are caused by different microbes, the seed of which are floating about in the air, and have nothing to do with the *pencillium crustaceum*. Fresh investigations are required to settle this point.

I shall, doubtless, be asked: but whence does the seed of the pencillium which produces the micrococcus come; is it brought forth by the simple alteration of the matters that contain it?

To this I answer, that the time has long since expired when people believed in spontaneous generations; (4) such as, bees being produced by the putrefaction of bullock's entrails, &c. *Omne vivum ex ovo*, every living comes from an egg or seed, says Linnæus, and all *savans* agree with him nowadays.

(1) *Crypt*=hidden. Trans.
(2) *Arthron*, in Greek, is the socket or joint of a limb. *Trans.*
(3) *Coccus*, in Greek, is a small berry. Trans.
(4) v. Vergil, G. IV, v. 230. Trans.

If among the infinitely small, such as the microscopic fungi, the seeds generally escape a superficial investigation, they exist all the same, since, under the microscope, we see them develop and reproduce themselves before our eyes. Their extreme tenuity allows them to be carried in suspension through the air, and thence to penetrate into the bodies of animals, as well as into all liquids freely exposed to the air.

As we saw just now, the same cell is capable of developing itself into different forms, according to the matters to which it is applied. Now, it seems that the liquids of our bodies contain an innumerable quantity of these cells which, far from being hurtful to us, are indispensable to our health, but become the cause of disease if, by alteration, they are led to develop themselves into a different form. Such is the case with blood, milk, &c., the simple exposure of which to the air for a few minutes is sufficient to bring about the development of the micrococcus, which quickly transforms the whole mass. Do the seeds of these ferments come from the air, or are they contained in the liquid itself? Learned men are not yet agreed on this point; but it is certain that the assumption by the cells of new forms is never carried on except under the influence of free air.

That certain vessels of our body contain such seeds, we know from a very striking example—rennet, the interior skin of the calf's stomach which contains the spores of the lactic or butyric fermentation, and causes the curdling of the milk in so short a time.

These spores are very tenacious of life, dried, frozen, heated provided the temperature of 212° F. is not exceeded, they do not seem to suffer at all, and they retain the reproductive power for a great length of time: up to three years and even more.

From what has been stated, it follows that if you wish to preserve your butter and cheese without alteration, you must not expose it freely to the air, from which it might imbibe the Penicillium, the seed of the mildew, and thereby furnish to this seed a medium suitable to its development.

It is useless to add that the dessication or the proper salting of articles of food would protect them from the action of the seeds of the microscopic fungi, and frequently from the insects that infest them; for, in addition to their vegetable enemies, there are also animal ones, against whose attacks the products of the dairy must be guarded.

The insects that are known to prey upon butter and cheese are the *acari* or mites, and the *larvæ* of flies. (1)

I class butter and cheese together, though insects seldom attack butter because the brine protects it from their assaults; and when there has not been enough salt used, the microscopic fungi will be beforehand with the insects in invading the butter.

(1) *Larva*=a mask, or fause-face as the Scotch call it. Trans.

RAM AND EWE OF THE BRAEWOLD FLOCK.

It is often remarked that all insects undergo certain metamorphoses, that, before entering into their perfect state, they must remain for a longer or a shorter term in the state of worms or larvæ. However, a great number of insects go through no such changes; they leave the egg in their most perfect form, that in which they pass their whole life, except as regards the growth in bulk which age naturally produces. Nearly allied to the insects are the Arachnidæ, to which belong the *acari*; such as lice, mites, moths, flesh-worms, &c, the kinds of which differ very much according to the species of animal or food they infest, and which are in general very numerous when they are met with at all. Horses, cows, sheep, dogs, hens, furnish examples of this. These parasites are generally called lice or mites. The name mite is particularly applied to those that devour our articles of food, such as sugar, flour, cheese, &c.; but the true name of these is: *acarus*. The scientific name of insects is more important than may be believed; for it is by means of this name that you will succeed in gaining information from writers on the subject of those enemies—of whom you complain. And without the name, what guide have you in your researches? How can you even understand those *savans* who have especially devoted themselves to the study of these little beings. The common every day names often serve to recognize the insects in the books, but they often contribute not a little, owing to the variation of their local names, to divert us from the true path of investigation, and make us follow a wrong road. Thus, if you look for the word *Acarus* in the *Dictionnaire des Sciences* of Deschanelle and Foullon, you will find full information about the animalcules. Bescherelle's dictionary, too, will tell you something about them.

The acari, mites, flesh-worms (*cirons*) or moths, as they are called, are always very small; hardly visible to the naked eye. Nearly colourless as they are, and having no crustaceous skin, they are not distinguishable from the substances they frequent, such as cheese, flour, bread, &c. They differ from the true insects in having 8 feet instead of 6; and, in consequence, Latreille has placed them with the spiders under head of Arachnidæ. They are nearly related to the *Trombidia*, the small bright-red velvety spider, which we find so often on the ground in spring.

The cheese-mite has received from Degeer the name of *acarus domesticus*. This mite is distinguished from its neighbours by a pair of feelers, shaped like pincers. Some authors assert that this is the same mite that causes the painful skin-disease which we call the itch; but it is understood now that the latter is very different, both in its form and in its mode of life; its name, too, is different: *sarcoptis* (*sarx* in Greek = flesh. Trans.)

The cheese-mite is usually found on old and dried articles of food, as, bread, dried or smoked meat, preserves, &c.

Stuffed birds and insects preserved in cases are often full of them.

Like all other insects, the female lays a great number of eggs, and however little favourable circumstances may be to their development, the progeny may be counted by thousands and millions.

How to ward off their attacks? The best way is to allow no remains of food, such as bread, meat, cheese, fish, &c., to be kept in the cupboard until they decay. Which answers to the rule—so wise, so boasted of, and so often repeated, but not always observed—of perfect cleanliness in the kitchen and larder.

