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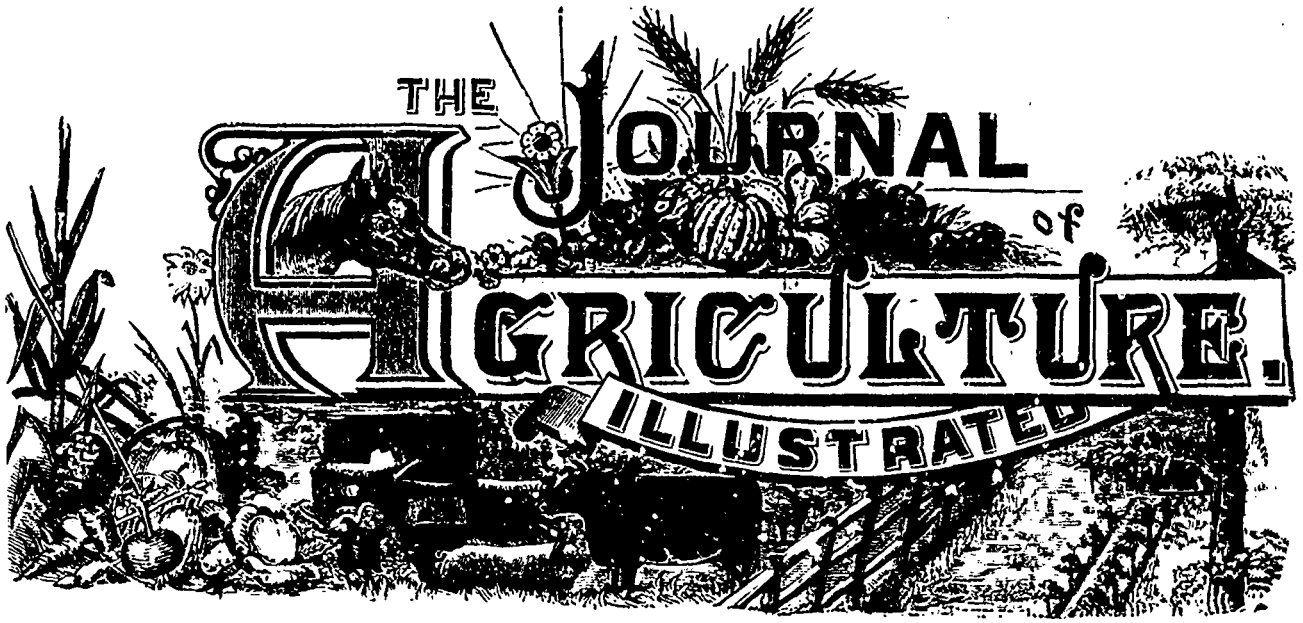

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OFFICIAL PART.

Table of Contents.

Dairymen's Association of the Province of Quebec

A special meeting of the Dairymen's Association of the province of Quebec will take place at Quebec on the 14th of April next; in one of the Legislative Halls. All those interested in the success of this important industry are earnestly invited to be present. Since its establishment, the Society has accomplished a great deal of good; amongst other things, an esprit de corps, remarkable in its intensity, has been created among its members, and a thorough understanding of the need of mutual support has been impressed upon them.

Quite a number of lectures will be delivered this year, by some of our most distinguished members. We cannot urge our readers too earnestly to allow themselves a couple of days holidays, to be devoted to both instruction and relaxation at Quebec, on the 14th intant.

Members, both new and old whose subscriptions ($1.00) for 1886 shall have been paid to the Secretary of the Society, M. J. de L. Taché, before the date mentioned, will be entitled to a reduction of their railroad fares and to a full report of the meetings held during the year.

Let me again remind my readers that a special meeting of the above Association will take place at Quebec on the 14th of April instant. In times like these, when all sorts of farm produce have fallen to such low figures, and particularly when the products of the dairy are almost unsaleable, I can conceive of no means more likely to tend towards the ultimate resuscitation of the prosperity of our farmers than the conferences and conversations which occur in the annual special meetings of such associations as the one in question. There, at Quebec, will be gathered together all the experts of the dairy industry, fully charged with the results of their researches during the past year. Questions will abound, and answers to the questions will, doubtless, set at rest many a balancing mind. For the answers will not proceed from amateurs, or from unskilled practitioners, but from men whose lives are devoted to the working out of problems on the resolution of which depend the prosperity and the very existence of the agriculture of the province.

For it is no exaggeration to say that without great improvement in the making of butter and cheese, we shall fall into the rear. Every despatch I receive from Europe tells me that Denmark and Normandy are gaining such a footing in the English market that no dairy produce not of the best quality can hope to enter into competition with them. Already the English are beginning to cease making the inferior sorts of cheese, preferring to keep their season's make until February, rather than to manufacture a poorer though a quicker ripening kind.

As for our English-speaking farmers, many of whom do not understand the French language, I am empowered to say that particular pains will be taken to translate, *vivâ voce*, all the more important parts of the addresses into English, so that they may share in the information afforded by the different speakers, and if they have any observations to offer to the

meeting, their speeches will in like manner be translated into French. Besides this a whole session will be given to the English members, if needed.

Thus, both the English and the French-Canadian dairymen will profit, by the interchange of experience, to the ultimate gain of both sections of our population, and the future improvement of one of our most important industries.

Arthur R. Jenner fust

ENSILAGE.

We have just received the "5th Ensilage Congress report" (address J. B. Brown, 55 Beekman St., New York, price 50c.) a most interesting 8° pamphlet of 48 pages. From its pages we gather that ensilage is becoming more and more popular in the United States from year to year.

Hon. H. O. Potter, New York, reports that twice the stock can be kept by ensilage than by any other system—respecting the building of the silo he says: The conditions of success are always the same—the most perfect isolation and exclusion of the air, with as uniform and unvarying a temperature as is attainable.

He advises the growing of corn in the usual manner for the securing of the heaviest corn crop. Then, as soon as the grain is glazed he husks it and dries the grain. The stalks are then cut at once and made into ensilage, after passing through the straw cutter ($\frac{1}{2}$ inch cut), and covered with a foot of earth.

Mr. Potter adds that without ensilage he should not know how to feed his stock of 250 head of cattle successfully on a poor farm.

Mr. George G. Smith, of St. Albans, Vermont, has two farms in St. Albans, Vermont. One is very light gravelly loam, very leachy. Before the adoption of ensilage the utmost capacity of the farm was 14 milking cows, with a proportionate number of young stock, six horses and about 40 sheep and even then had to supply for a deficiency of food from the other very frequently.

He now keeps on the same farm 50 milch cows, 45 younger animals, 60 sheep, 6 to 8 horses, with ensilage enough to carry the stock through continuously to the first of July, or with pasture, through August. He adds that in the near future this same farm will be enabled to keep 100 milch cows and the attendant young stock, with an increasing productive capacity of the farm, from year to year. On this farm, 25 acres of ensilage corn were planted which produced 680 tons, actual weight.

On the other farm, Mr. Smith keeps over 200 cows and raises about 1200 tons of ensilage! He says: "Although our cows have now been fed for six years with ensilage for their only winter food, with the addition of the usual quantity of grain (6 to 8 lbs. daily) the universal testimony of all who visit our farms is that they never saw stock looking so healthy and in such superb condition. Our butter takes equal rank with the finest Philadelphia butter and is of the best texture, color, and fragrance, and is free from the slightest possible taint or odour of ensilage."

This pamphlet is replete with interesting facts, and it should be read by every intelligent farmer in the land. The five reports can be had for $1.50 by applying as above.

Ed. A. Barnard.

PERMANENT PASTURE.

Box 23, Sorel—February 28th 1886.

Some five years ago, the *Orillia Packet*—I think that was the name of the paper—was good enough to devote a leading article to my address. I had been for a month or two recommending the readers of this periodical to try, at all events, to establish *permanent pastures* on their farms. I gave certain reasons why they should succeed, and I showed the advantages they offered.

The newspaper above mentioned ridiculed the idea, declared, without advancing any proof to sustain the assertion, that permanent pastures never could be established; and, in fact, ridiculed the entire plan.

What would the Orillia Packet say now? I should like to see the face of the editor when he peruses the exhaustive essay by Professor Brown of Guelph at the Huntingdon meeting of the Dairymen's Association! In the present article I shall quote largely from the essay, and I must be pardoned if I point out one or two errors into which I think the professor has, more from haste than from any want of experience, unfortunately fallen.

"As a stimulus to healthy appreciation of the importance of permanent pastures, and as one of the best possible ways of impressing our people, I may ask why it is that Britain, with all her age, experience, and wealth of other things, has already placed half her arable land under this crop. It is not altogether because of foreign competition in other crops, nor of climatic trouble, but because she knows of no better way to conserve, to wait, and to make money by doing little at the least risk and outlay. Britain has never hesitated to "hedge" in her agriculture when troubles arose, and to-day her farmers make more money per acre per annum on the best pasture than from any other source. One cow per acre being the average, there is a gross return of *four times more money than Ontario now shows*, and thousands of prime bullocks are annually produced from the same source."

Now, I am not by any means sure that half or even one-fourth of the arable land of England has been laid down in permanent grass. It is an expensive business, and tenant-farmers, unless aided by their landlords, have not of late years had the means to do it. A good deal has been done, but I doubt very much whether a million acres would not cover it. In Scotland there is, practically speaking, no permanent pasture, except what are called "grass-parks," i. e., small enclosures round villages, and a few acres round the farm-buildings for the use of the calves and sick horses. Indeed, I constantly meet with such advertisements as the following: Farm to let; property of..... containing 204 acres, of which 197 are arable. All the farming in Scotland, bar carse-land and upland grazing is on the five- or six-course rotation. (1)

As for one acre keeping a cow *for a year*, I think Mr. Brown must mean *for the season*. On our own Glo'stershire property, the land has been down in grass for certainly 500 years, and first-rate grass, too, it is, as will be understood when I say that if any one of the tenants breaks up an acre of it, he is bound to pay to the landlord £50! In spite of its goodness, it takes *three acres* to keep a cow winter and summer, and the average yield of a cow is 448 lbs. of Glo'ster cheese, that is, 150 lbs. per acre. No doubt, English farmers make more money off "the best pasture" than from any

(1) In 1880, there were in Forfarshire, a model county, 253,373 acres of arable land, and only 27,251 acres of permanent grass, exclusive of heath or mountain land, but inclusive of deer parks, &c. Forfarshire has to my knowledge always been noted for having a larger proportion of grass than almost any county in Scotland, and Forfarshire has only *one-ninth!* Kincardine had, in 1880, 1203,22 acres of arable, and 5797, one-twentieth, of grass! v. Journ. Highland and Agricultural Society 1881. Aberdeen, with 604,734 acres under the plough, has only 27,406 under grass. Lanark and Ayr, lying close to the West coast, have a larger proportion of grass, and are dairy counties. Much of the permanent grass on the Borders is in sheep-walk.

A. R. J. F,

other source, but there is very little of it in any part of England. Here and there, in the Vale of Aylesbury, in Northamptonshire and the midland counties generally, and in the "marshes" near the sea, one meets with grass-land that will feed a big bullock ripe fat without extra food; but such land is very scarce indeed.

