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THE JOURNAL OF AGRICULTURE. ILLUSTRATED

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OFFICIAL PART.

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MANGOLD WURTZEL.

This invaluable root, which I prefer spelling *Mangel*, has been cultivated in England for the last sixty years. It is, I believe, a native of Germany, and is supposed to be a hybrid between the white sugar-beet and the ordinary beet-root used for salads; but its genealogy is doubtful. There are several kinds of mangels, the most important ones being: the long-red, the orange or yellow-globe, and the ovoid or egg-shaped, which is either red or yellow. Of these, the long-red is an immense cropper, but inferior in quality to the yellow. On good heavy land I prefer the former; but on light loams, the orange globe will be found the better: it yields well, is less leafy, and, an important point, it is much easier to get up when ready to pull.

Preparation of the land.—The deeper the cultivation, the greater the crop, is an axiom in mangel growing, as well as in growing all kinds of roots. By this, I do not mean that in heavy land a large mass of raw clay should be turned up in spring, involving all sorts of botheration in cross-ploughing, grubbing, harrowing, and rolling, until half the summer is over. This would defer the sowing of the crop till all chance of an abundant yield was over. Still, the great aim of the root-grower should be the attaintment by degrees of a good depth of well worked soil, and he never should be satisfied untill he has secured a furrow of at least nine inches deep.

The treatment of heavy land, as it is usually met with here, should be carried on in some such way as this:

The last crop has, of course, been grain of some sort—the concluding one of the rotation—and, therefore, if there is any couch-grass, or other root-weed, in the land, it must be got rid of. This is, in my part of England, the very strongest feature in our system of farming. The moment the grain-crop is carried—sometimes, even, as soon as the shocks are set up—the cultivator is worked up and down the ridges and across them; the harrow and roller pulverize the broken surface, and the horse-rake drags the grass, etc., into rows. The rubbish is then either burned or, preferably, carted away to the corner of the field, to form the foundation of a mixen for the coming root-crop. With our best farmers, the cultivation is so perfect that this part of the preparation is rarely required, for the very commendable practice of forking out couch-grass in the stubbles directly after harvest is fast increasing. The cost is trifling, and the cure is perfect. A little knot of couch grass, if pounced upon as soon as the crop is off, is easily removed from the soil by a fork; but if it be raised by a grubber, and torn to pieces by the harrow, it may be carried over half an acre, and will become difficult to collect. Still, in this province, where skilled farm-labour is so scarce and so dear, the grubber will be found the cheaper if not the more accurately effective implement, the sun is often very scorching in its effects during August and September, and I have often observed that grass and other root-weeds have been so completely desiccated by a couple of days exposure to the air during those months, that all fear of their growing again was at an end.

The root-weeds having thus been all got rid of, the next operation is the winter furrow. When land has been fairly treated, and is not an absolute stranger to the dung-cart, the depth of this ploughing may be given as just as deep as your horses can draw the plough. I should not like, as a rule, to bring up more than one or, at most, two inches of raw-soil from the bottom of the old furrow; but we must not forget the enormous pulverising effect of our Canadian frost on a well-laid furrow slice, and the descent of some portion of the former manurings into the subsoil will have tempered its acerbity so as to render it less hostile to the interpenetration of the filamentous roots of the future root-crop, particularly in connection with the heavy dressing which *must* be given if you expect a remunerative crop of mangels. In truth, if I was to lay down so dangerous a thing as a law for ploughing, it would be: always plough deep for roots before winter, but never go below the old furrow for grain or pulse.

On *very* heavy land, not subject to spring-flooding, I am inclined to think that the easiest plan for growing mangels is to plough down the dung in the autumn, and to sow the seed in the spring on the flat surface of the stale furrow. I have tried this, and found it answer well. It simplifies matters extremely, and does away with half the work at the busiest season of the year. The only objection I see to its practice is the difficulty of finding enough manure at the time of preparation. This might be avoided in the neighbourhood of towns or large villages, but in a "far-removed place" I do not see any way of getting over it except by keeping the manure of the previous winter in a flattened heap, covered over with fifteen or twenty inches of earth.

I saw many years ago at Butleigh, in Somersetshire, England, a very wonderful crop of mangels grown on the sternest, stiffest yellow clay on the lias formation. As far as I recollect, the process carried out by Mr. Gray, the steward of the Hon. and Rev. Neville Grenville, was as follows: the land was cleaned in September, and ploughed ten inches deep immediately afterwards; grubbing and harrowing then reduced the land to a state which admitted of its being set up in drills by the plough at twenty-seven inches apart; twenty tons of dung were spread to the acre, and covered by splitting the drills as usual, and the land lay in this state till the following spring. As there was an open furrow between each drill and its neighbour, no water could well lodge on the piece, and so when the next season opened, the soil was found thoroughly dry and well pulverized. In April, a good many seed-weeds, such as *cadluck* (wild mustard), chickweed, and other annuals, had sprouted, these were destroyed by the harrows with one *time* along the drills, which were set up again in good shape with the double-mould-board plough, care being taken in performing this operation not to touch the land till it was thoroughly dry, and not to put any of the rawer soil on the top of the drills. All was now ready for planting, which was done in a peculiar fashion invented by Mr. Gray himself: a light roller was passed along the drills to flatten them a little; a man with a largish dibble made holes every foot down to the dung, into which a boy poured about half-a-pint of mixed manure, and a girl, following last of all, covered the manure with a handful of earth, dropped three or four seeds on the spot, and covered them with about half-an-inch of mould. The roller completed the job. The mixed manure was composed of superphosphate, guano, and fine garden-earth; but with our better knowledge now-a-days we should leave out the superphosphate. The crop over the twenty acres thus treated was thirty-seven tons to the acre of sound roots, with about six tons of tops, which were ploughed in then, but now would be put into a silo.

Mr. Drummond, of Petite Côte, Montreal, dibbles in all his mangel seed, but without the extra manure in the holes. I need not say he grows good crops, but in my opinion he sows too many seeds in a hole, as the last time I saw his crop the plants, which were about fit to hoe, looked crowded and twisted together, and the boys in singling them must have been very careful if they did not leave gaps. Each grain of fresh mangel seed contains at least two and sometimes four germs; hence, three or four grains in a hole would be quite sufficient. For my part, I prefer, I must confess, a continuous row to a crop of fixed intervals.

When sowing in spring on flat-work, where the dung was ploughed down in autumn, all that is necessary is to harrow well until all the annual weeds are destroyed, and then sow in the seed at two feet apart with Matthews' or the Planet, jr., seed-drill. In following out the system, I beg to recommend the cultivators of heavy land not to make their ridges too wide: two feet would be quite enough, and this width would give four rows of mangels to the ridge, as the two outside rows should be one foot from the open furrows, leaving the crop two feet apart from one end of the field to the other. The greatest care should be taken in drawing plenty of cross water-furrows—grips in Scotland—to prevent any work in spring, particularly when the field lies on a slope.

Spring preparation.—This is, of course, the usual way of getting in mangel seed, the land rarely being got thoroughly clean in the autumn, and dung enough being hard to be come by at that season. Cross-ploughing the winter-furrow or grubbing it is optional; I prefer harrowing along and across first, then cross-ploughing, and the grubber last of all; then, if your land is in decent condition, it should require no further implement than the harrow, and perhaps the roller, to put it in a proper state for drilling up. The cross-ploughing should be of the same depth as the winter-furrow, and the plough will go all the more steadily if it takes up half an inch of the subsoil; more would be dangerous. This will bring any root-weeds, that may have escaped in the autumn cleaning, up to the top, when they can be collected and disposed of in the easiest fashion. If turned up with raw manure, the heating will destroy all power of vegetation, except perhaps in the case of *docks*, which are dangerous enemies; in fact, as an old Aberdeenshire ploughman told me once: "If you lay a *dockan* on a *sclate stene* for three months, he's na' muckle to lippen to even then," which, being interpreted, means: If you lay a dock on a slate for three months, he'd just as soon grow again as not; which is not very far from the truth.

The land is now ready to be set up in drills, but we must not forget the preparation of the seed. I always steep mangel and carrot seed, as thus: tie the seed up in a bag, soak it in water for twenty-four hours, hang the bag up to drain, keep it in a warmish place till the white germ is chipped, and then dry it up with plaster, sand, or charcoal in powder. The quantity of seed required is about four pounds per acre. Nothing is gained by sowing the absurd quantities recommended by some American writers: there is no fly or beetle to eat the young plant, as is the case with swedes and turnips. Messrs. Crozier and Henderson, in "How the Farm pays," a book only recently (1884) published, say: "About six to eight pounds of seed are used to the acre, sown with seed-drill. If sown by hand, fully double that quantity will be required" How men like Messrs. Crozier and Henderson, who have been occupied in farming and market-gardening for years, can talk such absurd nonsense passes my comprehension altogether. Fancy, sixteen pounds of mangel seed to the acre!