But the true insects, also, attack dairy-products, particularly cheese. Especially the flies. Flies undergo a complete metamorphosis. Three species are known to feed on cheese: the house-fly, *musca domestica*, Lin; *musca putris*, Fabr; and *musca Cæsar*, Lin.

It is only the first of these, the house-fly, that we need fear. The fly, *Cæsar*, has been met with in America, but too rarely to be reputed injurious. As to the *m. putris*, I do not think its presence has ever been observed in this country.

It would be a very desirable thing were our knowledge of these insects, their habits, and the means of contending with them, more generally taught; for, in agriculture especially, we have to reckon with them daily The *cecidomyia* often destroys more than half our wheat-crop, eating the grain in the ear; the *agrostidæ* cut off the young plants of wheat, oats, tobacco, melons, &c.; the weevils, *bruschæ*, devour the pease in the pod; the *pieris napi* ruins the cabbages; the *halticæ* feed on the turnips and radishes; the *saperdes* gnaw the trunk of the apple-trees, while the *pyrales* eat into the heart of our apples. In a word, there is not one of our crops that does not serve as a feeding-ground to some insect, and which does not suffer, more or less, from its ravages. If we examine the interior of our houses, we still find a band of plunderers: lice in the heads of our children, bugs in our beds, flies everywhere, clothes-moths in our wardrobes; mites in our furs and woolens, black-beetles and cockroaches in our kitchens, gnawing and befouling every thing they touch, &c., &c., &c. Again; what a tribute does the insect race levy on us! I should surprise you, perhaps, were I to say that their ravages must be valued at hundreds of thousands of dollars! Well, I dare state that they amount to millions. If you wish to be convinced of this, take only one article and compute the loss. Take onions, for instance. There are 120,000 farmers in the province. It is certainly putting it below the truth to say that each farm has lost at least two bushels of this bulb by the onion-worm, since, in many places, the cultivation of this crop has been entirely abandoned. At 50 cents a bushel, this shows an annual loss of $120,000 on a single article.

Now, if we knew more about the habits, and the manners of these insects, we should have the means, not of exterminating them, but, of at least considerably diminishing the damage they do. I will only cite one instance.

The annual production of Canada (1) is estimated at $200-000,000. At least 20 % of this is destroyed by insects: a loss of $10,000,000 by their ravages.

In every war, it is not always the surest road to victory to attack the enemy in full face. It often happens that the enemy withdraws himself from our encounter, and manœuvres so as to render of no effect the batteries which we have drawn up against him: *ruses de guerre* must be employed if we wish to conquer him. Now, in the insect we have a powerful enemy, it is in his millions that he invades our crops; a numerous enemy, his name is legion; an enemy often unseizable, on account of his manner of life and his tiny size. With such a foe, then, we must employ craft, cunning, and artifices, and that these means may succeed, we must before everything thoroughly understand the manner of life of our adversary, the food which he likes, the retreats in which he lies hid &c. In this respect, we must acknowledge that information is almost entirely wanting to us. Our agricultural schools are still silent on this important matter. Visit them, and look for their collections of useful and injurious insects: there is no such thing to be found! I have already declared what I do not fear to repeat here: on this point the schools have not done their duty. What is the good of showing splendid grain crops in the green-state, if we do not know how to insure their safety from insects that will destroy half of them or more before they ripen.

Do you wish for a very striking instance of what science can do in the war against the insect race? The following happened in Ontario. In 1883, that province produced clover-seed to the value of $648 000. But, lo, a little fly, the Cecidomyia of Luitner, attacked this crop, laying its eggs in the heads of the clover the very moment they began to form. The little worm, when hatched, began at once to gnaw the seed, and at harvest, all that the farmers found was dry, empty heads, so that at the expiration of the second year they were obliged to send abroad for clover-seed. How could such a foe be resisted? Observation showed that, about the middle of June, the worms left the heads to bury themselves in the ground, there to undergo their metamorphosis, and re-appeared, towards the middle of July, just in time to lay their eggs in the second cut of clover, and thus to cause the loss of the second crop of seed, which is always the more profitable of the two Farmers then tried mowing the first crop earlier, but the bottoms of the carts were all yellow with the larvæ and cocoons which fell from the heads on to the ground, producing a new legion of enemies ready to attack the second crop. Some one then suggested that it would be better to feed off the first crop, and this plan met with perfect success. The stock while eating the young head, at the time of their flowering caused at the same time the disappearance of the eggs and larvæ which infested them. How could such a plan have been adopted, if the behaviour of this little fly had not been previously known. (1)

But to return to the house-fly, which lays its eggs on cheese when it finds any within its reach. When the egg is hatched, the little worm dives into the mass on which it feeds, and as each fly lays more than a hundred eggs, the whole of the cheese soon finds itself all riddled by these worms. They are yellowish, these worms, without feet, but they enjoy the power of jumping, approaching their extremities in a fashion as to curve their bodies which then act as a spring. I once saw a cheese placed on the table when the soup was being eaten. The cheese was so full of maggots, that we observed quantities of them on the side of the plate in which it lay, and so great was their agility, that some of them jumped into our soup-plates. Several authors declare that these insects affords a very rich and appetising food, but none of our friends at table would consent to make a trial of them, and all agreed in begging that the damaged cheese might be removed.

The worm or larva when arrived at maturity, that is, after three or four sloughings of the skin (*mues*), leaves its retreat, buries itself in the ground or in some chink, and there spins its cocoon, enclosing a sort of egg with a rather tenacious shell, in which egg it becomes changed into a perfect in-

(1) In what?