And, I fancy, the recent fall in the price of beef and mutton in Britain will make farmers there hesitate, before they lay down much more land in grass. For, after all said and done, much as I long to see a fair extent of permanent pasture on every farm in the province, I can see clearly that many a man will be disappointed at first. Sow what seeds you will; treat them as liberally as you please with manure; roll and bush-harrow them, and consume the produce as judiciously as you can; the time will come—and on light soils it will come soon—when the so-called *perennial* plants will die out, and the natural grasses of the soil will take their place. After the third or fourth year, the pasture will begin to deteriorate, and it will not arrive at its best under thirty or forty years. Such as been my experience in England, and with our drier climate I cannot hold out hopes that things will be different here.

The yield of some of the newly seeded pastures mentioned in Mr. Brown's essay has certainly been wonderful.

Near Brockville, twenty acres were seeded down four years ago, and so profuse was the first year's growth that pasturing and haying had to be adopted in order to prevent smothering. The second year was pastured, when fully two head of cattle were kept per acre; during the third year twenty cows were grazed up to 11th July, when ten tons of first-class hay were harvested from one-half of the field, and, after the hay was removed, seventeen cattle were grazed for the remainder of the season, leaving the pasture with a much better bottom. The enterprising farmer in this example gave particular attention to the effect of the

VARIETY OF GRASSES AND CLOVERS

upon dairy products. He says:—"The milk produced was richer and of a peculiar flavour, having, directly after milking, a greasy appearance like oil on the top of water; the butter had also a peculiar flavour and a richer yellow colour;" the same effect was produced on the butter when cows were fed on the hay.

Not far from the same place a prominent public man seeded some forty acres, and he expressed his satisfaction to the professor in this way:—"If the farmers take advantage of what the Experimental Farm has shown can be done with permanent pasture alone, it has more than paid all its cost to the country for many years to come." "I am not aware exactly how the calculation was made, but probably somewhat in this manner:—The present cultivated pasture of Ontario maintains one cow on every three acres (it is really 3¼ acres), and as the average cow gives 3,800 lbs. of milk per grass season, the produce is 1,270 lbs. per acre per annum. As the permanent pasture in question can hold

MORE THAN ONE COW PER ACRE,

and enables the same cow to give one-fourth more milk, the acre produces 4,750 lbs. of milk every season. There being about 15,000,000 acres of arable land in Ontario, it results that if ten acres of permanent pasture were established to every one hundred acres, the 1,500,000 acres thus changed from the present stamp of pasture would actually give a cash difference of $25,000,000, or $250 a year to every farmer of the Province. The cash cost to the Province of the Ontario Agricultural College and Experimental Farm is about $20,000 a year. If this rough estimate is wide of the position taken by the gentleman referred to, I shall be glad to have it corrected, as his congratulations were hurriedly made in a railway car two years ago."

All the best grass-land farmers I know, in England, pasture their young seeds with yearling cattle, putting on a heavy stock at once, so as to feed it down close and level as quickly as possible, the great object being to persuade the roots to tiller out and thus form the thickest possible bottom in the shortest possible time. In whatever manner the growth may be consumed, it is of the greatest possible importance that not one plant should be allowed even to form, much less to ripen, its seed; the odds are that if it does it will die out.

At Stratford, it seems, 25 acres were laid down two years ago. "Twenty store cattle, yearlings and two-year olds were kept on these 25 acres, and they would have carried more. The land was newly cleared and had never been cropped. Here was a case of $15 of beef per acre per annum, as against the average of $5.25 from timothy and clover pasture."

Surely, a rather vague statement on the part of the farmer! I confess I do not see how the $15 per acre are arrived at. Were the cattle weighed before and after the season?

And again: "The dairy testing last year was a produce of 7,800 pounds of milk per acre, when ONE ACRE MAINTAINED TWO COWS ALL THE YEAR THROUGH—a result so apparently remarkable in comparison with the present provincial average of 1,300 pounds that comment stands still." Yes, I should think it did! For if 10 pounds of milk will give a pound of cheese—the usual calculation I believe—this one acre must have yielded 780 pounds of cheese, that is to say, 5.2 as much as yielded by an acre of the finest Glo'stershire cheese-land which lets for $11 an acre per annum; to say nothing of six dollars of tithe and rates!

"But," the professor goes on to say, "the conduct of this class of pasture has been very uniform and characteristic. On all hands the complaint has been that it has come so strong and profuse the first year, necessitating a kind of management contrary to the best practice of Europe. As an example of this, take the case of the four acres we seeded in May 1885, in preparation for the store steers of 1886. Growth became so rank that for the sake of giving air and a better chance to the roots, we ran the mower over in May, and left the cutting as a mulch. In June another cutting was considered necessary for the like objects; the mower was used for a third time during the summer, and finally, in September, fearing that the profuse growth might smother out some plants when winter came, we took off a crop of hay—the fourth cutting—that averaged 1¼ ton per acre. Thus, the same season the seeding was done, we had to cut four times, and could have pastured afterwards had it been consistent with good management."

Well, this proves that where land is properly prepared and a judicious selection of grass-seed sown without a grain crop, an enormous yield of grass or of hay may be expected. But this is not the question. What we want to know is: what will be the state of the pasture, say, twenty years hence? We all know that the yield of grass-land in Canada, when well treated, is equal, and perhaps superior to the yield of grass-land in Britain. I have certainly seen finer crops of clover and timothy in Quebec than I ever saw at home, but our permanent pastures are not good, and we want to know how to ensure their being good, and it is here that Mr. Brown really comes to our assistance. After remarking that, in the experience of the Experimental farm, timothy hay has the effect of drying up the flow of milk—wherein I entirely agree with him—and alluding to the necessity of winter-dairying, to which end he advises the Ontario farmer to secure the kind of meadow hay that has always helped to give Britain her winter milk, the professor enters upon the

practical part of his subject, and his advice is worthy of deep attention.

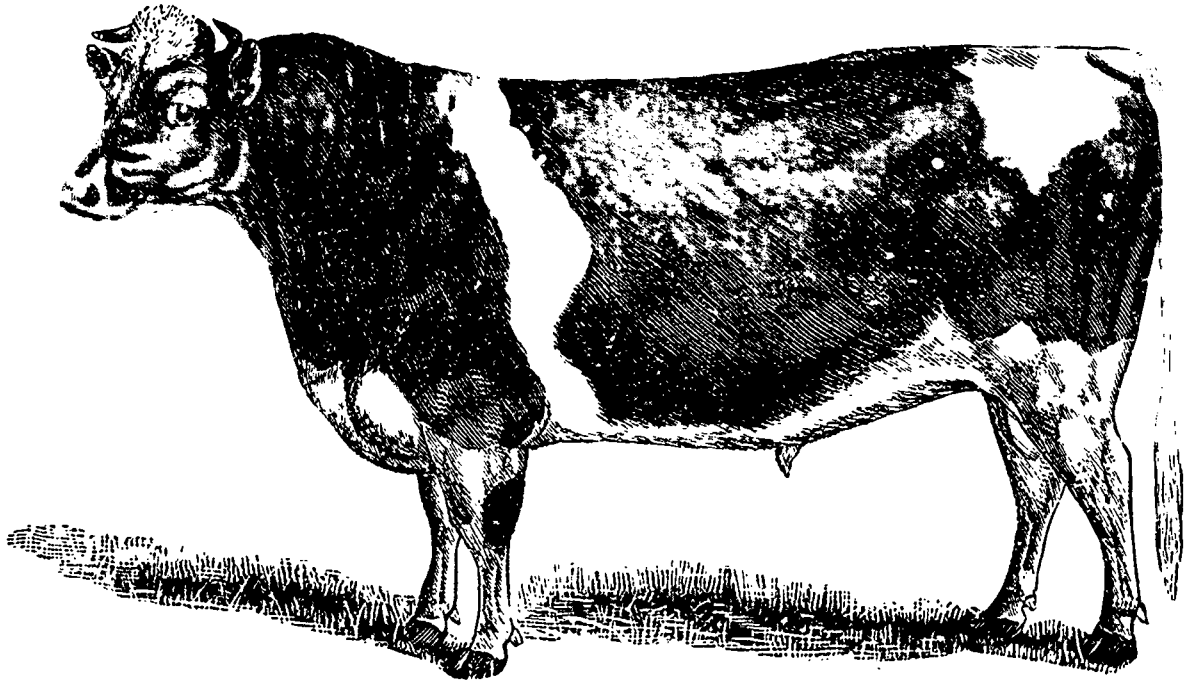
"What we have realized with others are

THE FOLLOWING FACTS:

That permanent pasture, after the first year, is the earliest of most green things, some of the grasses and the lucerne clover growing under the snow—if deep and late in *going(sic)*. The meadow fox tail leads in earliness, and, with the English rye, orchard, and lucerne, offers a full bite even for cattle early in May; these are followed by meadow fescue, blue grass, red top, yellow oat, and timothy in regular order, so that with the five clovers the animals are presented with a succession of different crops throughout summer and right into the snows of November—never bare and always fresh. The meadow fescue may be termed the "general purpose" plant of the mixture, no other is equal in an average of good things; never coarse, always in leaf, a good spreader, and a good neighbour; other grasses could be dispensed with—the meadow fescue never. Animal health is better where a variety of plants exists, though England has found, in some instances, that heifers grazed alone upon such pasture are more difficult to get in calf by reason of too many good things giving over-much fat."

The *meadow fescue*, Festuca Pratensis, of which the professor speaks so highly, is a valuable grass for permanent pasture, predominating in all the best English meadows. In the Vale of Aylesbury, the richest grazing ground in the world I may say, it constitutes a considerable portion of the most valuable and fattening pastures of that wonderful district. It makes excellent hay, and, although a large plant, the leaves are succulent and tender. It does not grow *tufty*, as is the case with most of the larger grasses, and does not arrive at its full productive powers so soon as either the *cocksfoot* or the *foxtail*. No species among the English *native* grasses produces so great a quantity of early food as the meadow-fescue, the foxtail excepted, and it is very superior as regards its nutritive qualities. Its habit is perennial, flowering towards the end of June, and growing to the height of 1½ to 2 feet. It thrives best on rich, moist soils, but is suited for and succeeds very well on all good land, and is relished by all sorts of stock. My own impression is that on sands and on stiff clays, the meadow-fescue would not succeed; but in every other case, on *drained* black soils, and on good loams, either clay- or sandy-loams, in the neighbourhood of towns, where dung is plentiful, on all soils; the meadow-fescue should form a large part of the permanent grass-seed sown.

The professor speaks of the English rye-grass, but he should have pointed out that for permanent work the *lolium perenne* should be employed. The common English rye-grass, which we always sowed with red-clover in my part of England, came ready to mow for hay at the same time as the clover, but never showed itself again after the first cutting. Not one blade of it was to be seen when the second and third crop of clover was mown. It is, in fact, an annual, but, by being sown with a grain crop, it, like the red-clover, becomes converted into a biennial. The difference between the weights of the two will surprise any one unacquainted with them: the annual weighs 30 lbs. a bushel; the perennial, 18 lbs. a bushel.