The steeped seed cannot be sown by the seed-drill; the manner of treating it will be seen further on.

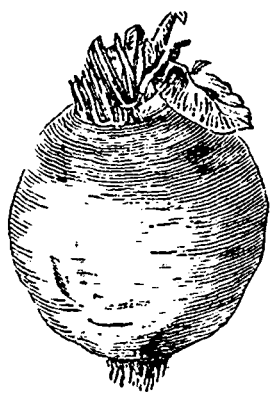
Manures for mangels.—And we must by no means ignore the fact that mangels are of all root-crops the most dainty in the choice of food. If there is anything certain in the prin-

ciples of sound farming, it is that mangels demand nitrogen in a freely accessible form. We are not growing sugar-beets for the factory; what we want is a large crop of bulky roots, the bigger the better, though, no doubt, the moderate-sized root is analytically preferable. Now, M. Ville, in his marvellous book on chemical manures, gives the following formula for beets:

	lbs. per acre
Superphosphate of lime	352
Chloride of potash	176
Sulphate of ammonia	176
Nitrate of soda	308
Suphate of lime (plaster)	132
	1,144

This, of course, without farmyard dung. The cost would be, in this country, at least twenty-one dollars. According to

No 1 —Long red mangel



No 2 —Yellow globe mangel.

my experience, superphosphate has hardly any effect on mangels; potash is only wanted on thoroughly exhausted light soils; and a moderate dose of sulphate of ammonia, with a good but not extravagant dressing of dung, will produce the largest possible crop of mangels. Somewhere about the year 1845, Mr Pusey, then President of the R. A. S. of England, tried experiments in mangel-growing, on land which, two years before, was said to be incapable of producing even white turnips I remember the district well; the soil was a peaty sand, or a sort of moor-band subsoil, below which the plant-roots could not penetrate. The manures were used in the following proportions:

No 1.....Fourteen tons of dung.
No 2 .....Twenty-eight tons of dung.
No 3.....Three cwts. Peruvian guano—(17 % of ammonia).
No 4.....Fourteen tons of dung and three cwts. of Peruvian guano.

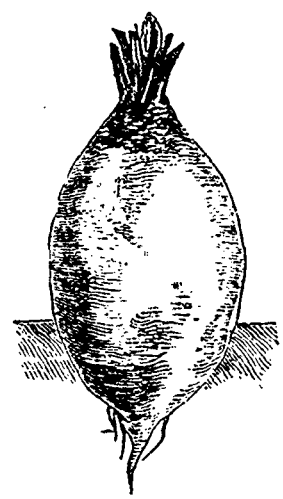
The yield of mangels—long red—produced respectively from these four different dressings, was, per acre:

No. 1	18 tons.
No. 2	21 "
No. 3	17 "
No. 4	33 "

Now, in those charming times, ammonia was abundant and cheap, because there was little call for artificial manures. Peruvian guano of the above quality only fetched $60.00 a ton, so it paid well to use it, as we see from the tables that while the addition of one hundred per cent of dung only added three tons to the yield of No. 1, the dose of three cwt. of guano, containing about fifty-seven pounds of ammonia—nitrogen, 47 pounds—added no less than fifteen tons to the crop, at a cost of 60 cents a ton! Here, in the province of Quebec, the addition of 2¼ cwt. of sulphate of ammonia, containing about the same amount of nitrogen, at a cost of $4.00 a cwt., would be, with a fair dressing of dung, all that the plant could desire.

We left the land ready for drilling up, and the question now arises, at what distance apart shall we draw our drills. There is nothing gained in wide drills; all that is to necessary is to make the intervals wide enough to allow the horse in the horsehoe to walk comfortably without treading on the plants. Twenty-six inches is my favorite distance, and it

No. 3.—White Paris cos lettuce.



No. 4.—Yellow ovoid mangel.

will be found sufficient to let plenty of light and air into the growing crop. An immense number of acres may be seen wasted every year, taking the province as a whole—thirty-six inch drills for roots, and even for Early-Rose potatoes, are not uncommon, by which extravagance one-third of the whole ground is left unplanted. It does not seem any great loss, until we look at it on a large scale. Such potatoes as the Champions do demand great space on account of their luxuriant tops—I have seen them four feet long—, but ordinary sorts, and all root-crops, will produce as much as

they can yield at twenty-six inches. Having made the drills, the dung should be carefully spread; and here I may mention that some even of our best farmers manage this part of the business uneconomically. A heap of dung to be divided among *five* rows will cost more to spread than if it were divided among *three* rows. The Scotch excel in this. The foreman starts the horse up the middle of the first three drills, and pulls out the dung in sufficient quantity into the drill in which the horse walks, without stopping the horse at all. A woman goes up one of the *wheel-drills* (to avoid treading the dung into the ground and making it troublesome to spread) and gives a fork full of manure to all three drills, which fork-fulls are equally shaken about and spread by three women who follow, one in each drill. Unfortunately, in this country we have no field-workers ts speak of, so we must be content with one man spreading the three drills, which he will do much more accurately, with much greater ease, and in much less time per acre, than if he were to attempt to meddle with five or more drills at once.

The dung being all spread, as we probably have no manure drill, if we use sulphate of ammonia, or any other artificial compound, the best plan we can adopt is to sow it over the dung. Splitting the drills with the double-mould-board plough makes all safe. (1)

Sowing the seed.—This operation will vary, according to the state in which our seed is: wet or dry. If dry, it should be *very* dry, as the best machines as we find them here won't sow if the seed is only slightly damp. I remember once starting to sow Belgian carrots, and fortunately, finding out before I had gone over the first three rows that the seed-drill—a very good one too—was completely choked. Mangel seed is freer from dust than carrot seed, but it is mighty apt to clog if the hole in the seed-box is not quite free from stones, sticks, bits of straw, &c. In all sowings with American seed-drills, I should open the seed-distributor a hole or even two above the one indicated on the index, for they are all made to sow too small quantities.

The roller having been passed over the drills, the sower may be started, and great care should be taken that the rut into which the seed falls is of the same depth all over the field. Few things are more annoying to the hoer than to find an irregular braird of mangels or of turnips. After sowing, I always roll again, and on light land I use the heaviest roller I can get. Last year, I trod all my mangels in after the second rolling, walking on the flattered surface of the drills—in moccassins, heeled boots would bury some seeds deeper than the others—and a perfect plant was the result, in fact, with only three pounds of seed to the acre, there was not a vacant spot two inches wide all over the piece.

But for steeped seed, another plan must be adopted. Roll as before, and with the seed-drill, deprived of the back coverers, make a shallow rut not more than ¾ of an inch deep. The corner of a hoe will do as well, but you will find it easier to keep the rut straight with the machine, and this, when we get on a little farther, you will find to be a matter of importance. The seed, mixed, as I advised above, with some drying material, is to be sown by hand in the rut, and carefully covered with a wide-toothed rake. Rolling, and treading if you choose, should follow as usual.

The steeped seed will probably begin to show itself in about ten days from the time of sowing—sooner or later according to the season—and the moment the lines of plant can be traced, set the horse-hoe to work. It is for this reason that I laid so much stress upon straight rows, for if the rows are truly drawn, the horse-hoe can pass along between the drills without damage to the plant even if, here and there, there may be a yard or two of seeds not yet up. Early horse-hoeing is of the very greatest importance: so great is it in my opinion, that in the case of parsnips, which love to linger in the ground, my custom is to mix with the seed half a pound per acre of rape-seed, which, sprouting rapidly, enables the horse-hoe to get to work on the fifth or sixth day.

If your horse-hoe is properly constructed, i. e. with curved side-hoes, it will, at the second time of going over, cut or pare away the sides of the raised drills, leaving only a narrow bit of two or three inches wide for the hand-hoe to look after. A miserable cut of my own horse-hoe with curved side-hoes, may be seen at page 163, vol. 1, of the journal. The whole implement is drawn too flimsy, and the curve of the side hoes begins too abruptly It can be made anywhere for about four dollars, and, where there are no stones, is a perfect machine. No drill-grubber can do the work properly until the tool has pared down the sides of the drill; then, the grubbers are useful enough, though I don't see the good of having two implements when one will answer every useful purpose.