(1) In the Eastern counties of England, the first crop of red- and of white-clover has always been treated in this way for, to my knowledge, the last fifty years. A. R. J. F.

sect, and leaves its abode by raising one of extremities of its prison which it breaks through without much effort.

The fly then takes its flight through the air, in search of the other sex, and after fecundation, deposits its eggs in the place where the larvæ which will be hatched from them can find suitable food within their reach. And so the process continues.

It is generally thought that the little flies one sees in summer so often are the offspring of the larger kind, which the former equal in size when they have attained their complete development. This is a mistake, for flies, like every other insect that undergoes a complete metamorphosis, when hatched have attained their full size, and grow no more. The larvæ—be they worms or caterpillars—of all these insects increase in size; nevertheless, this increase does not come to them insensibly, as with other animals, but suddenly, by fits and starts. The larva, under the form of worm or caterpillar, eats voraciously and, consequently, the bulk of its body increases rapidly. But viewed from without, its volume appears to be the same, for the tough skin that covers it does not easily dilate. Suddenly, the skin splits open, and displays the new larva much larger than it was before, and it continues to eat and grow until it sloughs off its skin once more. The larvæ generally go through three or four sloughings, increasing in volume at each change of skin. When arrived at the last period, they pass into the *nympha* state, either spinning themselves a cocoon or enclosing themselves in a sort of egg or *chrysalis*, whence, after a shorter or longer time, they emerge in a perfect state, with their wings and all complete.

Insects in general are only destructive when in the larva-state. And so it is with several of the Bombyx species, which when fully grown do not eat at all: some of them have not even a mouth to eat with. Their perfect state seems to be intended to insure the reproduction of the species by favouring the coition of the sexes.

Still, with insects which undergo the complete metamorphoses, like the *hemipteræ* or bugs, the orthopteræ, grasshoppers, crickets, &c., it is very different. These insects begin their ravages the moment they are hatched, and continue them until they die.

It would be an easy task to teach the students of our agricultural schools to distinguish insects according to their orders, and afterwards to know what they have to fear from their larvæ.

If time would allow, I would show you, even here, how every intelligent person who desires to understand what he sees, may know, at first sight, what he has to fear from any insect he meets with, and consequently, what means he should adopt to contend with it successfully.

Since the meetings you hold every year aim particularly at the regeneration of agriculture by means of the dairy-industry, I will here submit my views on certain points which are paralysing the progress which we all have in view. My ideas are far from infallible, and are all open to discussion; but they, it will be allowed, proceed from a somewhat practical man, who has observed and studied much, and who, besides, is doing his best for the prosperity of our common country in seeking to regenerate its agriculture, ruined by an exploded, and blameable routine.

And, to start with, I must tell you that I am opposed to the Council of Agriculture, to the commissioners of Agriculture, and to the inspectors of standing crops, because I perceive too much political jobbery in all this; jobbery which seems to have no other end but the advantage of those to whom good luck has given a position in these dramas.

The Council of Agriculture seems to me to be a fifth wheel added to coach, and which far from increasing the rapidity of its movement, greatly interferes with its action. The government has an excellent means of getting information on agriculture through special committees of the house. I should, therefore, prefer to the council a commissioner thoroughly up to his work, with sufficient clerks to do the work properly. This would do much more good than the council.

I may say the same about the commissions of agriculture which are another form of jobbery, in which the favouritism of political parties peeps through to the neglect of men who possess real capacity as agricultural advisers.

The same may be said of the inspection of standing crops, a costly business, whence no benefit has ever been derived except to those who won the prizes, generally men whose wealth enables them to do better than those who do not possess the same resources.

In 1854, being then curé of St. Joachim, in the county of Beaupré, I was invited to organise an agricultural association as there was nothing of the sort there. I drew up the programme in such a way that the prizes fell to the greatest produce per arpent. The first year, the prizes were awarded as follows: Harvested from an arpent: wheat, 19 bushels; oats, 45; pease, 18; hay, 377 bundles, &c. On all sides was heard the cry: "Wait a little! See if I won't beat that next year. I'll take an arpent for wheat, one for pease, and another for oats, and give them special preparation." So the second year, the winning arpents were: 1st, wheat, 34 bushels; 2nd, 23; oats, 65; pease, 23; hay, 400 bundles, &c. (1) Was not this real progress and within the grasp of all, since only an arpent of each crop was taken? And the piece that produced 34 bushels the arpent, would it not remember the treatment it received for 5 or 6 years? If each farmer would undertake the improvement of only 3 or 4 arpents of his land yearly, would not that be a real and promising sign of progress?

As for the agricultural schools, I do not wish to hurt any body's feelings here, but permit me to say, I do not think they have done their duty.

Some years ago, I advised the Department to present to each subscriber to the *Journal d'agriculture*, which, being said in passing, is admirably conducted and very useful, a plan of each farm-schools, explaining thoroughly the situation, the nature of the soil, and so on, of each field; and to relate every succeeding month the work done on it, the *brairding* of the seed, the harvesting of the crop, any accidents that may occur, &c. In this way, every subscriber would be able to follow, at home, the operations conducted on a model-farm, and to assure himself of their successful issue. But it was not thought advisable to do this. Fear of making public a compromising want of success was probably the cause.

Why is not botany taught in these schools, as well as the *grafting and pruning of trees, and a knowledge of destructive* and useful insects? These are points which are not to be neglected in agriculture, especially when the object aimed at is to form model-farmers.

An experimental farm has just been established at Ottawa, but in this, as in many other things, the French-Canadians seem to have been forgotten.

You will kindly observe, gentlemen, that I have only glanced at the above ideas, without allowing myself time to develop them properly. I am well aware that they will not meet with the assent of all my hearers, but no one, I think will doubt the purity of my desire to accelerate to the progress and develop the resources of our fine and wealthy country, a land of which we have every right to be proud, and which cannot increase and prosper save through the improvement of its agriculture.