No.1–Imported 2 years old Holstein-Friesian Bull, "Mars Ellis" No. 661. H. F. H. B. Property of F. N Ritchie, the Manor Stock and Dairy Farm, Ste. Anne la Pérade, Prov. of Quebec.

I am surprised to see that Mr. Brown does not include the *cow-grass, trifolium pratense perenne*, among the clovers he recommends. The *true* cow-grass—not the *trifolium medium*, a worthless weed, which is a troublesome creeping plant, and never fails to destroy the more valuable pasture plants around it—the true cow-grass, is a great favourite with the best English farmers, and is more lasting than the broad red-clover. When clover is intended to stand more than one year, the cow-grass should always be sown.

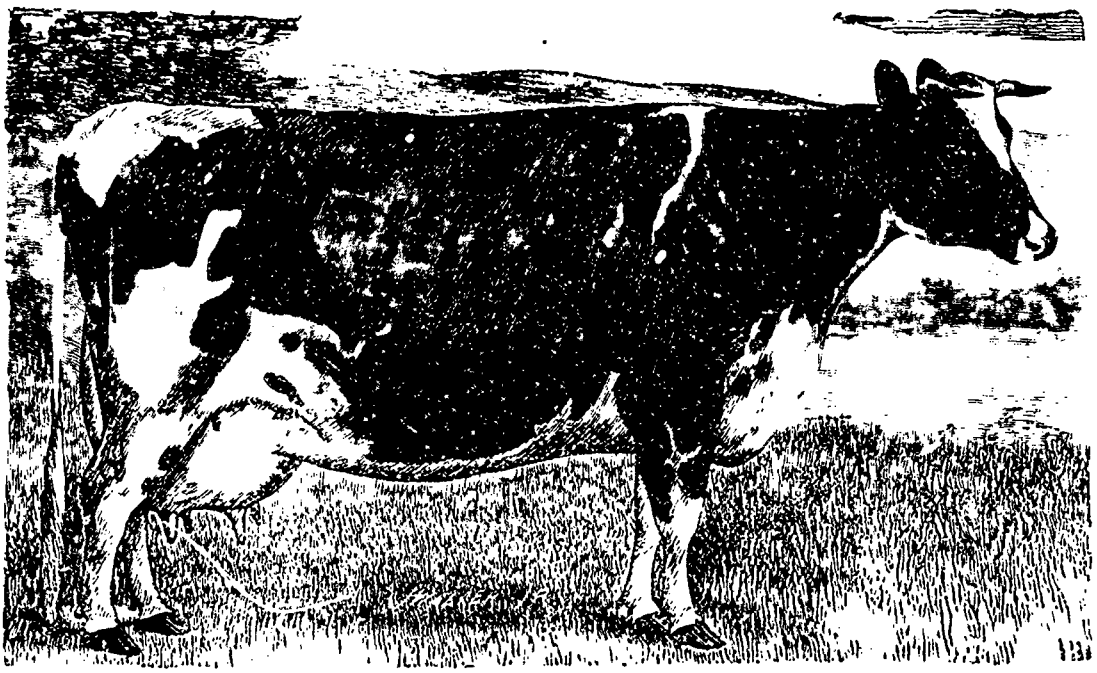
As for including *lucerne* in the permanent pasture mixture, I can say nothing about it; except that a plant that is

so impatient of contact with weeds when sown alone, would not probably feel on good terms with its neighbours in a pasture.

Meadow foxtail, Alopecurus pratensis, is one of the earliest and most valuable grasses for our purpose. It grows to the height of from two to three feet, and is remarkable not only for its earliness, but for its highly nutritious qualities and the abundance of its aftermath. It is a grass to be depended upon for its lasting powers, as it does not come to perfection under three or four years from sowing.

Of the *Cocksfoot*, or orchard grass, *dactylis glomerata*, I have spoken so often in the Journal that I need not go over the ground again. Sown in sufficient quantity—3 bushels alone, or 2 bushels with 7 lbs. of clover to the acre—it is most valuable for three years ley, or in smaller proportion when mixed with other grasses for permanent pasture. It will must secure the kind of meadow hay that has always helped to give Britain her winter milk.

The soils best adapted for permanent pasture are those with a decided clayey tendency. Whatever the soil be, secure a firm, friable, rich seed bed, naturally or artificially dry. The best preparatory crop is roots that have been liberally dealt with as to manures and cultivation, so as to obtain a rich and clear surface. We agree with the Belleville farmer that it is better not to turn under this surface but till only, in the fall as well as spring, if you desire to run no risks, but conserve everything for the future crop, seed in the spring, and seed without a crop of grain of any kind. Sow immediately the land is mellow enough, never deeper than half an inch, and therefore, after, and rarely before the harrows : the roller is usually sufficient to cover. The grasses and clovers, with quantities that are best and most reliable to date, are as follows :—



No. 2—Imported Holstein-Friesian Cow "Estrella G", No. 472 H. F. H. B. Property of F. N. Ritchie, the Manor Stock and Dairy Farm, Ste. Anne la Perade, Prov. of Quebec.

not succeed, I fear, on sandy land, unless in the neighbourhood of towns where dressings of dung are to be had at a nominal cost.

As to the *yellow-clover, medicago lupulina*, called in England trefoil and hop-clover, I don't think I would trouble myself about that. Though the crop is rather large, its stems are so hard and wiry that neither cattle nor sheep are fond of it, either in a green or a dry state, and only care to eat it when mixed with better fare; and plenty of white clover, *trifolium repens*, is sure to show itself if ever so little a dusting of lime is given. I should cut out the white and yellow clovers, and substitute in their place 3 lbs. of cow-grass.

"ANOTHER FEATURE OF THIS CROP

will be the use of part of it all season as green fodder for housed animals, and part to be made hay for milch cows in winter. The Experimental Station has had the experience that the feeding of timothy hay without much clover tends to dry up the flow of milk in winter, and as winter must become a largely extended dairy field, if Ontario means to cope with other countries in these fast competitive times, she

GRASSES.	
Meadow Fescue	6 lbs.
Meadow Foxtail	3
English Rye	2
Timothy	3
Canadian Blue	4
Orchard	3
Red Top	2
Yellow Oat	2
	25
CLOVERS.	
Lucerne	4
White	2
Red	1
Yellow	1
	8
	25
Per acre	33 "

" THE QUANTITY CAN BE VARIED

according to circumstances; never less than 25 pounds under the best conditions, and not more than 33 upon the poorest conditions.

Avoid grazing any class of animals the first year, and if blessed with much rankness mow and mulch as previously explained. If weeds should trouble they cannot remain long when liberal treatment is carried out in after years, because the cultivated plants thus encouraged soon kill out the poorer. Believe in and practise rolling every year, and top dressing with compost, or farm yard manure, every third year. For my extended views of the best management of permanent pasture I beg to refer to the " Canadian Farm Cyclopedia," as published by Hunter, Rose & Co., Toronto. Do not be afraid of heavy depasturing early in the season and use the mower to keep under what the animals won't touch. Lime and salt sweeten and stimulate pastures, when never more than 5,000 lbs., every eighth year per acre (1). If any difficulty arises in securing a good crop by the use of ordinary appliances, try 300 lbs. of bone dust; if this fails, break up. Manuring is usually best after haying or in early fall, as if in spring with a succeeding dry season the effect is not good. Take advantage of any natural irrigation from streams or barnyard liquid, which are best in winter, or spring rains, so that the position of the plot of permanent pasture is an important one indeed."

I fear that the better class of farmers in this province will not, alter their plan of cultivating grasses. So many fine crops of hay are cut every year composed of timothy and the preference of the market is so great for it, that the prejudice in its favour seems to be almost ineradicable. Still, even in neighbourhood of Sorel, I am often questioned on the matter, and their seems to a vague idea floating in the brains of many of the *habitants* that a grass that won't stand pasturing must be but a poor thing to rely on. Mr Brown's statement, that " the feeding of timothy hay without much clover tends to dry up the flow of milk in winter, " is doubtless correct, as a mere inspection of the " *fizzenless as chuckie stanes* " stuff would prove to an unprejudiced judgement. It does not look like a milk-producer, and as for the bulk, my faith is, that good oat straw, cut when not fully ripe, would answer as good, or better, a purpose as the hay usually given to cows.

Mr. Brown's preparation of the land for permanent pasture is perfect. I always find the roller sufficient to cover the seed, but I think if I were a little late in sowing and there was a prospect of dry weather, I should be inclined to use the bush-harrow, or, if I had one, the chain-harrow, a most invaluable implement for giving a fine skin to the land; almost indispensable where large plantings of potatoes are made.

I do not say with Mr Brown, " avoid grazing any class of animals the first year. " I should follow the practice of the best English farmers, which is to graze with yearlings, and give them, each, two or three pounds of decorticated cotton-seed cake a day. Bush-harrow and roll in the spring, and see that your pasture is eaten down level at least once a year. In our best English pastures, rough Welsh bullocks are bought on purpose to " clean up, " as it is called, after the fat beasts are all sent to market. I would not let a sheep on to the young grass on any account.

Lime is clearly a necessary food for the clover. The cheapest form in which we can give it is as *plaster*, sulphate of lime. A barrel to the acre will be plenty—cost one dollar—and, I should be tempted to give a dressing of 3 cwt. of superphosphate as often as I could afford it. As for farmyard dung, that goes without saying. In low, peaty soils, ground mineral phosphates such as Carolina rock and the *old char* mentioned in the last number of the Journal, would answer well without being dissolved in sulphuric acid. Lime in its usual state of hydrate is impossible to use here, as such a mere fleabite of a dose as forty bushels to the acre would cost $16.00, beside the carriage over 25 miles of rail. Salt is utterly unnecessary, as our land is full of it, but ten bushels of ashes, per acre, would supply potash and phosphoric acid, both of which, in an available form, are almost absent from our light land. (1)

There is no earthly reason why grass should not be as permanent a crop here as it is in the South of England. We have hot summers it is true, but there is enough rainfall to produce abundant pasturage in the average of seasons, if the land is fairly dealt by. Of course I don't mean to say that poor sandy soil will stand long in turf. A cool bottom is desirable, and most of our farms afford that. But the point on which I must be pardoned for insisting, even at the risk of repeating myself, is: there are certain grasses that affect certain soils, and do what you will you cannot prevent nature from exercising her power of selection.

A most valuable lesson has been learnt at Rothamsted. There is the old struggle of the survival of the fittest going on continually among the grasses and other plants when associated together in pasture. They are all on the very best of terms; grasses, clovers, crowfoots, daisies, all have perfect peace as long as they are left to themselves. Season after season, the same plants appear, varying only accordingly as the character of the season may affect the individual habit of each species. But let the hand of man interfere with the simple processes of nature, and all is changed. Let a handful of nitrogenous manure be thrown over a patch of pasture, and instantly a fierce fight begins: the grasses lay hold of it, rear up their bulky forms, and exercising the depressing influence of their lofty shadows, drive the humble clovers, comparatively speaking, out of existence.