Hand-hoeing Mangels.—Mr. Stephens, in his "Book of the Farm" objects to the deep hoeing of root crops on the drill on account of the danger that the manure will be thereby disturbed in its position; so much the better, say I, for the more intimately the dung is mixed with the soil, the more readily does it yield up its fertilizing juices to the plants. Dung is only spread in drills for economy's sake, and to start the germ of the seed into life. Last year, I was surprised to see the roots of white turnips running across twenty-six inch drills, and, not contented with meeting in the middle, invading each others territory. Some of the roots was as thick as a goose-quill. The cause was plain: the horse-hoe had pulverised the central spaces, the hand-hoe had pulled down the drills, and the turnips found themselves floating, so to speak, on a sea of mingled food and moisture, which gave them unlimited scope for searching after anything they might covet. Now if this is true of white turnips, it is ten times more true of mangels. The greatest possible crop of this root cannot be grown unless the drills are pulled down to the dung, and the growing plants left so naked as to make an unaccustomed observer think that they must perish of inanition. Don't be afraid, however queer they may look. In twenty-four hours they will revive, and all the exposed part of the root will become converted into sound cattle food. The deeper you hoe, and the more thoroughly bare you leave the plants, the bigger and the more nutritious will be the crop. Keep the horse-hoe going once a week until the leaves of the mangels are in danger of being injured by the horse; never pull the leaves, as some do, until the crop is ready for harvesting; and, when ready, let the roots remain in heaps, exposed during the day but covered at night, until the outsides are pretty dry. The tops should be wrung off, not cut, as the knife is apt to cause bleeding, which impoverishes the roots.

Time of Sowing.—In this country, mangels cannot be sown too early,—there is no fear of their going to seed,—the first week in May, if the soil be in a proper state, will do very well. After the middle of that month, I should prefer sowing swedes. Practically speaking, it is as easy to grow twenty-five tons of mangels as eighteen tons of swedes, and I would as soon have a ton of one as a ton of the other, wherefore I am surprised that so few mangels are grown in this province. The solution of the mystery is, I suspect, this. all the good farming of the country has been learned from Scotch agriculturists; the Scotch, except in some few districts, have not been in the habit of growing mangels; hence, their apprentices have never learned the art.

(1) Number of yards along a drill, manured with one pound of any manure, equal to 112 lbs. per acre, at 27 inches apart = 57.

Constituents.—The following are the constituents of mangels:—

Water.	Ash.	Albuminoids.	Fibre.	Other carbhydrates.	Fat.
88 0	0 8	1 1	0.9	9.1	0.1

At what time of year the samples for this analysis were taken, I know not. The loss of water between the time of storage and the middle of the summer would be very great—not less probably than five or six per cent. Mangels, carefully looked over two or three times in the spring, will keep well till the month of July. I remember well that my old farm-tutor, Wm. Rigden, use to pay almost any price for mangels to give his show-rams in June, when his farm was full of keep of all sorts. He found his valuable sheep came out better at the July exhibition of the Royal on that food, than on tares, trifolium incarnatum, or anything of the sort. They do not answer so well in autumn, except for an alterative in small quantities. As for the leaves, I don't know how they are to be economically treated. They have a way here, in Sorel, of mixing them up in layers with oat-straw. I can't say whether it answers or not, but I doubt frozen mangel leaves being worth much. A few do no harm to cattle, but the slightest excess produces diarrhœa. In England, we sometimes fold the ewe-flock over the field, giving chaffed straw in addition, but before frost sheep will hardly touch chaff, and so most of the leaves are ploughed in.

For storing root crops, I observe the following rule: white turnips first, Belgian carrots second, swedes third; and last of all mangels. If I grow five acres of roots, there would be: white turnips, half an acre; Belgian carrots, one acre; swedes one acre and a half, and mangels two acres.

OUR ENGRAVINGS.

Leicester Rams.—Since the colliers have refused to eat extravagantly fat mutton, this breed of sheep has gone out of fashion There are very few flocks of them now in England, the midland counties prefering the cross-bred downs, the Shropshires and the Oxfords.

Double-action Tedder.—This newly invented hay-tedder, with its backward and forward motion, and its extra width, gained by an outside attachment to the axles, seems to be the best machine of the sort yet brought out. I can recollect when, in England, all the hay was broken out of swath by men and women! I have seen in the great hayfields of Kent and Middlesex as many as a hundred and fifty at it! And there were no horse-rakes either.

Points of the Horse—This engraving tells its own tale.

Head of a Boar.—An excellent representation, from a photograph, of the head and shoulders of one of Lord Ellesmere's "large white" boars, a winner of the first prize at the Royal Agricultural Society's meeting last year.

Old Grannie.—One of the earliest of the foundation stock of the Polled Angus breed. When the portrait was taken, she had completed her *thirty-third* year, and the year previous had borne a living calf!

Mangels—See article, p. 1, of this number of the journal.

DE OMNIBUS REBUS.

At the steam-mills in Sorel they deduct one bushel in ten for grinding! A pretty stiff toll I think. Will farmers never combine to do themselves good?

Jerseys, in England, have never caused the same madness which has pervaded this continent for the last five years. One of the leading herds was sold by auction last month. It was the property of Capt Morse, of Dureley, Glostershire, and the average prices of the cows and down-calving heifers was £18 13s. 9d. = $92.00 about. This is as nearly as possible what they were worth when I left England twenty-seven years ago.

It is curious to see that, as long ago as 1805, the Chinamen in Australia were buying dung, bonedust, and guano, for their land! I do not think that in this neighbourhood,—Sorel—one pound of artificial manure has been bought this season. And yet this very soil responds more rapidly to a small dose of manure than any soil I ever saw.

I had a long chat with the Hon. B. Guévremont last week. He agrees with me that until the farmers make up their minds to cultivate the outlying parts of their farms they will always remain poor. Manuring four or five acres in the vicinity of the barn and leaving the rest to take care of itself will soon tell a tale.

Berthier Exhibition, September 30.—I am glad I went, for I saw one of the loveliest bits of scenery! The showyard was close to the old Manor House, and anything more enticingly beautiful than the glances of sunlight dancing through the varied leaves on top the greensward it is impossible to conceive. I don't care for *wild* scenery, but this "bit" filled my eye and satified my heart.

The show was no great thing. Take away Mr. Mousseau's stock and much would not be left. There were three boxes of cheese, and four packages of butter; a dozen good red mangels. A few cotswolds with gray-faces I was surprised to see. We rather prefer this type in Glostershire, as being hardier than the pure white faces. Two ram-lambs with only one testicle a piece ought to have been turned out of the yard by the judges, as should have two cows that evidently had not been milked for many an hour. *Stocked out* cows are bad enough in a market, but disgraceful in an exhibition. The best thing in the yard was an Ayrshire cow of Mr. Mousseau's, which I nailed at once as coming from Mr. Jas. Drummond's herd, Petite Côte. The first-prize heifer calf was a most ludicrous selection; wiry hair, thick horn, bull-head; in fact, about the worst calf in the lot. As Lord Ducie's cattle-man, Wm. Knowles, used to say: "We can breed good stock, but we can't breed good judges."

If country exhibitions are in general no better than this was, I think it is a loss of time and money to keep them up. Is it possible that the funds for their support are in any sort derived from the annual grant to the Agricultural Societies? If so, judging from this sample, I protest most earnestly against the continuance of such waste. If they must be continued, the judges should be men who know *something* about stock.

I observe in a seedsman's catalogue an attempt of the publisher to divert himself of all responsibility for the sale of bad seed. Just as it is no use for a Steam-boat or a Railroad Company to say: "we will not be responsible for any damage done to stoves or castings", so, no seedsman profits anything by saying, "I exercise the greatest care, &c., but I give no warranty, express or implied, as to description or quality, of any seeds I send out." In other words, if Mr. S. sends me rape-seed when I order swede-seed, or red carrot-seed, when I order Belgian carrot-seed, he can snap his fingers in my face! Bosh! an action for damage will lie, and it is not a case of "caveat emptor," at all, which only applies to *patent* defects. At the same time, I must say that many of the complaints made about bad seed are unfounded, the fault

lying with the sower. For instance, this last June, a farmer came to me to complain that his seedsman had send him bad onion-seed. I examined the piece, and, with a lens, found dozens of seeds just sprouted, so exhorting the man to exercise a little patience, I left him. On returning a fortnight afterwards I saw a beautiful *braird* of onions, and convinced the owner that he had deposited the seed twice as deeply as he done ought to have been.

Cabbage caterpillars.—This pest seems to be on its last legs. Thousands of cabbages have been grown about Sorel this year, and very fine ones too. Why has Montreal always succeeded in growing cabbages? Because the market-gardeners in that district do not grudge sixty to eighty large loads of dung an acre for the crop, and here, forty half-loads are considered liberality itself—almost extravagance. In consequence, the plants are feeble, the growth slow, and when the eggs are hatched, the young caterpillar finding no firm resistance, riots in his abundance, and if a heart, here and there, escapes from his greedy ravages, it is so pierced with holes and befouled with ordure that the eye and the palate equally reject it.