(*From the French.*)

(1) This proves nothing, as the difference of seasons might account for the difference of yield. A. R. J. F.

September 5th 1888.

ARTHUR R. JENNER FUST, ESQ.,

Sir,—A few months ago you wrote us respecting the price &c. of superphosphate of lime. The value of the article is unchanged, but the more immediate object of this letter is to apprise you that the "Lake Nepigon" has sailed from this port with about 170 tons of superphosphate for Montreal.

When you or your friends require any we shall be glad to hear from you. We are, Sir, your obed. servts,

SAMUEL DOWNES & Co.
Per H. J. Langar.

ENSILAGE.

It rarely happens that two seasons so entirely opposite in their character as those of 1887 and 1888 follow each other in succession. In June and July 1887 we registered at Rothamsted 1½ inches of rain. In the same two months of the present year we registered 8¾ inches. Last June rain fell in more or less quantity on 29 days, leaving only two days without rain. The mean temperature of the two months in 1887 was 64 F. This year it was only 57 F. Last year our silos was almost empty, this year they are loaded to their full capacity. Practical farmers have never looked with very favourable eyes at the system of ensilage—in fact they have looked upon it more as a kind of plaything, suitable for landowners, who have had farms thrown upon their hands. It is said that the last disastrous haymaking season has caused many practical farmers to direct their attention to ensilage who have never done so before. The present time therefore affords a good opportunity for me to draw some general conclusions from the results of our experiments.

We began to carry out experiments on silage in 1884, and they have been continued up to the present time. A good many of the experiments have been published, while others have not yet been written up. The crops which have been used have been pasture grass, clover, oats, and a mixture of beans, peas, oats, and tares as a special silage crop. The crops were all weighed, both in and out of the silo, and they were chaffed, one of our great objects being to ascertain what was the loss of food material during fermentation. The silos were constructed of brick and cement and were water tight. The feeding experiments were carried out either with dairy cows or fattening oxen. I have upon my farm about fifty dairy cows for the production of milk which is sold in London, and above one hundred head of cattle of various ages. The questions, whether silage was a good food, and also an economical food, and whether it could take the place of hay and roots, were therefore questions of considerable interest and importance. All our evidence points to a very considerably larger loss of food in the silo, than there is during hay-making, and the loss appears to be larger in grass silage than in clover. In one set of experiments where green oats were made into silage and were fed by oxen against the ripe crop cut into chaff, straw, and corn together, the silage proved so inferior to the ripe crop that we were led to think that much of the starch of the grain, which when put into the silo was quite soft, was destroyed during the process of fermentation.

As silage contains a great deal more water than hay it is necessary to calculate the two substances as equally dry, before we can compare their feeding properties. Both clover and meadow-grass silage are equally good foods as clover and meadow hay. As however there is a larger loss of food in the silo than in the hay stack, less stock can be kept from an acre of land when the product is made into silage, than when it is made into hay. This is, however, assuming that the hay is not injured by the weather. It has been said that by the use of silage crops, we can dispense with the costly root crops. Grain crops appear to me to be quite unfit for silage. A mixture of peas, beans, oats and tares, make a very suitable crop for silage as the oats and beans keep up the other two plants. If this crop is thick enough, the land from which it is removed will be quite free from weeds; this cleanliness is somewhat deceptive and is totally different from the cleanliness of a root crop In the silage crop the weeds could not grow for want of light, but they still remain, while in the preparation for, and after culture of the root crops, every effort is made to germinate and destroy the weeds. The root crop is said to be a costly crop, and if we compare the cost with the value of the food it yields, it is so, but should not the corn crops bear a larger share of the cost than is generally assigned to them? At all events I have not seen my way to substitute silage for root crops, nor can I say that where seasons are favourable for hay-making I see my way to converting grass crops into silage. If, however, silage is only to be made in those seasons when good hay cannot be made, it will be argued that a silo is not required, and it will be better to adopt the stack system. That there is much greater loss of material in the stack than in a well made silo cannot be denied. Still in those cases where silage is only used when good hay cannot be made, and when the plant may be idle for possibly two or three years in succession, the less capital expended in the plant, the better it will be for the farmer. A good silo is I think indispensable where farm crops are regularly grown for silage purposes, but under other circumstances the cheapest method by which the necessary pressure can be obtained is perhaps the best.

It may probably be considered that I have not selected a good time to make my remarks upon silage? Now I quite admit the value of silage during the recent wet summer, but the system of farming in any locality ought not to be altered because one season is very wet, and another season very hot and dry. The average climate of the locality ought to regulate our course of cropping.

With a rainfall which averages about 28 inches per annum and a dry atmosphere, I have come to the conclusion that upon my farm, which is about one half permanent pasture and one half arable, ensilage cannot be adopted successfully as part of the regular farm crops, but it is of great value during wet seasons when good hay cannot be made.

If I lived in other parts of the British Isles, where the atmosphere was moist and the rainfall greater, I should then place a much higher value on the process, as I should consider ensilage crops as part of the regular system of the farm.

J. B. LAWES.

Sober data about Silage.

BY PROF. J. W. SANBORN, COLUMBIA, MO., U. S.