If phosphates—not what is sold in the States, but unmixed phosphates—are used, the *grasses* will be no larger, but the *clovers* will flourish, and usurp more than their fair share of the common territory. In fact, each act of improved cultivation occasions an internecine war. Whether the land be manured, drained, or otherwise interfered with, the effect will be to change the condition to which the turf has been subjected, and each plant will instantly endeavour to turn the opportunity to its own advantage. Thus the general effect of improving grass land is, by exciting this emulation, to drive out the inferior plants, and to increase the proportion of good grasses in a pasture: good grasses, with good farming, drives out bad ones.

But to my mind, the point of the greatest interest in Sir John Lawes' experiments on pasture-grasses is: that the *ultimate herbage depends on management and not on the description of seeds sown* Every heath and down will illustrate the truth, that if the soil food is bad, the weeds and inferior grasses will drive out the better sorts of herbage – supposing them to have existed—; and if the food is good, the superior grasses will drive out their rivals.

Thus we have arrived at a general law of great practical importance in farming; feed your valuable plants well, and they will fight for you against your enemies the weeds. We know the law, you will say; perhaps so, but you don't follow its behests, or else your pastures would wear a very different appearance.

The effects of manures at Rothamsted were, in general, as follows: farmyard dung increased the bulk of the grasses, and in so doing diminished the weeds. *All* manures tended

(1) The sentence seems incomplete. There are many other sentences in the report, as I have it, in the same condition. A. R. J. F.

(1) I may remind my readers that the recommendation of the use of ground mineral phosphates does not apply to our *apatite*, which, undissolved, is utterly useless. A. R. J. F.

to drive out the weeds by increasing the better herbage. Mineral manures, alone, diminished the proportion of the grasses by lending special aid to the growth of leguminous plants, such as clover and the meadow-vetchling, or wild tare.

On the other hand, ammonia-salts favoured the production of the grasses, increased their bulk, and, by doing so, destroyed almost all the leguminous plants and the weeds, developing in a very remarkable degree the leaves of the grasses rather than the stems and seeds.

Of the mixed manures, ammonia salts and minerals together gave the greatest increase of crop, still favouring the grasses, almost to the exclusion of the clovers and other leguminous plants. Weeds were driven off, and the development of the stems and seeds of the grasses was particularly marked.

I see no reason why the young seeds should not be laid down with a crop of rape, to be pastured with sheep eating cake or corn—about 4 pounds of rape-seed to the acre, sown broad-cast.—The rape would act as a shelter, and the sheep in feeding it off would—repeating myself for the dozenth time—firmly fix the roots of the young grasses in the soil. But I would on no account allow of feeding off the young grass, after the rape was eaten, except with young cattle. Observe, that in autumn, during a white frost, whenever any animal sets its foot on young grasses they (the grasses) turn black as soon as the sun rises. Sheep, where they find plenty of rich food like rape, will not trouble themselves to bite out the hearts of the clovers, which is the chief harm they are likely to do. Rape, sown on the 15th May on land in good heart should be fit for the sheep by the 15th July. It should be fed off, in this case when about 15 inches high, and the sheep should not be kept long on the same piece; that is to say, they should be run quickly over it. I have no experience of such land as professor Brown talks about, where there is danger of smothering the grasses within a month of their being sown; but I know that in that highly farmed county, Lincolnshire, the farmers always sow down land for permanent pasture with rape, and it answers perfectly. Sir John Lawes sees no reason why young seeds should not be sown with a barley crop; wherein I hardly agree with him—all our farms are not in such high condition as his; but he lays great stress upon the non-feeding of the grass in autumn after harvest. He, and every good farmer too, thinks it very important that the tilth should be fine, and that the seeds should be lightly but well covered, and the land rolled down smooth. The variety of grasses sown, he says, can hardly be too numerous, leaving the best and most suitable to hold their own after the inevitable fight that will ensue.

Lawes is much opposed to the practice of mowing the second year, having found that it destroys the clovers and the lesser grasses, by its encouragement of the free-growing and coarser species. He would, by preference, not mow at all for the first few years, and would exclude sheep, feeding with cattle entirely, and perhaps a few horses in the autumn, to eat off the more rugged portions which the others have rejected.

A pasture can't do much above ground—after the first cream is skimmed off—till there is a bulky formation of roots below. The roots of a good old pasture will weigh from 5 to 10 tons an acre. New turf will not become permanently productive until after the underground formation of stored up material, and of that extensive absorbing apparatus which exists in the large development of roots.

And what are the conditions necessary to maintain the best kind of grasses—when we have got them—in a permanent state of productiveness? They are these: the land should be of such a texture as not to part with moisture too readily, nor to hold it too long; and we find these conditions best fulfilled with a fair depth of mould resting upon a well-drained clay subsoil. The wetter and the poorer the land is allowed to become, the more worthless will be the vegetation upon it. It is quite a mistake to think that drains do little or no good on grass-lands. On the contrary, the most valuable grasses won't flourish at all in damp situations, being soon vanquished and expelled by sub-aquatic plants. All kinds of stock do better on well-drained land; having a drier couch to lie on, and sweeter, more nutritious food. Manure, too, is almost thrown away on undrained land; it won't rot—like bodies in a wet burial ground.

The land should be perfectly clean and in good heart. No better condition can be found for sowing grass-seeds than after a crop of roots.

As to the choice of seeds for sowing, that will depend entirely upon the character of the land. Some varieties thrive best at one season and others in another season. Some sorts extract food from the soil which would not be utilised by other varieties. Some, again, mature early in the season, others later. Stock of all kinds, too, do better on a variety of food than when confined to one alone. Lastly, the land when plenty of different sorts of grass are sown will have a better chance of selecting, as it will most surely do, those kinds which are best suited to its capabilities of providing subsistence for its future foster-children.

At Rothamsted, Sir John found that on the unmanured land there were fifty-four species of plants, twenty-eight of which were weeds, eighteen were grasses, and four leguminous plants. Of these, sixteen species made up 74 per cent. of the weight of the produce, while five species alone made up from 60 to 69 per cent. of the heaviest crops.

The following is a list of the best grasses:

Alopecurus pratensis...	Meadow foxtail.....	Rich loams.
Agrostis stolonifera....	Creeping bent.....	General soils
Avena flavescens.....	Yellow oat-grass.....	Sands.
Cynosurus cristatus....	Crested dogtail.....	General soils.
Festuca duriuscula....	Hard Fescue.....	Universal.
" pratensis	Meadow "	Rich loams.
" ovina	Sheep's "	General soils.
" lolium	Darnel-leaf fescue.....	" "
" rubra.....	Reddish "	Clays.
" tenuifolia	Fine-leaved "	Light soils.
Dactylis glomerata.....	Orchard or Cocksfoot...	Rich loams & clays.
Lolium perenne.....	Perennial ryegrass.....	Universal.
Phleum pratense.	Timothy	"
Poa pratensis.....	Smooth meadow.....	"
" trivialis	Rough "	Clays.
" nemoralis	Wood "	Shady places.
" sempervirens.....	Evergreen "	General.

The perennial ryegrass is generally called "Pacey's." If sands are full of dung they will grow any of these grasses. The natural grasses of this neighbourhood (Sorel) seem to be chickweed, *fin foin*, wild timothy, and white clover.

Among the chief requisites for a comfortable home demanded by the grasses is that its geological position shall be congenial to their individual habits. In this province, the underlying rocks have, almost invariably, been covered up by accumulations resulting from the operations of water.

We see how streams and rivers cut out for themselves channels, glens, and valleys, and transport the eroded materials in the state of mud, sand, and gravel to some lower level. The sand and gravel, being the heaviest, are deposited first; the clay, remaining longer in suspension, only leaves its bearer when the water becomes tranquil. This may be seen all along the course of any river by any one who chooses to look. These operations began when the land received its present configuration; and thus we have accumulations, often of considerable thickness, of alluvial silt, masses of gravel and shingle, with occasional beds of clay, and layers of moss or

bog earth The Richelieu, which flows within fifty yards the place where I am writing, affords a good example of this. Take Chambly, for instance: above the *Canton*, there are sand and gravel; at the *Bassin*, dark blue unctuous clay; and in the *Savanne*, a thick bed of peat.

On these drifts and alluvial deposits lie most of our farms. The subjacent rocks affect them but little, except where the two, on the lower slope of the hills, meet and modify one another, as at St. Hilaire, Rougemont, Abbotsford, &c.—Our best plan, I take it, will be to consider, in laying down permanent grass-land, what plants are best suited to these accumulations, without troubling ourselves with the rarer cases in which the silurian, or the primitive rocks, come to the surface.

Our Eastern Townships are full of outlying bits of land in grass that have never been broken up at all. Here, the grass perhaps twenty different species of grass should give a higher flavoured product than a pasture with only two species.

Now, nothing is easier than to improve these upland pastures. They are principally deficient in two constituents, lime and phosphates. A barrel of plaster per acre will supply the former, and two cwt. of old char—burnt bones—will supply the other; total cost, $2 50 an acre. A few bushels of wood-ashes would help, no doubt, but as the land has never been scourged by grain-crops, potash must be present in sufficient quantity. Oh, you really fortunate husbandmen! If you only knew the wealth you possess in your side-hill pastures, with a hundred trickling streams curvetting down their slopes!

DE OMNIBUS REBUS.

Steaming food for cattle.—I do not think steaming food

is the natural production of the soil, and, where the subsoil is cool, should never be broken up on any account. These pastures are most valuable, and are worth treating well. My friend Mr. Wm. Macfarlane, a very successful cheese-maker, wrote to me some six years ago to this effect:

"You are quite right in saying that the cheese of mine you tasted at the Exhibition last year (1879) was the produce of old pastures. In reference to the kinds of grasses of which the pastures are composed here, they are mostly timothy and white clover, and the pastures are all permanent, and mostly hilly, with now and again a pasture on low ground with wild grass. It is very rare to see a pasture with any of it ever having been ploughed—just as nature left it after being cleared of the timber which grew on it." Dated; West Brome, Dec 2nd, 1879

The cheese in question was so full of flavour, and so meaty, that I was convinced that no new grass could have made it, and so it turned out. It stands to reason that a pasture with for cattle pays, except for cows giving milk for sale. The following extracts from the Rural New Yorker will show that I am not alone in my opinion.