A young man, Séraphin Guévremont by name, and a practical pupil of mine, has been essaying "la petite culture" this summer. His success has been marvellous, and would have been greater had he not sown too large a proportion of yellow turnips, called here the *Altringham*. These, though good in flavour, never yield well, but there seems to be a prejudice in their favour as against the whites. Mr. Guévremont's swedes are capital, many selected samples weighing from seven pounds to eight pounds a piece. The cabbages, too, are good, with large firm hearts, but unfortunately, the seed was mixed and the plants in consequence, are not regular. As this little farm is surrounded on all sides by land let out to grazing the village cows, Mr. Guévremont has wisely made the fences at least 5 feet high and very strong. Nothing less would have kept out the poor half-starved cattle, which, this summer, have suffered for want of grass more than usual. On Saturday M Guévremont sent me four swedes weighing 45 pounds and a Saint-Denis cabbage, the absolutes heart of which weighed 16 pounds. So much for Sorel sand!

Captain La Traverse, too, has a really good piece of long-red mangels, but the cultivation has been neglected, and the weeds—wild timothy chiefly—are rampant. The horse-hoe has not been employed, and the drills are at their original height.

Some splendid Belgian carrots behind the gaol. M. Prudhomme showed me some measuring fourteen inches in circumference. Unfortunately they were left too thick in the rows; in fact, they were never thinned out at all. The soil here is remarkable for its pushing power. Vegetables of all kinds grow with inconceivable rapidity, and quickly grown vegetables are always the best.

Twice mowing meadows is not an improvement to them, although "Hoard's Dairyman" says it is. You can't mow clover too often or meadows too seldom. Rather a pleasant animal is the editor of this periodical! He proposes that every farmer should insist that his representative in Congress should vote for the imposition of a tax of fifteen cents a pound on *butterine!* What would the consumer say about it? If, as I hear on all sides, butterine is superior in flavour to the second qualities of butter, there can be no just reason why it should not be sold in open market, always with the proviso that it be sold under its own name, and the packages stamped to avoid deception. Bran, let me tell Mr. Hoard, is both a flesh *and* a fat-former, and, on the whole, a food not to be despised:

	Albuminoids.	Other carbhydrates.	Fat.	
Coarse wheat bran..	12.9	59.1	3.5	} Fibre omitted in both.
Barley.....	10.0	63.9	2.5	

London, Ont., Show.—Apparently, here as elsewhere, the beautiful red, white, and roan shorthorns were the grand feature of the exhibition. The sheep, I hear, were very good; indeed, it is said by the American papers that there never was a better lot of sheep got together on this continent. Even the Dorset Horned sheep, which lamb earlier than any other known breed, were represented.

I regret to hear of the misfortune at the Agricultural College, Guelph. Almost all the best cattle, however, were at the London Exhibition.

Sherbrooke Show.—I have not yet received a list of the prize-winners at the Sherbrooke exposition, and as I was not there, I cannot say anything about the quality of the stock exhibited. It would be easy to state that such and such a heifer is "very neat and pretty," or that a yearling bull, the property of Mr. Snooks, is "a regular animal of finely marked colour, good quality and carriage"; but what sort of a guide to the enquirer would that be? And if Sir Thos. Smith, who never bred or fed a steer in his life, declared that "the show was equal if not superior to what he saw last July at the meeting of the Royal Agricultural Society of England," I shall not require my readers to believe the statement on even Sir Thomas' authority. Satire apart, though, people who were there tell me that the exhibition was very well managed, and the stock of superior quality.

I congratulate my old friend, Mr. Reburn, of Sainte-Anne de Bellevue, on his service at the London Exhibition. He began with moderate expectations, and has realised them abundantly Five prizes won, with such opponents as Mr. Vallancy Fuller and Mr. Jeffery, by an ordinary Quebec farmer, must be taken as a credit to the province.

On the 13th, I had the pleasure of inspecting Mr. Bourque's two stallions at his stables in Sorel. Of the Hambletonian family, they are fit to get harness horses of a valuable type. A four-year-old, bred by Major Paul, of Sainte-Anne de Sorel, has made the most marked improvement since I first saw him in the summer of 1884. He has marvellously good thighs and fore-arms, with big hocks and knees, and bids fair at six years old to be a most powerful animal; chief fault want of length in the quarters. Mr. Bourke tells me that he paid $500 for him, after he won the second prize at Saint Hyacinthe, where he did his mile in 2.44.

The best yielders of the milch-cows at London were:

Shorthorn-grade cow, 46.80 lbs.; 120 days after calving; property of Mr W. Patrick.

Holstein-grade cow, 37.60 lbs.; 113 days after calving; property of Mr. Ferguson.

But, whereas, the product of butter, respectively, of these was only 3.62 lbs. and 2 75 per 100 lbs. of milk, Mr. Fuller's Jersey, Belle Glengairn, which only gave 29 lbs. of milk 86 days after calving, produced 5·75 lbs. of butter from 100 lbs. of milk; and Louise, an Ayrshire cow, belonging to G. Hill, gave 29.50 lbs. of milk, 138 days after calving, and 5.43 lbs. of butter from the 100 lbs. of milk.

At Toronto, three Jerseys, the property of Messrs. Fuller, Jeffery, and Reburn, yield, respectively, 6.87 lbs., 6.73 lbs.

and 6 41 lbs of butter from one hundred pounds of milk, the next highest product being 4.68 lbs., by an Ayrshire belonging to Mr. Guy.

The harvest in England until near the end of July was more promising than any since 1876, but the extreme heat occurring then disappointed the hopes the earlier months had fostered. The general opinion of the correspondents of the various agricultural papers which send out enquiries every season seems to be that the *wheat-crop*, though not so good as last year, is better than that of any other year since 1874. The long drought ripened the grain too quickly, and, consequently, there are many light pickles. Generally speaking, the weather was good during carrying time: a few showers fell, but as they were succeeded by bright drying weather, little harm appears to have been done. The grain is very dry and hard, and therefore fit for immediate milling; a blessing, indeed, to the poorer farmers, as they can turn the crop into money at once. Prices are, unfortunately for the grower, very low, less than a dollar a bushel on the average returns. As the American harvest is about 150 millions of bushels less than last year, and as the Russian crop is 25 per cent. short, prices might have been expected to rise; but, as a matter of fact, the price is lower than last year when the whole world rejoiced in an exceptionally good crop. (1)

The season for autumn-sowing of wheat has opened favourably, and this will tend to keep prices down. English farmers, particularly on the arable lands, are so poor just now, that they must thresh and sell to meet their rents and other outgoings, so, even if the spring and summer of '86 prove unfavourable, and a rise takes place, they will be unable to profit by it.

Barley, like wheat, is a good crop, but owing to the scorching heat, I fear good malting samples will be scarce. Oats and beans are a bad crop, pease still worse, and as for hops, they are almost a complete failure. The potato crop is poor, but, fortunately, the disease seems not to have affected it. After such a latter summer, it will be apparent to my readers that roots and pasture must have suffered disastrously from drought. The hay-crop, happily, was enormous, but July and August were so very dry that the aftergrowth was greatly stunted, and the pastures have been quite parched up. The effects of the drought were aggravated by the cold nights of August, and hence the farmers find themselves with precious little food for their cattle. Already, therefore, there has been a serious fall in the prices of beef and mutton. Immense numbers of cattle have found their way into the English market from America, and to some extent this is supposed to have been caused by the President's action in compelling the ranchmen to evacuate the Indian reserves which they had illegally seized on.

The best English cheese has hitherto been independent of American prices, and, consequently, it would appear that the production has increased too much. The result is a ruinous fall which will be felt throughout Cheshire, and, I am sorry to say, throughout Glo'stershire too. The price of butter has also declined, the first quality of *Corks*, during August, having fallen 20 per cent under the average of ten years.

Thus the out-look for British farming grows worse and worse. Wheat falls when everything goes to show that it ought to rise; and cattle, butter and cheese likewise fall when the cost of feeding cattle is enhanced by long continued drought. All this must lead to a further throwing up of farms, to reductions of rent, and to a serious fall in the wages of agricultural labourers. There are only three good crops: wheat, barley and hay; cattle food is short, prices are low, and how the agricultural population are to live by the land, I do not see.

ARTHUR R. JENNER FUST.

(1) It must not be forgotten that though the Russian wheat-crop may be a little short in yield, that country has a large stock of old wheat to fall back upon. America has at least one hundred millions of bushels in store, and India, too, has a large reserve.

Experiments in Planting Potatoes.

EDS. COUNTRY GENTLEMAN—In your issue for Nov. 30, page 941, F G. has an article on Deep Planting of Potatoes, which has interested me very much, as it accords with some experiments made by myself during the present and former years. The past season our potatoes were grown in two fields quite distinct in soil, both thought to be well suited for producing good crops. On the smallest plot we had some years since grown one of the best crops of potatoes we had ever grown. It has a warm, sandy, gravelly soil, well prepared as was supposed at the time of planting, but failed to give us a remunerating crop, which we supposed was owing entirely to the drouth in this vicinity. Judging from the experience of F. G., probably one of the causes of failure was because the potatoes were not planted deep enough to give the best yield. Farmers would be wise if they heeded such experiments, and when another planting season arrives, to act in accordance with the knowledge gained by others, and published for the benefit of all.