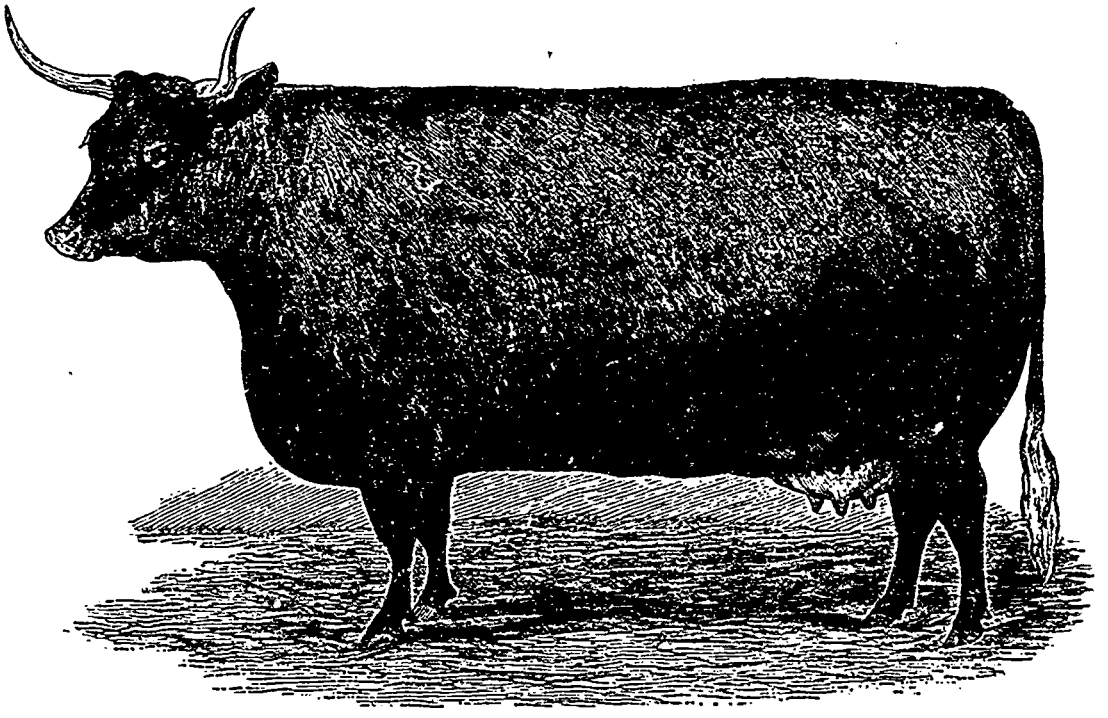
It is flood tide of interest in ensilage in many parts of the West Is anything like foam raised as it beats upon the shores of our bad practice; or is there only displayed the steady pressure of abiding forces? Millions of our farmers await sober data, and fear that there is still an effervescence of enthusiasm in the reports coming to them from those whose personal observations, loose though they be, are loudly proclaimed conclusive and final. Unfortunately, I have been regarded as an opponent of the silo, when in truth my only effort has been to hold it to the hard facts and confine its growth to its merits. Many of its swaddling claims have passed or are passing into an oblivion from which I do not care to raise them again into view. Entering upon the now of the question I will take in two equal sections of land respectively in corn, either for fodder or for the ripened ear...one for ensilage and the other for the air-dried product. If conditions of fertility and culture are the same, evidently the yield by either system will be the same. More, it will be similar even though one

be drilled for fodder for the silo and the other grown by the field system for corn. This, Prof. Geo. H. Cook, of New Jersey, who has done the most creditable work on the subject extant, showed in a conclusive field trial.

But it is said that the dry fodder of corn cannot be well preserved with the silo. An empty claim. Professor Cook found that his ensilage lost 18 lbs. dry matter of its food materials in the silo for every 17¼ lbs. lost by curing in stacks in the field, notwithstanding the field cured fodder stood nearly three months in the field—an unnecessary exposure. I allow mine in favorable weather to stand only a week, and can preserve it in unlimited quantities by stacking or housing as I have done for years. Thus, the claim that the silo enables us to grow and preserve an amount of food that we otherwise could not, thereby vastly increasing our available food, is absolutely groundless. Here in the West, where we waste all or nearly all our corn fodder, it has taken occasional root—because it is found that the silo adds the food thus preserved to the total food of the farm. This fact is due to the absolute ignorance of the ease with which the fodder can be preserved in the dry condition, and so long as our farmers refuse to learn to save their fodder in the dry state, just so long will the silo be a great aid. Having now concluded that we can grow and preserve each of our two sections of corn or corn fodder in equal amounts, our next step is to ascertain the most economical system of gathering and preserving it. Professor Geo. H. Cook kept the account and found the system cost $22.71. where the silo system cost $26.41. But had he not husked the corn etc., the amount would have been much more favorable for the air-drying method. I calculate as follows for one acre of dried fodder corn yielding twenty tons green food: Cutting up and binding, $2.50; drawing, $3.50; total, $6. Professor Cook's cost of $26 for labor of harvesting a smaller crop may be and is too large, but it will not cost far below $1 a ton, or $20 to put an acre of green cut fodder corn under weights in a silo. The difference in the cost of the two systems in harvesting will buy in half of the West in hay, at $5 per ton, two-thirds the nutrition found in the ensilage.

We now come in our course of care of our two lots of corn fodder to the cost of protecting each. I saw in Kansas an iron roof, said to have cost $150, and stated to cover 100 tons of hay. The protection was perfect, save a slight loss on the sides.(1) A separate building for ensilage, although made of wood, cannot be made for less than $900 to $1,000 on the cheap plan, that will cover an equal quantity of nutrition. The wooden silo is called cheap. At our Western prices for lumber of $18 per M, it will cost not less than $2.33 per ton of silo capacity, for it must be remembered that we must measure the space before settling if we are to get the cost of ensilage room per ton. This its friends forget to do, and make 40 lbs. instead of 30 lbs. per cubic foot of space. On this basis we get the startling cost of silo room for an acre of fodder weighing twenty tons of $46.60. Land costing $25 requires $46 of silo room per acre. The interest and wear of such a silo will be at least 15 per cent, or $6.99 yearly, which will purchase here nearly 1½ tons of hay having as much nutrition as 6½ tons of ensilage. "Build them in one corner of the barn," says some one. This does not alter the proposition if you utilize a building that also cost. We rob Peter in Paul's interest. Besides, we are without the barns. Perhaps we would better build a barn in order to build a silo in one corner of it. No, a skeleton barn intended only for hay, as a silo is intended only for ensilage, will cost much less per pound of nutrition covered.