Steaming feed.—Can you give me any information about steaming stalks and hay? Is it injurious to cattle or horses to feed steady without any unsteamed fodder? Is it best to steam feed with fodder? Should fodder be wet and mixed before it is put in the vat? What is the best length to cut stalks to prevent sore mouths? I cut mine one-quarter inch long—is this a correct length? C. W. S. *New Jersey.* [You will find these questions fully answered in detail, and the practice of several skillful managers given, in the article of 20 pages, fully illustrated, in RURAL AFFAIRS, vol. VII, commencing on p. 123. We know of no instances of sore mouth produced by stalks cut a fourth of an inch long, whether steamed or fed dry, and by which the value of the

corn fodder is usually doubled in either case. Some of the best managers who formerly steamed or cooked the food for cows, have now discontinued the practice, as they find it does not pay for the extract labour and expense.] *R. N. Yorker.*

William Crozier, Beacon Farm, Northport, L. I., one of the smartest stockmen in the United States, gave up steaming feed after a number of years of trial, as he became satisfied it weakened the constitutions of the cattle, and it certainly caused the calves to be puny. *R. N. Yorker.*

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3. Roskilde, about 30 miles to the south-west of Copenhagen. Mr. Neilson's farm outside the town, is rented from a convent at 38s. 6d. an acre. His 26 cows were crossed from the Angeln and Jutland, two native breed resembling our

Ayrshires and Shorthorns in their adaptations, but rather larger. They are never outside grazing except for a month or two in the autumn, and the following will show the high-feeding practised here, with its results :—In winter the daily mixture for each cow is—5 lbs. bran, 2 lbs. ground oats and barley, 1½ lb. rape cake, 1½ lb. palm nut-cake, 1 lb. cotton-cake, ½ lb. linseed cake, 1 lb. earth nut-cake, 80 lbs. mangold, 8 lbs. of hay, and all given cold, as they consider warm food very wearing on the cow. In summer it is 2 lbs. bran, 1½ lb. cotton-cake, 1½ lb. palm nut-cake, with as much clover or vetches as they will consume. The average annual yield of milk per cow is 900 gallons. Each cow's produce is marked down on a board, and when they do not give 750 gallons the owner feeds them off. All the dairy buildings are sunk under the dwelling-house, and are very suitable and clean. The byre had four rows across, with the heads to each other; but the roof was too low, and ventilation very bad. The foot walks were rather narrow and dirty, and precautions against sewage filtration were insufficient; but all the crops on this farm were good and clean.

Cost of draining.—"What will it cost," asks a correspondent of the Rural New Yorker, "to underdrain forty acres of land lying along a river?" In reply the editor states that "the cost of draining varies much with the hardness of the subsoil, imbedded stones, depth of drains, nearness to tileries, price of labour &c. The average, however, for thorough work, and with drains two rods apart over the entire surface, varies from thirty to forty-five dollars an acre." In England, the Drainage companies used to contract at from $18 to $24 an acre for drains two rods apart and four feet six inches deep. Four feet deep and two rods apart in stiff clay, without *picking*, I have had done for $15.50 an acre—lots of it—all expenses, except cartage of tiles included. This was in Kent, a very high-waged county. Any expenditure such as the R. N. Yorker mentions is totally out of the question here, as it would buy the fee-simple of the land.

Feeding calves.—My favourite calf-food has again proved itself to be the best. In this country for beans I of course substitute pease, as beans are not grown except on the Island of Montreal.

Some interesting experiments in feeding calves were recently reported for the Munster Agricultural and Dairy School. The foods used were as follow, the quantities named being given daily; (1) eight quarts of skimmed milk; (2) ten quarts of separated milk; (3) a mixture prepared by pouring eight quarts of boiling water on one quart of linseed-meal and one-third quart of bean-meal, covered up for twenty-four hours, and then boiled with more water, enough of which was added

to provide eight quarts for each calf; (4) a feeding meal sold at 21s. per cwt., mixed with water — quantities not stated. Two calves were put on each kind of food, and, after they were a month old, each had a little hay. The experiment lasted from May 20th till August 27th. The average daily increase in live weight in the different lots was 1.6 lb. for the first, 1.77 lb. for the second, 1.65 lb. for the third, and 1.65 lb. for the fourth. The cost per lb. of increase was respectively in the same order of lots, 2.9d., 3d., 1.55d., and 2.16d. (1) The mixture of bean-meal and linseed-meal, therefore, gave the best increase at the least cost per lb.

Value of roots. — Professor Brown, Inspector of cattle for the Privy Council of England, writing on "Animal Life," says that animals can not be fattened on roots without grain No animals can be made to pay their keeping when fed for beef, unless the value of their manure is taken into the account. Stock husbandry is yet the chief reliance to the ordinary farmer. Roots are worth more in practice than chemical analysis indicates. The water in roots is not like the water from the pump. Enough roots should be fed to prevent cattle from drinking much water.....

A theory which fully confirms what I have so often put forth — timidly, I confess — in this journal.

Food for milch-cows.—Mr. E. C. Tisdall, who manages the cattle experiments for the Royal Agricultural Society of England, is an extensive dairy proprietor. He keeps about 200 Shorthorn cows and supplies large quantities of milk to the London dealers. My readers will observe that he does not steam his mixture but, as I have often recommended, simply pours boiling water over it. Neither does he allow the mixture to *ferment*, but uses it twelve hours after moistening. In 1874, Mr James Cochrane told me that he attributed the loss of a great many of their calves to the fermentation of their food. I had suggested this the year before to his father, and on the son's return from Cirencester, it was given up. Sour food for pigs, but not for cows.

EXPERIMENTS

Mr. E. C. Tisdall, Chairman of Experiments Committee, reported that the Sub-Committee visited Sudbury, near Derby on January 27th, and selected thirty cows. They were further divided into three sections of ten each, of about equal milking capacity. The following daily ration of food for *each animal* had been agreed upon for the present, and instructions to that effect given to the bailiff in charge: —

20 lbs. mangolds
5 " meadow hay, uncut
5 " ditto, in chaff
10 " straw chaff
20 " grains
2 " bean meal
2 " maize meal, and
2 " palm-nut meal

Ten quarts of boiling water to be poured over the mixture of chaff, grains, and meal twelve hours before use. *Ag. Gazette.*

"*Quebec*" sends the following notes.

The "nsus of 1881 gives occupiers of farms 137,863, improved, [6 410 264 -

Green Crops	Potatoes, acres, 123.869..	Bushels 14,873 287
	Turnips " not given.....	" 1,572.476
	All other roots, acres not given.....	" 4,050.901
	Maize	888.169

(1) Parts of a penny stg

The number of acres in hoed crops, I am inclined to think, would be, from the above data, about 165, 829; one acre and one-fourth per farm, or one acre in 37.

This is a very small proportion indeed. There must be many thousand farmers who grow no hoed crops, and, as we saw last month, "a summer-fallow is a thing unknown to the farmers of French extraction;" it is no wonder the land yields so little, and is so full of weeds.

"Quebec" wants to know "why the old country farmers, at least, do not grow more hoed crops." I really cannot say, but I know that in this neighbourhood the farmers "of French extraction" are becoming alive to the necessity of cultivating roots; for as one of them remarked to me yesterday: "I am going more and more into growing roots every year, my cows have two blue-pails full of turnips each every day, and I see the good of them all the time." I should like very much to know what proportion roots bear to acreage in Ontario: It is very certain that the root crop of that province is most carefully managed, and, though the extent of pasturage infringes on its limits, the acreage of roots must be large.

OUR ENGRAVINGS.

Imported 2 years old Holstein, Friesian bull, "Mars-Ellis" — v. article on p. 52.

Hampshire Downs— 3 engravings.—

Imported Holstein-Friesian cow, "Estrella G." v. article on p. 53.

Price of meat in England. — At Bristol, my brother writes me word, *good* muttion is selling for 9 cents a pound for necks and shoulders, and 14 cents a pound for legs! Such is the effect of the high prices butchers have been charging that farmers are killing their own stock and retailing the joints out just as is done here.

Mr Wood has kindly sent me three photographs of his Hampshire Down sheep. They are true to type, and good specimens of the breed. I find that his prices for lamb-rams, in the fall, say, in September, are from $20 to $25 each. Reasonable enough, as a good early-dropped lamb will serve forty ewes, if properly managed. I have already spoken so much in favour of the hardiness of the Hampshires, of the good flavour of their mutton, and of their prolificacy, that I will not go over the old story again. I still retain my opinion that they are the sheep for this country. The wool of the "Baron" looks a little open on the flanks, but his position is the cause; the wool of the breed in general is of the very closest description.

Artificial manures. — Bone-ash, in Liverpool, 70 0/0 phosphates, is worth $17.30 per short ton — 2,000 lbs. — Here, "old char," the same thing, 74 0/0 phosphates is worth $15.00. This is as it should be. Compare it with superphosphate here: 24 0/0 soluble phosphate, $26.00 a ton; Liverpool 26 0/0 soluble phosphate, $12.60 a ton! This is as it should *not* be.

The Elevator Ditching machine, of which we shall give an illustration in our next number has been before the public for about three years. I am told by a gentleman, who has seen it at work, that its effects are surprising. It would have to be let out to hire, if introduced here, as the cost is too heavy, and the team required too powerful for our small farms.

Arthur R. Jenner Fust.

Mt. Kisco, N. Y. Feb. 22nd, 1886.

A. R. Jenner Fust, Esq.

Dear Sir,—In response to your request of 1st inst. I send you to-day three photographs of my Hampshire-downs. If you reproduce them in your Journal will you kindly send me a few copies ?

I have faith in the Hampshire as the mutton breed for this Continent, having sold them to go North, South, East and West, and having heard no adverse opinion from any quarter. I now have an order for six to go to Cuba.

Your very truly, James Wood.

THE SILO.

Montreal, Feb. 13th, 1886.

A. R. Jenner Fust, Esq.

Dear Sir,—Your P. C. came duly to hand, and in reply would say that ensilage is the cheapest, best and most wholesome food for stock of all kinds during our long winters after my five years experience with it and also for summer where stock is kept on the soiling system.

I had six and a half acres of Western corn which filled my two silocs, which contain about 150 tons, and commenced to feed the second week of October last fourteen head of cattle, and twenty-two sheep. I shall have plenty to last till end of May. The cattle in milk get two quarts twice a day of ground oats, peas and barley mixed; young stock one pint twice a day and what waste hay there is from six horses at night; the sheep get about three quarts of above mixture, and a feed of oat straw at noon, and if any one has their cattle and sheep in better health and condition than mine, I would like to see them.

Any farmer that will make ensilage and put it in right, that is, cut it up fine and pack it well and fill slowly, say not more than a foot per day, so that it will get quite hot, the hotter the better while filling, as it makes it sweeter, and put a row of handy stone along the wall and one up the centre of the covering planks,he will have the *best* of feed for his stock, and will never want to go back to the old slavish way of making hay and making mashes of his meal for his stock; for with ensilage, all you have to do is mix the meal with the ensilage as you feed it and you need never be afraid of impaction of the stomach and constipated bowels.

Yours, M. C. Dawes.

Mr. Ritchie informs us that his Holstein Heifers gave at 24 months old 33 lbs. milk per day, on very poor grass and without any pushing whatever; and it took 17½ lbs. of milk to make 1 lb. of butter. So he presumes that they are the coming dairy cow.

This is certainly the first time that we hear of Holstein's milk of such richness. The averages we had heard of so far were of from 30 to 40 lbs. of milk for one of butter, and although we have every confidence in Mr. Ritchie, we are afraid of some mistake in these extraordinary figures.

E. A. B.

American and Canadian Cheese.

The meeting of the members of the New York cheese trade, the other day,to discuss the question of Canadian competition with cheese made in the United States, fully confirms, *Bradstreet* states, the views frequently expressed. All the speakers were unanimous in the opinion that if something were not done to regain for America its lost ground, Canada would ultimately become the great cheese-producing country, and at the same time there was the same unanimity in the views of the various speakers regarding the superiority of the Canadian product, especially as regards its keeping qualities.

THE FOOD OF PLANTS

A POPULAR LECTURE

LATELY DELIVERED AT READING, ENGLAND.