The largest plot was on clayey soil, having on a portion of it muck and fine gray sand intermixed; very light and easy to till. The field had a crop of corn upon it in 1881, it was then sod ground manured on the surface in the fall and winter preceding. The ground was plowed in the fall after the corn was harvested, and replowed in the spring some inches deeper than the manure was plowed under for the corn.

It was well fitted, and the soil being very mellow the furrows in which to plant were made some five or six inches deep, about three feet apart. The pieces of potato were dropped about 15 inches apart in the rows, the cultivating was done as usual, except that the last dressing was done with the plow and finished with the hoe by hand. A few rows had nothing done to them except what was done with the horse and plow. The field was kept very free from weeds, that being one of the main points in the cultivating of potatoes. The crop of potatoes was abundant, the tubers sound and of excellent quality, very smooth, and free from any scabbiness, that is so annoying in some seasons on some soils. I supposed the difference in yield on the two plats of ground was wholly in the soil and season, but since reading F. G.'s letter I have no doubt that a part of the success attained in the largest plot was due to their being planted deeper and from more thorough cultivation during the period of their growth.

Some years since I had a piece of mucky soil on which potatoes were planted as the first crop after the plot was tile drained. The draining was done the year previous, as the soil was very wet. The ground was very mellow, and consequently the furrows for the potatoes were run nearly or quite six inches deep; much deeper than I thought best at planting time. The crop was abundant, and the tubers much larger than usual, which I then supposed to be due entirely to the soil. On a piece in a different soil with the same kind of potatoes planted in the usual manner, the crop was very light and of poor quality. From those experiments it would seem that deep planting on light, well drained soils, especially in a dry season, is necessary to the production of a full crop of sound, smooth tubers.—JONATHAN TALCOTT.

Rome, N.Y., Dec. 11.

THE VETERINARIAN.

EXAMINATION OF HORSES

1. STAND in front of a horse, to see how his limbs are formed, the width of his chest, the depth and fulness of his bosom, all anomalies of position in his fore legs being carefully registered.

2. Examine the mouth for age. At 4 years old tushes appear; at 5 years he has a full mouth, tushes top and bottom, corner teeth shelly; at 6, marks disappear in the two centrals, corner teeth inside or posterior wall of the teeth is lower than the anterior wall or front of the teeth; at 7, two more marks disappear in the two laterals, corner teeth level; at 8, marks disappear in the corner teeth; he is level-mouthed at 9 years old.

3. The eye is next observed. For ophthalmia, cataract, &c., quite a vet's question.

4. Feel the crest for condition—firm and muscular.

5. Examine the poll for poll-evil, the withers for fistula and as to character. Fine withers (high or low, as the case may be, and in keeping with the class) or undue coarseness. Shoulders for muscularity, length, and obliquity, also proportion of parts. Scapula and humerus: The humerus in a valuable horse is never by any chance horizontal, neither is the scapula short and upright; resident quality of conformation is length, obliquity, proportion.

6. The forearm or radius (the humerus is the true arm) long, massive, muscular powerful forearms.

7. Knees the indices of stability. Good knees always have a well-defined, centrally situate trapezium bone, deep and long.

8. Short cannons, flat tendons—broad, firm, and flat. No splints, no gum.

9. Pasterns free from ringbone, no windgalls at the joint.

10. Sesamoid bones at the upper posterior portion of the fetlock fully developped.

11. Feet moderate in size, frogs clean, sole gently concaved. No side-bones or flat feet, &c.

12. Back muscular, moderate in length, loins nicely sprung, and muscular.

13. Top of the quarter long, muscular, horizontal in the blood horse, oblique in all other classes, more or less; but positive droop and short at the top is both unsightly and indicative of short breeding, lack of quality.

14. Body deep, fore and back ribs long and low, well coupled.

15. To get a good view of the contour of the horse, stand three or four paces back, that you can include his head and tail without moving your eye or shifting your position; you then are best placed for judging the proportion, the concert of parts.

Following No. 13 down, observe the muscularity of his haunches, the position of his stifle, and proceed down his thighs and second thighs, which should be let down well into the hock.

16. "Hocks clean, no blood spavins, thoropins, or bone spavins. Good hocks have a prominent os calcis, or point of the hock, and are broad both above and below; viewed laterally, the angle the mean between straight and bent." (Fitzwygram.)

17. Stand at right angles to adjudicate on curbs.

18. "The metatarsals or hind cannons short, flat, and straight; but, by virtue of the angle of the hock, and to obviate concussion, they should incline a shade forward—too forward is weakness." (Fitzwygram: *Horses and Stables*)

19. Hind pasterns moderately long.

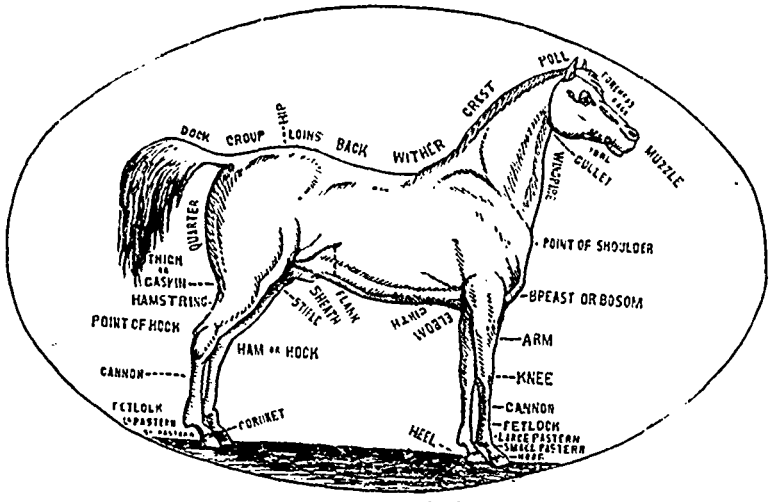
20. Feet sound, soles concave, medium frogs. Now stand behind the horse and view his quarters, that they and his gaskins, or second thighs, are nicely let down and muscular.

21. View the position of the hind legs, and note any anomaly of position, &c.

22. Then satisfy yourself about the "set on" of his head and tail, the fullest development of sheath and dock, also the graceful curve and development of his throat. Next look for—

23. Capability to wear, corky action, constitution, the class of work he's best adapted for, &c., and his quality must not escape attention.

Groom now runs the horse on—gently—leaving his head free. Good action is truth in action; brilliant it may be, but it is never excessive, nor exaggerated in the forehand at the expense of the hind-quarters. Action depends on quality of make, length and position of the movable bones, power in the muscles controlling action, strength and breadth of tendons, their health; and in no less degree is it important to be assured as to the ligaments. We often find muscles strong, leverage weak, or *vice versâ*—in either case action, *de facto*, is non-resident. Brilliancy owes its origin to "courage," as opposed to "heat." A hot horse "fights," a high-couraged horse "goes." Freedom in action can alone be found in sound horses.



No. 5.—Points of the horse.

A hot horse is ever uncertain, and often robs one of pleasure and confidence. A high-couraged horse imparts confidence and charm. Good breeding has many advantages, *e. g.*, greater quality in blood, bone, and muscle; superior cover from the fact that all his moveable bones completing his superstructure have greater length, *i. e.*, above the knee and the hock, his wear in broad, flat, short cannons; his corky action is derivable from elongation of his pasterns.

The walk must be perfect at the lift, well executed in the stay, the approximation or grounding flat and firm. The trot true, level, and straight, with liberty and equal force. The gallop: the hind legs brought well under, his forelegs got neatly away. He should gallop low or near the ground. This briefly and imperfectly touches the examination of the horse in health and for sale, which practice alone can make the buyer *au fait*.

A horse to go really well must first go at his shoulders, his knees, and his pasterns; he must bring his hocks, in all his paces, well under his body, in ratio to the speed, and make

good use of his hind pasterns—overlooked by many in the south, but prized in the north.—Yorkshire.