Our fodder being now housed by the two systems, which feeds out the cheaper in labor? By ensilage we handle 400 odd pounds to secure the same amount of nutrition found in 100 pounds of hay, or some 300 pounds for the amount found in 100 pounds of dry corn fodder. The one is handled as



DEVON COW MOSS ROSE. Re-engraved from the London Live Stock Journal.

(1) The sides of all hay-stacks should be well pulled after the hay has settled, and there will be no loss. A. R. J. F.

spoon material, the other on the fork. Which is the cheaper? But, surely, now we have reached the tidal point favoring ensilage—its feeding value. Our acre in dry fodder corn is to fall far in the rear of the acre of ensilage fodder corn. Professor Geo. H. Cook made a brilliant, practical, theoretical test of just this question, half of fodder corn was put in the silo and half was dried in the air, and for three years his cows failed to discover this "new truth"—that the value of a fodder is governed by the amount of water in it—likewise failed his chemistry. Professor Henry pursued the same plan with identical results. Professor Wolff has just published a critical trial of the same order with the same result. Sir John B. Lawes's German experimenters fail to find green food more effective than the same food carefully dried. Three years with green food versus dried foods forced the same view upon me. Dr. E. Lewis Sturtevant showed nothing better. There is no appeal from these critical experimenters, at least not from them to the careless guesses of the fresh enthusiasm of stock feeders. It would pleased me to marshal the figures of the above experimenters before the reader, but they are too many for any inclosure that the editor will be likely to assign me. I have not spoken for or against ensilage. It has its fair pros and cons, doubtless. I merely state what I believe to be the sober truth or data, and say: "Choose ye." But strip ensilage of its pretentiousness before choosing.

SECOND PRIZE ESSAY.

IS SHEEP RAISING PROFITABLE?

By John Adams, Ambleside.

The question is asked, is sheep raising profitable in the Dominion? One of the first questions to be asked is, what does it cost to keep sheep, and what can be shown in profit at the end of the year? In order to do so, please allow me to submit the following memorandum, and I should like to hear from other farmers and ask them to criticise my figures freely:—

First, then, there is the cost of five butchers' ewes at, say, when yearlings, $7 per head	$35.00
Rent on one acre good grass land for summer run	5.00
Rent and expenses in procuring one acre of good oats and peas, cut into chaff for winter feed, all fed together, with, perhaps, the addition of a little straw once a day, say	14.00
Interest on outlay	2.25
	$56.25
By a fair average of seven lambs from five ewes (butchers' prices) at $3	$21.00
Wool from same	7.00
	$28.00
Less depreciation in value, &c., &c	3.00
Leaving profits of	$25.00

This shows a very handsome profit on the outlay, which some may say needs a little clipping down. To those I will say come on "mae freens," it will do us all good to have a friendly bit of good natured banter on this question which I enjoy sometimes more than my dinner, but don't hit below the belt.

I am quite satisfied that there is a large quantity of land in Ontario and Quebec nearly worn out by constant grain growing and a poor system of farming, which could raise sheep nearly as profitably as my memorandum shows. Any land which will grow grass, peas or oats will raise sheep and fatten them also.

If I am not drifting away from my subject allow me to say to anyone having poor or worn out land: try sheep farming. Plow the land deep in fall at once, then give it a sort of an early fallow in the spring, and if a little manure can be added all the better. Then sow the field with white or yellow Aberdeen turnips, and then fold sheep on the turnips after they get a reasonable size. Have the sheep folded in a small enclosure easily made of wire netting, and made moveable. Have the sheep folded over the entire field, unless they are hollows which don't require manuring. Should you not have sheep enough purchase a lot of lambs; they will pay handsomely, and will be ready and fat in the fall to sell. Then after a light plowing in the fall, sow the land with barley, or peas and oats the following spring and seed down with clover. It is really surprising what can be accomplished on a poor worn out farm after five years proper sheep farming.

In order to make sheep farming more profitable, cheap land is wanted, so that you can get a large run with large flocks, the labor and the interest on capital would be less.

The exports of the Dominion could be largely increased in a very short time by changing the system of farming in many portions of our country. I am satisfied that at least $5,000,000 annually would soon be added to our exports by sheep farming on some worn out lands that I have seen in Ontario and Quebec; and light sandy loams, and thin, stony gravelly, rocky sections of the country which will produce grass and coarse grains will be cleared and reclaimed.

The large ranges of land north of this place, Muskoka, Haliburton, Kinmount and Bobcaygeon district, are admirably adapted for sheep raising, and those lands can be procured very cheaply. A young man with pluck and energy could soon make money, and if of good business habits, with a good head, could in time become rich by raising Down sheep, which breed is the best adapted for such a country. There is also a large acreage of lands on the shores of Lake Erie and in other parts of the Dominion, that could be made profitable by a proper system of sheep farming, which now produces very little to add to our exports.

Now, what are our future prospects for profitable sheep raising? I say excellent, if we can only get a free market for our wool, lambs and mutton at our American neighbors south of us. The people of American cities and manufacturing centres are largely increasing their consumption of lambs and mutton. It is really surprising to see that the vast numbers slaughtered and consumed in those populous centres, and Canadian lambs from three months to nine months old have almost an unlimited demand in their markets if we could only get into them free of duty. In December, January and February nine month lambs when fat readily find customers at from $6 to $7 each. What can a farmer raise to pay so well at so small a cost of labor and first outlay in so short a time, and at the same time increase the fertility of lands which have produced too much wheat in the past, which, in the near future, will be grown for our own use in the far west?