[We have had this lecture in type for some months, and now publish it as a fair representation of the relation of plant, soil, and manure.]

Carbon, oxygen, hydrogen, and nitrogen—these four elements are as main pillars for the structure of the whole organic creation; from them, with sulphur, phosphorus, and their compounds, all the numberless wonderful forms of the animal and vegetable world are produced. We as yet know little how these results are effected, but we have nearly ascertained the external conditions under which they take place, and the sources from which the above-named elementary substances are derived.

That plants require for their germination and development soil, water, air, heat, and light is well enough known; and the chemical investigations of modern times have diffused a clearer light as to what individual constituents are taken up from the water, the earth, and the air by the plants, and serve them as means of nourishment.

REQUIREMENTS OF THE PLANT.

Water.—Water containing carbonic acid makes a sensible impression even on quartz. In an experiment quoted by Liebig, some white sand was thoroughly cleansed by boiling in nitro-muriatic acid, and, after completely removing the acid by washing the sand with water, the sand thus purified was exposed to the action of water saturated with carbonic acid. After the lapse of thirty days this water was analysed, and found to contain in solution silica, carbonate of potash, lime, and magnesia; thus proving that the silicates contained in the sand were unable to withstand the continued action of water containing carbonic acid; although the same silicates had resisted the short action of "aqua regia." So also, in nature, felspar and all minerals and rocks containing silicates of alkaline bases, cannot resist the continued solvent action of carbonic acid dissolved in water; and in this way, either in the form of soluble silicates or a hydrate of silica this important ingredient in some plants is taken up by the roots. All plants of the grass kind require silicate of potash. the amount of which removed from a meadow in the form of hay is considerable, as well as evident to anyone who examines the melted ashes of a haystack which has been consumed by fire, the earth of which exhibits a glassy appearance.

Manures.—The seeds of beans, peas, garden cress, &c., will germinate, and even grow to a certain extent, on moist sand or moistened horsehair. In such case, the only mineral substance is that contained in the seed, and when that is exhausted, the plant dies; it may blossom, but it can never bear seed; some of the principal ingredients of the seed are absent. Various plants have been grown in purified sand. Barley and oats grown in this way, and moistened with pure water, reached a height of 18 inches; they blossomed, but did not come to seed, and died soon after. Vetches reached a height of 10 inches, blossomed, and put out pods, but they did not contain any seeds. Tobacco attained the height of only 5 inches in four months, the plants had only four leaves, and no stem. The analysis of the ashes of these plants proved that the sterile sand had yielded a certain small amount of potash and soluble constituents, on which the growth of the leaves and stems depended; phosphoric acid was also detected,

but its quantity proved it to have been derived from the seeds sown. By an instructive variation of these experiments, an artificial soil was prepared from the same sand, with salts, prepared in the laboratory. Seeds of the same plants were sowed in this soil, and they flourished in the most luxuriant manner. The tobacco rose to the height of 3 feet, put forth many leaves, blossomed, and ripened its seed. So also barley, oats, buckwheat, and clover grew luxuriantly, blossomed, and yielded ripe and perfect seeds. The growth of these plants, doubtless, depended on the addition of the salts to the sterile sand. In the same manner, any other plant might be made to grow in a similar artificial soil, provided those saline and mineral substances were added to it which, analysis proves, must exist in the stem, leaves, and seeds of the natural plant.

The ashes of the same plants, though on different soils, are similar in chemical composition. Silica and potash are always present in the straw of the graminæ, and in their seeds is always phosphate of potash and phosphate of magnesia. In the straw of peas and in clover a large quantity of lime occurs. Liebig classified cultivated plants, according to the solubility of their ashes, into:—1. Potash plants, the ashes of which contain more than half their weight of salts with alkaline bases (potash and soda), soluble in cold water. 2 Lime plants, the ingredients of which are salts of lime and magnesia, soluble in acid. 3. Silica plants, in which silica predominates, and this is insoluble in acids. Potash plants include the chenopodium, wormwood, &c.; and amongst cultivated plants, the beet, mangel wurzel, turnip, and maize. Lime plants include the lichens (which contain oxalate of lime), the cactus (which contains crystallised tartrate of lime), clover, beans, peas, and tobacco. Silica plants include wheat, oats, rye, and barley. In our cultivated plants soda seems to be substituted for potash, but it does not appear, that lime can replace the alkalis in these plants.

PROVISION FOR PLANTS.

The art of manuring land depends chiefly upon two considerations—first, a knowledge of the inorganic constituents of of the crop intended to be grown; and, secondly, a knowledge of the constituents of the soil, or, in other words, the soil must be able to supply the crop with mineral food sufficient in kind and quantity to enable it to arrive at maturity. For example, in preparing the soil for potatoes, the farmer ought to know that both lime and potash are required; for the potato plant belongs to the lime plants as regards its leaves, and to the potash class as respects its tubers. So, also, in growing beetroot, phosphate of magnesia is required, and only a small quantity of lime; but in growing turnips much phosphate of lime is required, and only a small quantity of magnesia.

It has been shown how a soil may be rendered perfectly sterile even for weeds, by carrying off crops every year, and returning nothing to the soil in the shape of manure. This state of sterility may be produced sooner by one plant than another. If, for example, the soil be poor in phosphates, but rich in silicates, wheat will exhaust it sooner than oats or barley, because a larger amount of phosphates is removed in the seeds and straw of one crop of wheat than in three or four crops of barley or oats. If the soil be deficient in lime, barley will not flourish. However rich the soil may be in silicates, seed cannot be formed without phosphates. We may grow admirable straw for Tuscan bonnets, but we shall get little or no bread. When the supply of phosphates in a soil is limited, while alkaline silicates are abundant, the exhaustion of the phosphates may be delayed by a judicious system of rotation of crops; if, for example, we alternate with the wheat plants which are usually cut before they come to seed, or plants which require scarcely any phosphates. If peas and beans be cultivated on this soil, they will leave in the soil after the crop is removed a quantity of silica in a fit state to feed a succeeding crop of wheat, but they will rob the soil of phosphates quite as much as the wheat. The exhaustion of the phosphates may, however, be delayed by adopting a rotation in which potatoes or clover are made to alternate with a white crop, the former crops being rich in sugar, starch, &c., but containing little phosphates. The large amount of phosphates which are carried off by our crops and by grazing animals are, for the most part, returned back to the soil in the form of bone manure, a single pound weight of which contains as much phosphoric acid as a whole hundredweight of corn. In this way, while our farmers are paying large sums of money to foreign for countries bone manure, our domestic arrangements are so faulty that we waste every year thousands of hundredweights of phosphates in the form of urine and solid excrements, which are allowed to flow out into the sea by the Thames and other rivers. (1)

A field properly prepared for culture ought to contain in sufficient quantity, and in the form adapted for assimilation, all the inorganic materials required by plants. It must also contain a certain amount of ammoniacal salts and inorganic vegetable matter. In such a field the system of rotation is, that a potash plant (turnips or potatoes) is succeeded by a silica plant, and the latter, is followed by a lime plant (peas or clover). The potash plant requires alkalis, and only a small quantity of phosphates, the silica plants require, in addition to the soluble silica left by the potash plants, a considerable quantity of phosphates; and the lime plants may take away so much of phosphates that only enough may be left to grow a crop of oats or rye. Thus the soil may suffice for two successive crops of a potash or a lime, and for three or four crops of a silica plant; after which the mineral substances removed from the field in the form of fruit, herbs, or straw, must be restored in the form of manure, or the land will lose its fertility.

In every system of manuring it is not the name of the manure, but its chemical composition, that constitutes its agricultural importance. It is of course unimportant whether we obtain ammonia in the form of urine, or from the ammoniacal liquor of the gas-house; or whether phosphate of lime be in the form of bones, or the mineral apatite. The chief object of manure is to restore to the land the substances which animals and crops have taken away from it, and which cannot be restored by the atmosphere.

VEGETABLE MANURE.

But the quantity and kind of vegetable manure are of importance so as not to overload the soil. For example 1000 lb. weight of willow sawdust, fermented and added to the soil, impart only 4½ lb. of saline and earthy matter, while the same quantity of dry willow leaves will contribute 82 lb. of inorganic food. Green manuring, as it is called, as sowing a crop such as rye, buckwheat, white mustard, &c., and ploughing it into the soil while green, is a useful practice. The juices of the plant soon begin to ferment, and the vegetable matter is thus more equally diffused through the soil, and by this natural decay of vegetable matter ammonia and nitric acid are produced for the succeeding crop. If the farmer were to collect the green sods and weeds of his lanes and fences into compost heaps, he would always have a supply of valuable manure.(2) Seaweed is an excellent green manure; it decomposes easily and yields organic food and saline matter of great

(1) True, but no one seems to be able to plan any means of saving the sewage at any reasonable expense. A. R. J. F.

(2) Composts, in Canada, cost too much for labour. A. R. J. F.

value. Dry vegetable manure, such as straw, ought to be mixed with the urine and droppings of cattle, so that by its fermentation its particles may be brought into that state of minute division in which alone it can form the food of plants. Sawdust saturated with the ammoniacal liquor of the gas works or with liquid manure is good for raising turnips.(1) Sawdust (2) may be charred by burning or by mixing with quicklime Bran and pollard of wheat, moistened with urine and slightly fermented, form a good manure. Brewer's grains and sprouts of barley formed in the process of malting are also useful.

The seeds of plants are more enriching to the soil than the substance of their leaves and stem; thus rapeseed, after the oil has been expressed, is good for land, especially when used with other manure.(3) Charcoal powder absorbs noxious vapour from the air and the soil; it also absorbs oxygen and other gases; hence it forms a valuable mixture with liquid manure, night soil, farmyard manure, ammoniacal liquor, and other rich manures. Seeds sown in moistened charcoal sprout with remarkable quickness and certainty. (4) Soot contains from 18 to 48 per cent. of mineral matters, consisting of earthy substances from the coal and of gypsum and sulphate of magnesia derived from the lime of the flue and the sulphur of the coal. It also contains from 1 or 5 per cent. of ammonia, chiefly sulphate. Hence it is a most valuable manure. It must, however, be used with caution, because, when applied to grass in the spring, it is said to give a bitterness to the pasture and even to communicate that taste to the milk. Coal dust or that which is too small for burning, is used in arable land or as a top-dressing upon old pastures. Coal tar may be used in the form of a compost, or applied to wheat stubble by means of the water cart, and allowed to remain two or three months before being ploughed in. Peat contains a valuable store of organic matter capable of improving the adjacent soils. By draining off the sour and unwholesome water, and applying lime and clay, peat bogs may be converted into rich corn bearing lands. Tanners' bark may also be used when it can be got easily and cheaply—a remark which applies equally to almost every form of manure.

(1) And yet every drop of ammoniacal liquor from the Sorel gas-work goes into the river. A. R. J. F.