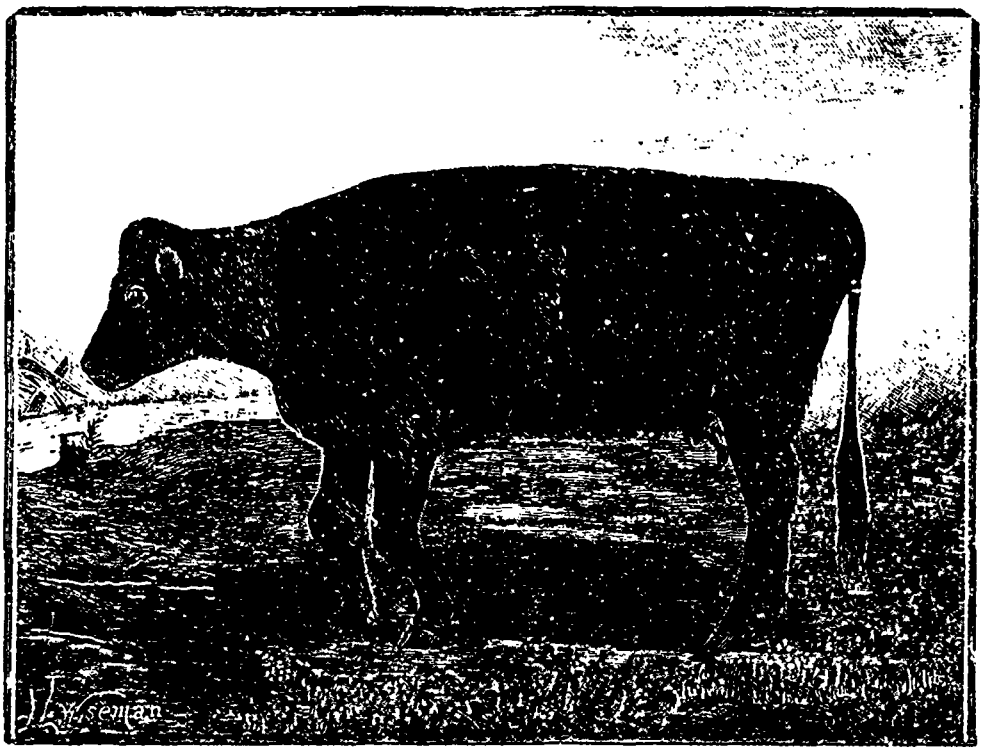
THE BROOD MARE.

The object we have in view in horse breeding should be an annual improvement. The investment is remunerative when applied to good shape, soundness, and vigorous action, combined with the stoutest and most fashionable blood in the several classes. Horse breeding, when rents are high, can alone pay by the breeding of the very best, for which the demand exceeds supply, and which phase of the market has ruled strong for years without alteration; the difficulty is to get horses good enough for the best London trade.

It is important to regard constitution in the parentage, apart from the essential consideration of size, freedom from hereditary blemish or defect, good sound legs and feet, a symmetrical body, wind, eyesight. Action is contributed by the mare in regard to force, by the sire with regard to direction. These are influenced by the deep shoulder, the moderate arm, length and muscularity of the forearm, a well defined trapezium at the back of the knee and well defined sesamoid bones at the upper posterior portion of the fetlock, shortness from the knee down; length in all bones, capability of mobility in the superstructure. Good shoulders are deep and well laid back in all good horses. Quality in the hind-quarters is determined by proportion of parts. Loins, thighs, gaskins, hocks - strong loins, muscular thighs and gaskins, clean bold hocks, the point of the hock in all cases well defined. We thus have considered the bases of speed, action, endurance. Beauty of proportion and style of movement are features no harness, hack, or hunter breeder can afford to despise; and the same holds good in regard to heavy draught horse stock for export.

Leading breeders have always a high standard as a fixed aim; in some cases their efforts excel, in others fall short of their beau ideal. When such is the case the mare is invariably at fault. An upstanding roomy mare—that is, one with a lofty fore-hand, a long barrel, well coupled up or ribbed home, wide across the hips, deep at fore and back rib, evidencing length, and gentle obliquity, but no droop, in the quarter, on short, flat, clean legs—this would be the brood mare of our choice to recoup outlay.

Mares with their first foals require the greatest attention. The mare should be served nine days after foaling, and again tried at the end of a fortnight. If the mare then refuses, it is conclusive; but should she stand, she must be tried on the termination of another fourteen days' interval. Mares have a strong aversion to smells—viz., tar, carrion, vegetable putrefaction. The leaves of the willow and of the savin are equally obnoxious. Pine varnish is the material that should be used, rather than tar, for palings. All excitation should be avoided—The neighing of entires, &c.



No. 6.—Old Grannie.

The most eligible time for foaling are the months of March, April and May. In the first of these months they must be housed, unless the weather is most favourable. A roomy, sheltered, and well ventilated box is a desideratum. No draughts, nicely littered down, level and soft in surface, not too deep. The mare must be watered three times a day. Mares at this season are liable to gorge themselves with clean litter, and they frequently exhibit a morbid appetite, which must be restrained. Therefore dry, used litter, taken from under other horses, is the best for present use. Register the time when the mare should foal down. Ten days before she is likely to foal make the necessary preparations, and frequently examine her, at least twice or three times a day, without disturbing her; and as the event nears, a nocturnal visit or two must be paid. A roomy mare, naturally fed, neither too gross nor too poor, seldom requires external aid.

A waxy substance on the teat, a sinking and expansion of the pelvis, rendering the act of parturition easy, are unmistakable signs. After delivery the mare will lick her foal—leave her do it, but watch the placenta or afterbirth that it does not recede, and when it has come away, remove it. Give the mare a nice pailful of warm linseed gruel, succeeded by a bran mash. Get the foal to suck as soon as you conveniently can. In any case of difficulty or doubt, do not delay to call in your professional friend and adviser, the qualified veterinary surgeon.

Variety of feeding is held by many to be a very safe plan. Just prior to foaling down, and after foaling, reliance for a copious supply of milk is usually looked for in those seasonal products—green meat or tares, lucerne, trefoil, and clovers. Most of the treatment relative to the brood mare accepts the cardinal features of first-rate management applicable to neat stock—quiet, cleanliness, supervision.—B. H. HILHOUSE.

FARMERS' CLUBS.

KINGSCOTE — GLOUCESTERSHIRE.

THE BEST METHODS OF RETAINING SOILS IN GOOD CONDITION.

AT the first meeting of this season Mr. Harle opened a discussion on this subject, reported in the *Wilts and Gloucester Standard*:—

M. HARLE said: At the outset, it may be necessary to define bad and "good condition of soils." When soils are cropped years after years, the grain and live stock sold off, the hay and straw brought back as more or less rotten manure, but little or no purchased food or manures brought back again, then there is barely enough plant food available for the growing crops, a very favourable season produces barely an average crop, and a bad season causes a failure, and those soils are generally termed "in low condition." On the other hand, I call a farm in "high condition" when the plant food removed off the farm is less than the amount brought back again; for in such a case the soil has an excess of available plant food beyond what is required for a heavy crop, and in ordinary years will produce large crops, and even in bad seasons the crop seldom fails. Of course, to be in good condition it is also necessary that the soil should be kept free from couch and annual weeds. An ordinary fertile soil in its natural state contains sufficient of the constituents of plant food to support some hundreds of crops, and we all know that Mr. Lawes, at Rothamsted, has grown upon the same soil, without manure, thirty-eight crops of wheat in consecutive years, and that the yield has not materially decreased during the whole of that period Fortunately for us and our posterity, only a very small percentage of the plant food in soils is sufficiently soluble to be easily assimilated, but the great bulk of it is locked up in such a manner that excessively wet seasons or a scourging system of crops can only remove part of it, otherwise long before this period of the world's history all our plant food would have been at the bottom of the sea.

Nature, by the action of rainfall and atmospheric changes, seems to liberate a certain portion year by year, and this amount can be materially increased by tillage and stirring up of the soil. The quantity made available every season, however, is not sufficient to grow large and profitable crops, and unless we take back to our soils as much at any rate as we remove we will never have an excess of plant food available for growing large crops and have our soils in high condition. Some of our crops, such as turnips, clover, and peas, have the property of drawing part of their nutriment from the atmosphere to a greater extent than the grass or corn crops, so that when the former crops are grown more frequently, and consumed on the farm, those soils are more easily kept in good condition. Thus, on the lighter classes of arable soils such as you possess on these hills there can be no better or cheaper way of keeping the land in high condition than your system of growing a large acreage of roots with the help of artificial manures, and consuming them on the land by sheep eating cake or corn. The land is left in splendid condition for barley, a large portion of the dung is left for the clover crop, which it increases, and also leaves the soil in good order for wheat; and you have, as it were, a self-supporting rotation, and so long as nothing is sold off but the grain and live stock, these classes of soils will gradually improve in condition, although we must bear in mind that on such soils more plant food is removed by heavy rainfalls than upon gross or arable clay soils, as some farmers say "they eat the muck quicker."