And now, without offending anyone, I suppose it is right for me to say which breeds of sheep I should recommend. My answer is, study the American requirements, indeed, we have already anticipated their wants and tastes, and there is no breed which we have to excel the various breeds of the Downs. They are hardy, plump, lean meat producing sheep. Their carcass is the best selling meat in any market, and their wool is so well adapted for the use of the inhabitants of this hemisphere where so much flannel is used all the year round.

There is another favorable consideration which should be taken into account, viz., that this Province in particular is the best sheep breeding ground on this continent, so that in the future as in the past we can derive a greater profit than I have shown in supplying pure bred, healthy breeding sheep to our own kinsmen to the east and west of us, and also to our gallant cousins residing south of latitude 45°.

Farmer's Advocate.

LIQUID MANURE.

It has been suggested that as liquid manure is weak in phosphoric acid, the addition of "floats" or other phosphatic material would greatly help it. The addition of "floats" or bone meal to sawdust or some other good absorbent for use in the gutters is suggested. What is needed to hold the ammonia formed by fermenting manure, is either some strongly absorbent substance like vegetable mould (or humus) or some acid substance or salt capable of combining with the ammonia. The "floats" are neither absorbent nor acid and while they would even up the deficiency as regards phosphorics, they would have little retentive power. If you could get your floats into form of acid phosphate by cheap sulphuric acid, the material would do just what you want. Sulphuric acid (chamber acid) does not cost the manufacturer more than $5 a ton, and could be sold with profit for $7.50 a ton. If you could induce some manufacturer to make a simple acid phosphate and sell it for a low price, it would meet your case. Why not use sulphate of iron to fix your ammonia, and then add your floats to bring up the phosphates? The copperas would cost not more than $20 a ton, and a few pounds would go a long way in arresting the loss of nitrogen from putrefying urine.

Ag College, Mich. PROF. R. C. KEDZIE.

Brown, or chamber acid, is sold in London for $15 a ton. The price charged here is something exorbitant, but there is the duty to be taken into account. The following from the R. N. Y., is the true way of preserving the liquid dejection. For our small Quebec stock, 7 feet square would be enough for a box. A. R J. F.

I keep my cows in box stalls 2 feet deep with tight floors. By keeping plenty of bedding under them and throwing in dry horse manure, I think I save most of the liquid manure.

Passaic Co., N.J. P. H. L.

WASHING BUTTER.

One of the principal improvements— or what is considered by many an improvement—introduced of recent years into the manufacture of butter has been the process of washing it while in the granular stage, and before it has gathered into lumps in the churn After temperature and "ripeness" of the cream had been looked after at the beginning, and the churn driven at the proper speed, the next thing attended to was to stop the operation as soon as the butter formed into granules as big as pin-heads or grain of wheat; run out the buttermilk from below, and fill up the churn with cold, clean water, a few turns given, the water changed, and the operation repeated until the water came away clear. The object was to removed all traces of the buttermilk, which contained the casein, albumen, milk sugar, &c., origally in the milk. Pure butter-fat does not readily undergo decomposition or fermentation of any kind—in common with all other fats and oils—but the other ingredients of milk do rapidly change, producing rancidity and sourness. The more of these latter that were extracted from the butter, therefore, the longer it would keep, and washing did this. Old-fashioned dairymaids, however, held that the operation spoiled the butter, in that it removed or destroyed the fine flavour desired in a first-class product, and there are not wanting many of the best butter makers of to-day who are of the same opinion. Further, there is a good deal of scientific evidence against washing.

It is difficult to define exactly what the aroma and flavour of butter is, or to state what is the body or chemical product which is the cause of it. Some hold that it is simply the incipient stages of decay (a form of fermentation) of the albuminous substances present, and if this is so, it gives a very feasible explanation of the evil effects of washing. Its object is to remove, as far as possible, the fermentable substances, and if these are totally washed out, then nothing but a mixture of tasteless fats remains, incapable of generating a flavour. Of course, too much of these left in would overdo the matter and make the flavour objectionably strong, so that the proper course appears to be a happy medium between the two. At one time the butter milk was removed by pounding the lumps by hand, and now we have wooden beaters and butter-workers for the same purpose, when hand work is no longer admissible. It must be acknowledged, however, that these will not remove the objectionable matter from the butter if it has once got mixed the lumps, so that perhaps washing once with water would do what we require without spoiling flavour.

Some of the most noted butter-makers, however, do not wash at all, among whom we may mention Mr. Fitzgerald, Ireland. Some two or three years ago (1885) an utensil called the "Delaiteuse" was exhibited at the Dairy Show at Islington. It was constructed on the same principle as the cream separator, and its object was to remove the butter-milk from butter while in the granular stage by the centrifugal tendency generated when the butter was spun round at a great speed. It was illustrated and described in the *Agricultural Gazette* at the time, and the above-named gentleman was one of the first, if not the very first, to use one in this country. But before its introduction butter was not washed at his creamery, and it is one of the finest brands in the country, and easily commands a good price all the year round. The utensil mentioned, however, is only for use on a large scale, and in its absence we must fall on some other plan. It seems, therefore that while we cannot do without washing altogether, it should be done as little as possible, and pounding with beaters or manipulating in the butter-workers carried out as much as may be. The evidence is so strong in this direction that we advise this, notwitstanding all that has been said and done by lecturers and demonstrators of recent years in favour of thorough washing. Where salting is practised there is less need of the thorough removal of the buttermilk, because the action of salt is antiseptic, and prevents the decay which ends in rancidity, but as we do not want to prevent this absolutely—else there is no flavour—we must use means accordingly.

Eng. Ag. Ga.

SINGLING TURNIPS.