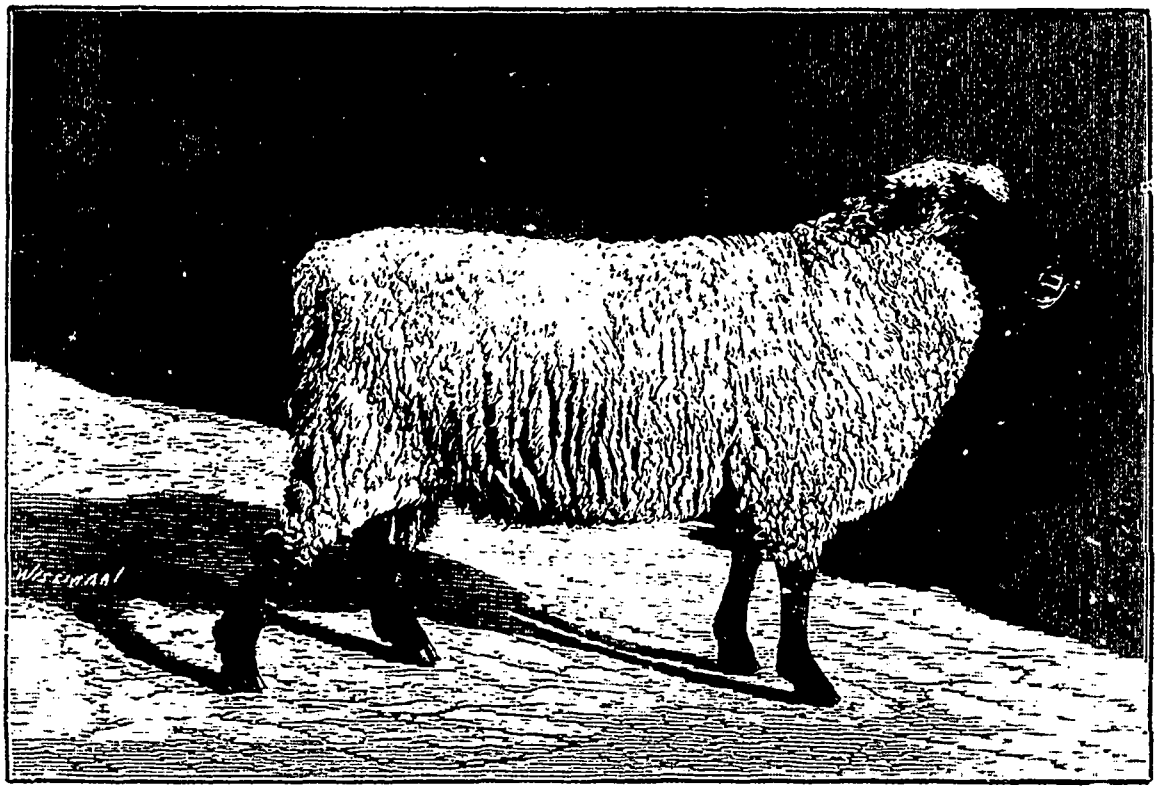
(2) Sawdust had much better be used for litter. A. R. J. F.

(3) Rape-cake was the principal manure used at Holkham by Lord Leicester's tenants, who were the wonder of the early part of the century. A. R. J. F.

(4) Useless in the neighbourhood of London, but an admirable manure elsewhere. A. R. J. F.

ANIMAL MANURE.

Animal manures which contain much water—such as flesh and blood—decay rapidly, and are fitted to operate immediately on vegetation; but their action is temporary. Dry animal manure, such as bones, decomposes more slowly, but the beneficial effect remains through several seasons. Flesh is rarely used as a manure, except in the case of horses and cattle dead from disease. Fish is in some districts employed extensively as a manure, such as the refuse of the herring and pilchard fisheries, sprats,(1) herring, dog fish, and mackerel when very abundant. It should be made into a compost with a large quantity of soil. Shell fish is a valuable manure, especially if crushed. Blood makes an excellent compost with peat ashes and charcoal powder. Animalised charcoal is blood from the sugar refineries, in which lime-water and bone charcoal have been employed in refining the sugar. It contains about 20 per cent. of blood, and is so much esteemed in France that the sugar refiners sell it for more than the unmixed blood and animal charcoal originally cost them. This



(6) One hundred bushels an acre for hops in Kent, at 12 cts. a bushel. A. R. J. F.

has led to a spurious imitation, which is much less efficacious than the original. The parings of skins from the tan works are first boiled down by the glue makers, and the insoluble refuse sold as manure Horns, horn sawdust, hoof parings, hair, and wool are all valuable and permanent manures.

Blood and flesh contain from 80 to 90 per cent. of their weight of water; but a ton of horn shavings, of hair, or of dry woollen rags, is as efficacious as 10 tons of blood; but, as they decompose more slowly, they *appear* to be less effectual than blood Bones form a very valuable manure, 100 lb. of bone-dust convey to the soil as much organic matter as 33 lb. of horn, or 300 or 400 lb. of blood or flesh; they also add about two-thirds of their weight of inorganic matter, consisting of lime, magnesia, soda, common salt, and phosphoric acid, all of which must be present in a fertile soil. In order that bones may be the more readily available as food for plants, the bone-dust is mixed with dilute sulphuric acid, which completely dissolves it in two or three days. The solution or paste may be dried up with charcoal powder, dried peat, sawdust, or fine vegetable soil, and applied with the drill to the turnip crop, or diluted with fifty times its bulk of water, and applied with the water cart.

But it is in the solid and liquid excrements of an animal, that manure obtains its highest value especially for those plants which furnished food for the animal. The dung of pigs fed upon peas and potatoes is best adapted to manure a field growing peas and potatoes. In feeding a cow upon hay and turnips we get a manure containing all the mineral constituents of grass and of turnips. The dungs of pigeons contains the mineral ingredients of the cereal grains; that of the rabbit the contituents of culinary vegetables, the solid and liquid excrements of man contain in very great quantity the mineral substances of all seeds.

Cross-bred males.

As there is a large number of cross-bred cattle in this country I would recommend those who wish to improve them with either Ayrshire, Shorthorn, or other breeds that, in selecting a bull, preference should be given to an in-bred one, if good, and the young stock should be mated with animals of the same strain as their sire, and the cross blood would be worked out in a few generations. There is great judgement required in selecting a bull. The breeder should understand the defects of his cow, and endeavour to secure a bull exceedingly good in those particular points, to counter-balance the defect. Great mistakes are made by many breeders of the Ayrshire cattle in selecting bulls. They run away with the idea that the more the bull has the appearance of a cow the better. They prefer one small in the head, with a ewe neck and shelly appearance, and very likely mate him with cows of the same stamp. The consequence is that the progeny are more like half-bred goats than good Ayrshires. If a bull is like a cow, what may you expect the cows from that bull to be? A bull should always have a masculine appearance, with substance and quality combined.

FARMYARD MANURE.

[In the *Albany Cultivator*, Oct. 6, Sir John Lawes, of Rothamsted, writes on this subject, in answer to a question why, in certain reported experiments, Indian corn had responded so freely to the action of farm manure, as compared with "artificial" manure. We take here some passages from his letter, selecting what is more especially of Canadian interest.]

The decomposition of barnyard manure is attended with the production of considerable heat, the land is rendered more porous, so that roots can penetrate more rapidly, the soil becomes more retentive of moisture, and its pores are filled with carbonic acid. In addition to a great variety of minerals, barnyard manure also furnishes organic carbon, organic nitrogen, ammonia, and nitric acid.

No one is in any way competent to assign the proper value to each of these operations, and yet the sum of them represents the value of barnyard dung.

Leaving out of the question all the benefits which the corn(1) may derive from that which the artificial manures could not supply, and considering barnyard manures in the light of merely supplying so many pounds of ammonia, phosphate of lime or potash, let us see how the case would stand.

Of course I do not pretend to say what would be the composition of the barnyard manure applied on Mr. Valentine's farm; but having compared the analysis of different chemists with our own, and having found that they agree tolerably well with calculation made as to the composition of barnyard manure, based upon the composition of the food consumed, and the litter used in ordinary farming, we have adopted the following figures:

Contents of 100 *parts of fresh manure.*

Potash	0.50
Phosphoric acid, calculated as phosphate of lime	0.53
Nitrogen	0.64

Adopting these figures, there would be in the 40 loads of barnyard manure applied to some of the experiments on the Houghton farm:—

Potash	400 lbs.
Phosphate of lime	424 lbs.
Nitrogen	512 lbs.

This nitrogen is equal to that contained in 2580 lb. of sulphate of ammonia, or 3300 lb. of nitrate of soda. Sulphate of potash contains about one-half its weight of potash. The barnyard manure would, therefore, supply the potash of 800 lb. of this salt. So far, therefore, as merely contributing the constituents used in the artificial manures, even the smaller application of 20 loads of barnyard manure, mentioned by your correspondent, would furnish them in much larger quantities.

It is true that in barnyard manure the greater portion of the ingredients are liberated during its decay, and that this process may extend over a period of very many years. (2) In our experiments on the continuous growth of barley at Rothamsted, we have found that 275 lb. of nitrate of soda, with mineral manures, has produced as large a crop for thirty years in succession as 15 ton of barnyard manure which supplied about four times the amount of the nitrogen contained in the nitrate of soda. It is quite possible that corn, with its vigorous roots, and great powers of growth, may liberate from the barnyard manure much larger amounts of food than can be effected by other cereal grain crops.

* * * *

It will, I think, be generally found that the beneficial influence of mineral manures, and more especially of phosphate of lime, bears some relation to the period when the seed is sown, and that when active growth commences, the nearer these periods are together, the greater will be the influence of the minerals.

It is the practice among English farmers to apply nitrate of soda alone, in March and April, to wheat sown in the previous autumn, during the autumn and winter the wheat has time to extend its roots sufficiently to obtain the requisite quantity of mineral food.

In growing barley, after a previous cereal crop, phosphates

(1) It is a pity the word *maïs* cannot be used universally, as, in England, *corn* generally means oats or all sorts of grain. A. R. J. F.

(2) Therefore, in England, half dung and half artificials are used, almost invariably, for roots. A. R. J. F.

are generally used with ammonia and nitrates; with root crops phosphates are often used without nitrogen. (1)

We have in our root crops a seed sown at about the same time as corn in the United States; both crops also terminate their active growth at about the same time in the autumn, and both are equally benefited by phosphate of lime.

At Rothamsted, on the land under a rotation-experiment of turnips, barley, beans or clover, and wheat, which has received no nitrogen for thirty-three years, the last turnip crop, manured with mineral superphosphate of lime, weighed 11 ton per acre, and contained 27 lb. of nitrogen. If our soil, after the removal of every particle of produce grown upon it during this long period, still yields so large a crop, surely we may expect that, upon the more fertile soils of the States, greatly increased crops of corn may be obtained by the same manure.

* * * *

Professor Atwater says that, "with many others, he is coming to suspect very strongly that plants do somehow or other get considerable nitrogen from the air;" and he proposes to carry out some experiments with the view of investigating the subject.

I am quite of opinion with Professor Atwater that it is exceedingly difficult to account for all the nitrogen which plants obtain, but I am disposed to look upon this point in a somewhat different light since we carried out, at Rothamsted, our experiments with plants, which confirmed those of Boussingault, to the effect that free nitrogen was not assimilated from the atmosphere.

Assuming even, for instance, that our experiments had proved conclusively that plants did assimilate nitrogen from the atmosphere, this would not alter the result with regard to those of our experimental crops in the field, which are well supplied with minerals, and yet, so to speak, are always crying out for nitrogen.