ORDINARY MANAGEMENT.—On ordinary grass land, where cattle are fattened or young stock kept, nothing is removed but the increased weight of the animals, and the balance of plant food is so nearly kept up that there is no perceptible deterioration. But even in this case a little cake consumed along with the hay, or given to fattening stock on the pastures, improves the condition greatly. I do not know of any other part of farming so profitable as fattening stock with cake on grass scarcely good enough to fatten them without it; if well managed the stock pay for the extra food, and the increase both in quantity and quality of the herbage is very great. I have a letter by me from an extensive grazier in Northumberland, who tells me a field near his homestead was valued at 16s per acre twenty-five years ago. Since then enormous quantities of food have been fed upon it, and he now values the field at £4 per acre, and it has produced frequently nearly 3 ton of hay per acre. I farmed myself a grass field for ten years, which by similar means was raised in value 10s. per acre during that time. On dairy farms the removal of milk, butter, and cheese is a great drain upon the soil; but the case is greatly aggravated when the manure made from the hay is placed upon the arable portion to increase the grain crops which are also sold off. By such a plan the amount of plant food is very great, and the soil must deteriorate, as I will try to show you by figures. We will suppose an ordinary farm of 50 acres, and 200 acres of pasture. Thirty cows would probably be milked, one half of the calves sold young, and the others kept to replace the herd, or sold at three years in a fresh condition: 25 acres would be in corn, and we will suppose 15 acres of wheat to be sold off, and the other 10 acres of barley and oats be used for cattle, and to assist the whey in feeding sixty pigs. Probably in practice more of this 10 acres would be sold and replaced by maize or cake, but I wish to simplify the calculation by considering the 10 acres of barley as equivalent to the amount of all sorts of food generally consumed. As phosphate of lime is the most necessary element of plant food on such a farm, we will estimate the amount yearly removed by the produce. Thus:

15 acres of wheat grain will remove		480 lb. bone earth
Produce of 30 cows (6 ton cheese)	"	450 "
60 pigs, average 300 lb. (live weight)	"	270 "
Live stock sold, 7 old cows, 8 fat cattle, 15 calves	890 lb. each 13,500 =	700 "
		1930 lb.

which would require nearly 2 ton of bone meal or four ton of superphosphate to replace the bone earth. So that we have

a serious loss of one sort of plant food alone, and there are others such as nitrogen and potash removed in nearly as large quantities.

IMPORTED FOOD AND MANURE.—What I wish you to discuss with me this evening is the best means of remedying this state of things. If purchased dung is not within reach, the only other means are artificial manures and purchased foods. It has never, I believe, been the custom in the Vale of Gloucester to give much cake to the dairy cows on grass. I know of some cheese-making districts where it is considered profitable to give cotton cake to cows all the time they are in milk. Cakes are certainly very valuable foods during winter when the hay is damaged, or in late springs when the grass is scarce, as it prevents the cows being lowered in condition, and their flow of milk from being checked: and purchased food properly consumed is a cheap way of increasing the condition of the farm. The plant food can also be profitably brought back by suitable manures if they are properly applied: the most effective and cheapest of them, in my opinion, is a mixture of superphosphate and bone meal, the former supplies the earth bone for the first year or so, and the latter afterwards supplies it and other plant food over a series of years. These manures have an excellent effect on grass land, and sweeten the herbage, yet they do not largely increase the hay crop; and if stimulating nitrogenous manures be applied, the heavy crop produced drains the soil of other constituents of food, and the land is apt to become in worse condition than before, unless dung is also applied. I believe dung to be the best manure for meadow hay, and I would recommend nearly all of it to be applied to the meadows, and to grow the arable crops with artificial manures. It has been proved by several experiments in different parts of the country that proper mixtures of chemical manures will frequently produce heavier crops of roots and a better yield of corn than heavy dressings of dung alone, and I think the reason can be easily explained. We sell the grain, which is rich in phosphates, and keep the straw, which contains little of that manure, and the animals when consuming the hay, &c., abstract a large portion of phosphates for the growth of bone, &c., so that farmyard dung is poor in phosphates, and does not generally contain sufficient of it for heavy crops. I never feel surprised when told of a small crop of turnips that have been grown with dung alone, or a bad yield of wheat after a fallow heavily dressed with poorly-made dung.

It may be said that arable land cannot be kept in condition with artificial manures alone. I happen to know of a farm in Northumberland, upon which three or four fields are so awkwardly situated on the top of a hill that for forty years they have received no dung. The turnips have been grown with bone manures, and two-thirds of the crop eaten by sheep on the ground, the corn and straw is removed, but the clovers, &c., are always grazed, and the land is now in better condition that forty years ago. I am firmly of the opinion that if the arable land was properly dressed with artificial manures, and all the dung laid upon the meadows for hay, we should be able to grow the same quantity of hay as we grow at present, upon two thirds of the area, at a cheaper cost per ton of hay, and we should have more pasture land for grazing, and the whole of it would graze more stock, as the farm would be in better condition.

Mr Lawes, of Rothamsted, cropped a meadow for ten years without manuring it, and obtained an average crop of 21 cwt, per acre; he then put on every year as much manure as would be contained in 1 ton of hay, and for the following twelve years the average crop was 33 cwt. I feel confident that if this method was carried out the dairy farmer would be able to dress the grass lands every alternate time they are mown, and the crop which does not average more than 20 cwt. could be raised to 30 cwt. per acre, or 65 to 70 acres would produce as much as 100 acres. Thus on our 50 acres of arable and 200 of pasture, instead of 100 acres of hay, we should have 70, we would save the cost and labour of harvesting 30 acres, and we should have 30 acres more grazing and the pasture land itself would be at least 10 per cent, better, owing to its higher condition from being less frequently cut.(1) We must not forget, also, that hay grown on such manured land is worth more per ton for feeding than hay grown on land out of condition. I learned farming some years ago with a very successful agriculturist, who always asserted that the cheapest portion of a crop was the extra tons of roots or stacks of corn grown by liberal manuring; they had no rent or rates to pay, or any extra tillages. And I think I could show by figures that it would be so with our hay crops. Our chief point, after all, is to produce each ton of hay, or cwt. of cheese, at the least cost. If we consider that average land, costing £2 per acre for rent, tithes, and taxes, only produces 1 ton per acre, and that the cost of harvesting is equal to the value of the after feed, then at present we produce hay at £2 per ton. If, however, we raise the produce to 30 cwt. without further expense, we lower the actual cost of the hay to 26*s*. 8*d*. per ton. But then you will say there is the cost of the manures. If, however, we gain 30 acres of land for pasture, they would be worth for summer feed at least 30*s*. per acre, or £45, and if this sum was spent on manures the increased crops might be considered to be grown at no really greater cost. I think I speak within the mark when I suggest that our average crops at 20 cwt. could be increased to 30 cwt.: there ought to be no difficulty in growing 2 ton per acre on the bulk of the pasture land in the vale, the latter quantity is frequently grown on worse land in the North by liberal manuring. I have before me a letter from an extensive grazier in Northumberland, who asserts that 2 to 3 ton per acre is frequently grown.

MANURE STALLS.—Another matter ought to be remedied, which robs our farms of their condition—I mean the manner we make our manure and expose it to the rainfall. On our ordinary dairy farms the cattle are generally kept in large open yards, with access to a covered shed, and as litter is scarce, the ground is never covered with straw to dry up the urine and dung, consequently it lies upon the pavement in a sort of puddle, and the best parts of it are washed out by rain into the adjoining pool. I have no doubt that fully one-third is lost in this way. Some farmers will maintain that black, juicy-looking, rotten straw (however it may have been washed) is as good as drier looking stuff made under cover, but I have before me some experiments made by the late Lord Kinnaird on the subject. Cattle of the same age, and getting the same food, were kept in two lots, one in open yards, the other lot under cover, and the manures were applied in similar quantities to a field of potatos—one-half to each lot. The manure made under cover produced 11¼ ton of potatos; the manure made in sheds produced 7½ ton. The next season the former lot produced 54 bush., and the other lot 42 bush. of wheat. The late Sir H. Thompson made a similar experiment on grass; 15 loads of dung made under cover produced 25 cwt. of hay on poor land; 15 loads of dung made in open yard produced 16 cwt.; and these figures show us the advantage of protecting our manure. To do this, we must either keep our animals in covered yards or tied by the neck in stalls. Covered yards have been adopted in many cases, but are too costly for ordinary farmers, and would require more straw than could be grown. They cannot be erected at less than £10 per head for each animal, or an annual charge upon each beast of 12*s* per head at 6 per cent. Houses for tying up

(1) See my remarks, p. 166, on "Hoard's Dairyman."

cattle can be erected for £6 per head, or a much lower outlay, and in many cases the existing sheds might be altered at a small outlay. They have this further advantage, that they require less litter than covered yards; and I know several cases where they receive no litter, but refuse hay, &c. This system entails more labour, but the increased value of the manure and the saving of the food would pay more than the extra cost. If the cattle are tied up, the manure taken from them daily should be banked up in a small adjoining pit, which ought to be roofed in.