The productiveness of the land may be increased by two methods—by increase of costs and increase of care. As higher farming is not invariably a remedy for low prices, it does not necessarily follow that the former alternative augments profits, but the latter always does so. A few remarks on the careful hoeing of the turnip crop, and especially on "setting out," or singling the plants, may, therefore, prove acceptable; these operations having been delayed in many places by the wet weather.

We we will assume that the seed of best strains of swedes and turnips was duly obtained from a painstaking seed merchant; that it was drilled at a proper distance from row to row, with bonedust and the best manures beneath it, and that the plants are now waiting for dry weather to be horse-hoed and singled. Our remarks on the former operation shall be general. We will only say with respect to horse-hoeing that we have used for years one of Garrett's two-horse hoes, covering the same space as the drill; that ten to twelve acres are a day's work, and the cost a shilling an acre. An accurate writer, who is, at the same time a painstaking farmer, has counted 140,000 seeds of the common turnip in 1 lb., and if 3 lb. per acre are drilled in rows 27 in. apart, the number of seeds is fourteen

times the usual number of turnips left standing for the crop, and assuming that every seed produces a plant, about thirteen plants will require singling to each one that is allowed to remain. On this calculation, the turnips will stand a moderate distance apart. Wide spaces and large roots are very undesirable on account of the inferior quality of big roots of all kinds compared with small ones, and because a greater weight can be obtained by a larger number of lesser roots per acre. An experiment was tried upon three lengths of swedes sown in the same row, all conditions as to soil, treatment, and manure being alike. A length of 60 ft. was singled 12 in. apart, a similar length 9 in., and a third length 6 in. The three sets of swedes weighed respectively when mature, 2.50 lb. each, 1.95 lb., and 1.54 lb. the wider singling giving, of course, the greatest weight. As the drills were 27 inches apart, the acre would extend to a length of 19,360 feet, and the number of swedes per acre at 12 inches, 9 inches, and 6 inches apart, would be 19,360, 25,813, and 25,720. If these numbers be multiplied by the weights just mentioned, the largest swedes will be found to yield the lightest crop. At 12 inches by 27 inches the crop will weigh 21.61 tons; at 9 inches, 22.47 tons; and at 6 inches, 26.62 tons per acre. Our figures are theoretical, and in practice disease, or accident, rooks, fly, or club-root, for example, would be tolerably certain to reduce the number of plants to some extent. In such cases, and in all cases of occasional blanks occurring by the removal of a certain percentage of the plants, the effect of a such losses will be in proportion to the spacing of the crops It will be greater with wide spacing than with narrow.

In an interesting *brochure*, "Agricultural Botany," by Mr. A. S. Wilson, the differences of productiveness of different kinds of turnips is recognised; and this is a point which must be taken into account in the spacing of the plants. At six-inch intervals the respective weights of the bulbs of several varieties were are follows:—Green top yellow, 1.66 lb.; imperial green globe, 2.23 lb.; purple-top mammoth, 2.51 lb., and Lincolnshire red globe, 2.90 lb. At 27 inches from row to row the first-named turnip produced 28.69 tons per acre, and the last-named, 50.04 tons.

It is quite possible that the analysis of these two varieties might be different, and that the heaviest cropper might be the less nutritious of the two. But it can hardly be conceived that 28½ tons could prove as valuable to the feeder as 50 tons. This point, however, is outside our subject of singling. We have endeavoured to show by what method the heaviest crops can be obtained. Our remarks will, of course, apply to mangolds as well as turnips, and our typical width of 27 in. from row to row, will, in most cases, prove suitable to that crop. In the case of swedes and turnips we prefer 20 in. or 22 in. from row to row, and singling at 9 in. apart, though greater widths are desirable if the land is foul. Our object is profit, and the production of the heaviest and best crop in a given area. The big roots at the agricultural shows are grown as examples of the greatest weights which the different varieties are capable of attaining, just as monster cattle are brought to their greatest weight without regard to cost. We do not deny that such exhibitions are instructive. The mammoth long red mangold, weighing 73 lb., and exhibited by Messrs. Sutton as the largest specimen ever grown, seemed to us a very interesting proof of gigantic growth under pampered treatment. But only a few of the largest mangolds in one of the heaviest crops on record—63½ tons per acre—reached as much as half the weight of the monster in question. A practical farmer should avoid growing giants on account of the wide spaces they occupy, and in judging roots at shows, if the cost of the crop were taken into account, it would be found that those of moderate size, grown with such singling as we have just recommended, would carry off the palm for profit. *Eng. Ag. Ga.*

Some people appear to be of opinion that wheat can be grown anywhere except in this country, or, at least, in any new country, at a profit. Evidence, however, has been offered lately to prove that wheatgrowing at recent prices has not paid in any country, as a whole, unless in India. It is worthy of notice that such evidence accumulates as time goes on, many Consular reports having supplied a great deal of it. The latest addition is contained in the Annual Report of the Ontario Bureau of Industries for 1887, which gives estimates of the cost and returns of the several crops of the Province, as follows:—

Crop.	Cost per acre. dols.	cents.	Returns per acre in 1887. dols.	cents.
Winter wheat	19	43	17	8
Spring wheat	15	50	13	61
Barley	14	83	18	63
Oats	14	78	16	59
Peas	15	47	13	87
Maize	21	70	25	80
Potatoes	34	64	54	43
Turnips	33	41	41	27

In the return for the corn crops the value of the straw is included. It will be noticed that the cost of growing an acre of winter wheat is nearly £4, and that there was a loss of 10s. an acre in 1887. Spring wheat costs less to grow, and gives a smaller return, the loss being nearly 8s. an acre. For all the other crops, except peas—which usually pay well in Canada—a profit is shown. It is not surprising to see that the wheat area has decreased, as shown in a table given in another column. *Ag. Gazette.*

NON-OFFICIAL PART.