Speaking now as a commercial farmer, I should say that the main cause of all our difficulties is the necessity of a supply of nitrogen, combined with the high price which that substance bears in the market.(2) If, as a farmer, I were about to emigrate, with the hope of being more successful in the States, it would be because I should expect to find there a larger stock of nitrogen in the soil

A few years ago I was asked to select some land for the purpose of experiment, which should be of a very different character from my own. After spending some considerable time, aided by men with spades, I chose a field where the soil was a nice, light, loamy nature for the first 10 or 12 inches from the surface, while below, to the depth of 5 feet or more, there was apparently nothing but sand. I then had careful samples taken in different parts of the field. The analyses were not made until some time after the experiment had commenced; otherwise I might have possibly hesitated as regards the selection of the field. The result of the analyses showed that the amount of nitrogen within the range of the deepest roots of our agricultural crops was about 10,000 lbs. to the acre! (3)

As it is quite within the limits of probability that the soil in the United States may be very much richer in nitrogen than our English soils, does not the interest of the question lie in the soil itself?

In order to decide the point of whether plants do or do not obtain nitrogen from the atmosphere, I think we must look to the continuous growth of crops freely supplied with mineral manures, but left to their own resources to obtain a supply of nitrogen.

We know that in the States 100 bush. of corn can be raised per acre. I should have some faith in the power of this plant to obtain its nitrogen from the air, if a crop of this magnitude could be grown continuously, as I do not think that any ordinary soil could liberate its nitrogen so fast; if, however, crops of only half this quantity, or less, are obtained, I see no reason why they should not be continued for a considerable number of years.

The production of continuous crops, by the aid of an abundant supply of mineral manures, but without any application of nitrogen, combined with most careful sampling and analyses of the soil, will alone settle this most important question.

(1) Except where land is worn out by previous constant cropping. A. R. J. F.

(2) Surely, sulph. ammonia at £10. per gross ton. — guaranteed 24 0/0 —can't be called dear! v. Market reports Dec. 1885. A. R. J. F.

(3) Sir John Lawes omits to state that the question is: was the nitrogen in an available condition or not? A. R. J. F.

SUSSEX CATTLE.

These improve yearly. Probably no finer beast—weight for age—was in the Hall than Mr. J. Kirkpatrick's No. 142. This at 760 days old weighed 2,262 lbs., giving a record not far from 3 lbs. per day of its entire existence. Be this as it may, its depth of flesh and symmetry were unsurpassed in any breed or class. Besides first prize in the middle class for Steers, it had the breed cup. It has not the curly coat of the Devon-like section of this breed; but has the dark tinge of red which indicates a remote connection with the huge Welsh blacks. The younger class of Steers averaged 13 cwt. 0 qr. 10 lbs., but they also averaged two months, at least, more, in age throughout the class, than did the Devons or the Shorthorns. The Sussex are evidently a rapidly advancing breed for rough work, where milk is not specially in demand. None of the cows or heifers looked "milky," but all looked like giving—and breeding—fine carcasses of beef. Mr. J. L. W. Dennett's first young steer was very big, the second and third being of more Devon-like character, Mr. J. S. Hodgson's pair being especially so. H. R. H. the Duke of Edinburgh was *hc* and *rn* (1) in the middle class, which had (after Mr. Kirkpatrick's was removed) no special merit; nor had the class for oxen; all the entries in both classes being good, but not remarkable. Mr. J. L. W. Dennett's heifer looked heavier than she was—15 cwt. 1 qr. 16 lbs.—being a lighter beast than either the second or *rn* heifers; Mr. J. S. Oxley's second being almost as remarkable for substance as Mr. Kirkpatrick's steer. Only two cows were sent, and neither was unusually fine.

ONIONS FROM SETS.

D. Landreth & Sons, seedsmen, of Philadelphia, say:

"All the large onions produced in this section are grown from sets, and mature in advance of those grown from seed in New-England, New-York state and the West. They are mostly sold in ropes and are consumed here. The crop, as compared with last year, is more than one-third less, and it has been disposed of and will not enter into competition with other localities. With regard to bottom sets, more than two-thirds of the entire products of the United States are grown at Philadelphia. We grow on our own lands upwards of forty acres annually, in addition to about twenty acres more under contract and for which we supply the seed. The crop this year is two-thirds of an average one and the quality is exceedingly fine."

(1) *rn* means reserve number. A. R. J. F.

NON-OFFICIAL PART.

SCIENTIFIC TRUTH!

REGARDING THE FUNCTIONS OF AN IMPORTANT ORGAN,

Of Which the Public Knows but Little, Worthy Careful Consideration.

To the Editor of the Scientific American:

Will you permit us to make known to the public the facts we have learned during the past 8 years, concerning disorders of the human Kidneys and the organs which diseased Kidneys so easily break down? You are conducting a Scientific paper, and are unprejudiced except in favor of TRUTH. *It is needless to say, no medical journal of 'Code' standing would admit these facts, for very obvious reasons.*

H. H. WARNER & CO.,
Proprietors of "Warner's Safe Cure.

That we may emphasize and clearly explain the relation the kidneys sustain to the general health, and how much is dependent upon them, we propose, metaphorically speaking, to take one from the human body, place in the wash-bowl before us, and examine it for the public benefit.

You will imagine that we have before us a body shaped like a bean smooth and glistening, about four inches in length, two in width, and one in thickness It ordinarily weighs in the adult male about five ounces, but is somewhat lighter in the female A small organ? you say But understand, the body of the average size man contains about *ten quarts of blood, of which every drop passes through these filters or sewers*, as they may be called, *many times a day*, as often as through the heart, making a complete revolution in *three minutes*. From the blood they separate the waste material, working away steadily, night and day, sleeping or waking, tireless as the heart itself, and fully of as much vital importance; removing impurities from 65 *gallons of blood each hour*, or about 49 barrels each day, or 9,125 hogsheads a year! What a wonder that the kidneys can last any length of time under this prodigious strain, treated and neglected as they are!

We slice this delicate organ open lengthwise with our knife, and will roughly describe its interior.

We find it to be of a reddish-brown color, soft and easily torn, filled with hundreds of little tubes, short and thread-like, starting from the arteries, ending in a little tuft about midway from the out side opening into a cavity of considerable size, which is called the pelvis or, roughly speaking, a sac, which is for the purpose of holding the water to further undergo purification before it passes down from here into the ureters, and so on to the outside of the body These little tubes are the filters which do their work automatically, and *right here is where the disease of the kidney first begins.*

Doing the vast amount of work which they are obliged to, from the slightest irregularity in our habits, from cold, from high living, from stimulants or a thousand and one other causes which occur every day, they become somewhat weakened in their nerve force

What is the result? Congestion or stoppage of the current of blood in the small blood vessels surrounding them, which become blocked, these delicate membranes are irritated, inflammation is set up, then pus is formed, which collects in the pelvis or sac; the tubes are at first partially, and soon are totally unable to do their work The pelvis sac goes on distending with this corruption, pressing upon the blood vessels. All this time, remember, the blood, which is entering the kidneys to be filtered, is *passing through this terrible, disgusting pus*, for it cannot take any other route!

Stop and think of it for a moment. Do you realize the importance, nay the vital necessity, of having the kidneys in order? Can you expect when they are diseased or obstructed, no matter how little, that you can have *pure blood and escape disease?* It would be just as reasonable to expect, if a pest house were set across Broadway and countless thousands were compelled to go through its pestilential doors, an escape from contagion and disease, as for one to expect the blood to escape pollution when constantly running through a diseased kidney.

Now, what is the result? Why, that the blood takes up and deposits this poison as it sweeps along into every organ, into every inch of muscle, tissue, flesh and bone, from your head to your feet. And whenever, from hereditary influence or otherwise, some part of the body is weaker than another, a countless train of diseases is established, such as consumption, in weak lungs, dyspepsia, where there is a delicate stomach, nervousness, insanity, paralysis or heart disease in those who have weak nerves.

The heart must soon feel the effects of the poison, as it requires pure blood to keep it in right action. It increases its stroke in number and force to compensate for the natural stimulus wanting, in its endeavor to crowd the impure blood through this obstruction, causing pain, palpitation, or an out-of-breath feeling. Unnatural as this forced labor is, the heart must soon falter, becoming weaker and weaker until one day it *suddenly stops*, and death from apparent "heart disease" is the verdict!

But the medical profession, learned and dignified, call these diseases by high-sounding names, treat them alone, and patients die, *for the arteries are carrying slow death to the affected part*, consequently adding fuel brought from these suppurating, pus-laden kidneys which here in our wash bowl are very putrefaction itself, and which should have been cured first.

But this is not all the kidneys have to do, for you must remember that each adult takes about seven pounds of nourishment every twenty four hours to supply the waste of the body which is constantly going on, a waste equal to the quantity taken. This, too, the kidneys have to separate from the blood with all other decomposing matter.

But you say, "my kidneys are all right. I have no pain in the back." Mistaken man! People die of kidney disease of so bad a character that the organs are rotten, and yet they have *never there had a pain nor an ache!*

Why? Because the disease begins, as we have shown, in the interior of the kidney, where *there are few nerves of feeling* to convey the sensation of pain. Why this is so we may never know.

When you consider their great work, the delicacy of their structure, the ease with which they are deranged, can you wonder at the ill-health of our men and women? Health and long life cannot be expected when so vital an organ is impaired No wonder some writers say we are degenerating. Don't you see the great, the extreme importance of keeping this machinery in working order? Could the finest engine do even a fractional part of this work, without attention from the engineer? Don't you see how dangerous this hidden disease is? It is lurking about us constantly, without giving any indication of its presence.

The most skilful physicians cannot detect it at times, *for the kidneys themselves cannot be examined* by any means which we have at our command. Even an analysis of the water, chemically and microscopically, reveals nothing definite in many cases, even when the kidneys are fairly broken down.

Then look out for them, as disease, no matter where situated, to 93 per cent., as shown by after-death examinations, has its origin in the breaking down of these secreting tubes in the interior of the kidney.

As you value health, as you desire long life free from sickness and suffering, give these organs some attention. Keep them in good condition and thus prevent (as is easily done) all disease.

Warner's Safe Cure, as it becomes year after year better known for its wonderful cures and its power over the kidneys, has done and is doing more to increase the average duration of life than all the physicians and medecines known. Warner's Safe Cure is a true specific, mild but certain, harmless but energetic and agreeable to the taste.

Take it when sick as a cure, and never let a month go by if you need it, without taking a few bottles as a preventive, that the kidneys may be kept in proper order, the blood pure, that health and long life may be your blessing.

H. H. WARNER & CO.

We take much pleasure in drawing the attention of our readers to Messrs. J. A. McMartin & Co's grinders which are their own invention and excel any of the kind made in the United States. They are said by competent judges to be the best in the market.

"The farmer will find that thorough cultivation is ma "nure, and that each of his teams earns $10.00 each day they are thus employed." If this is true, how important it is that the farmer should use proper labor saving implements for the purpose of pulverizing the soil. See advertisement of the "ACME" Pulverizing Harrow, Clod Crusher & Leveler.