Mr. Lister, F.R.S., Professor of King's College, author of *The Germ Theory of Fermentative Changes*, and of *Lactic Fermentation and its Bearings on Pathology*, has thrown considerable light upon the bacteria of milk, but his researches have been made, I believe, entirely with regard to pathological science. A few days ago I was reading an address delivered by Mr. Lister. "On the nature of Fermentation," and I was much impressed with the results of one of the investigations therein described, and its possible connection with "the dairy." The object in view was the study of bacteria lactis, the particular form of organism which is the actual cause of what we know as lactic fermentation, or, in more simple language, the souring of milk. Mr. Lister's experiment was to ascertain whether, by preventing the development of bacteria lactis, milk would remain unaltered. He accordingly took means to prevent the development of these organisms, but all the samples of milk underwent fermentation, only of a different sort, the result of which was the development of other organisms, presenting tiny specks or granules, some orange, some yellow, some red, and other green, also two or three kinds of fungi. Mr. Lister came to the conclusion that these organisms declared themselves owing to the absence of bacteria lactis, which would under ordinary circumstances have been present, and would have smothered or killed these other species.

Now may not this throw some light upon the fungi or growth of various colours observable on many of the soft French cheeses, Camembert, Livarot, Brie, &c.? It is well known that the makers of these cheeses look with care and anxiety for the due development of the special shade of colour, upon which the sale of their product so greatly depends, and that these shades of colour should change in due order as the ripening process proceeds. Why are these farmers so particular? Because the dealers in these descriptions of cheese demand that they shall be of a certain colour. Why do the dealers make this demand? Because it has been found that the best flavoured cheese is always of certain peculiar shades, and that therefore by valuing the cheese by its colour, they are unconsciously attaching a value to a development of some particular organism, which development is dependent upon circumstances that permit this particular organism to flourish, and which are objectionable to the existence of any other organism. Lactic acid ceases to exist in cheese at a certain stage, and this permits these other organisms to come forth. The question therefore presents itself. Are these various organisms the cause or the effect? If the latter, their importance is not of great moment; but if the former, and both opinion and evidence are in favour of this view, then, a great field is opened.

The researches of Pasteur, Lister, and other scientific investigators have proved that, by the introduction of certain germs into the human system, certain effects are caused, and by the prevention of the development of certain germs other results are obtained. Pasteur has proved that various forms of bacteria can be cultivated. May we, therefore, not hope for results from future investigations that may exercise considerable influence upon some of our dairy processes? We have seen that the souring of cream is essential in butter-making. If this be so, it follows that there must be a degree of acidity, a certain development of lactic acid, that shall be better than any other degree. May not pure lactic ferment —that is to say, bacteria lactis free from other forms of bacteria—be obtainable, and in a form that can be added to sweet cream in an exact proportion, just as we add a carefully measured quantity of rennet to milk in the process of cheese-making? I go farther. If these wonderful organisms do exert the influence and are the causes of certain results, may it not be possible to produce—to grow, in fact—the exact species that may be found to exert the desired influence in the ripening of cheese, &c.? Duclaux, a French chemist, found in certain cheese six different forms of ferments—organisms; and further, that one of these, the chain-vibrio, possessed the particular power of making the small particles

No. 7.—Head of a boar.

of curd sticky, so that they more easily became consolidated into a close mass.

By drawing attention to this subject thus roughly and incidentally, I hope to reach the object I have in view—viz., to show how important a part influences comparatively unknown to us at present may, and indeed are playing in the world, and how important is the "infinitely little," and what a field for investigation and study is here open, not to mention the hundred and one other directions in which an earnest student would find congenial occupation. Now where could this be so well provided as in a school, with land, plants, and animals at the beck and call of science?

HEALTH.

HEREDITARY INFLUENCES.—"Like begets like" is an expression as true of health and vigour of constitution as it is of colour, symmetry, character and outward form. It is to a knowledge of this fact, and the enterprise it has awakened in the stock-breeders of this country, that the super-excellence

of English horses, oxen, and sheep, is attributable. Just as the progeny of our domestic creatures bear the general impress, temperament, and qualities of the parent, so do they inherit the strength or weakness of the latter, the tendency or predisposition to actual disease. The influence of parentage is as decidedly and completely shown in the good or indifferent performance of the various functions of the body as it is in the exterior physical conformation, and the defects of the one are as readily transmitted from parent to offspring as are those of the other. Weak lungs are capable of being as directly and powerfully inherited as are bent limbs and other bodily distortions, and even in some instances as the colour of the animal itself. General constitutional weakness, with an aptitude to relapse into disease, is the inheritance of some of our most valuable strains of both horses, oxen, and sheep. The over zealous desire to introduce or improve some special quality of form, function, or expression, or to modify the general appearance in conformity with the requirements of breeders of stock, has led to the adoption of a system of in-and-in breeding, *i. e.*, the mating of animals of the same family or strain or kindred blood.

The results obtained have been highly beneficial in promoting rapid growth, early maturity, and fattening properties; but they have likewise in numerous instances proved destructive of constitutional vigour and general health, by multiplying the intensity of family infirmities. From a health point of view, it is of the highest importance to breeders of farm stock that dams and sires should be judiciously selected. Animals only with sound constitution and good physical development, born of sound parents, should be used for stock purposes. Some of the most intractable, enduring, and fatal diseases are hereditary and transmissible from parent to offspring The destructive disorders known as tuberculosis and scrofula, which present themselves in the form of consumption or wasting, are among the number. Rheumatism, rickets, and the various diseases of the legs of horses known as splints, spavins, ringbones, and curbs are all the outcome of inherited weakness in by far the majority of cases.

Roaring, broken wind, and ophthalmia or inflammation of the eye—diseases which incapacitate and render worthless some of our best equine blood—are born of hereditary influence. Similarly the powers of endurance possessed by some horses and the tolerance of cold and deprivation exhibited by some other animals, are properties built up in the constitution and handed down from parent to progeny. Certain strains of racehorses, for example, are notorious for carrying heavy weights over long distances, and performing feats of endurance which other equally stout-looking and highly-trained animals are utterly incapable of.

The hereditary tendency to disease may be strongly or slightly inherited. In some families particular weaknesses appear in every member, at one period or another. In others they are only occasional, or may even altogether disappear from one or a succession of generations—to return again under the influence of indifferent regard for the laws of health. The influence of external circumstance may do much to uphold health and ward off disease where the tendency to it is only feebly inherited, and ewes in some cases permanently stamp out the morbid faculty altogether. In this connection good food, a suitable climate, and the general observance of the laws of health. added to judicious crossing with sound stock are the essential elements of success.

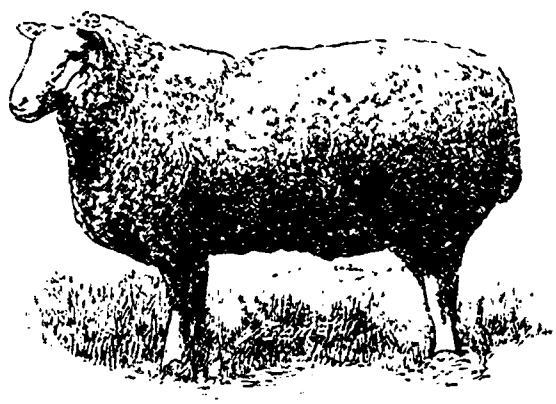
LEICESTER SHEEP.

The accompanying illustrations, which were photographed from life, represent sheep that were bred and have been exhibited by Mr. George Turner, jun., of Thorpelands, Northampton. The ram was taken as a shearling when he was 1st at the "Royal" meeting at Hull, and 1st at the Yorkshire and Lincolnshire Society's shows. The ewes were also shearlings in the same year, and took the 1st prizes at the above named meetings. The ram was sold for 120 gs. to go to France. The portraits are successful representations of the breed.

Transfers of Thoroughbred Stock.

AMERICAN BERKSHIRE RECORD.

Sweepstakes 13,921, Clifford and White, Wellington, Ohio, to Tilferd Rice, Larchland, Ill., Drion's Catherine III, 13,514, W M. Alexander, Huntsville, Mo., to F. A. Scott, Huntsville, Mo., Tom's Sambo VI. 13,861, Esgar Stilson, Ashkoohwis, to F. Brinkerhoff, Brandon, Wis., Euraka Belle 13,754, N. H. Gentry, Sedalia, Mo., to R. J. Gray, Euraka Springs, Ark., Lord Liverpool, jr., 2,801, J. Baker Sapp, Columbia, Mo., to Chas. G. McHatton, Mexico, Mo., Urbana Chief 12,155. A. W. Todd, Urbana, Ohio, to M. D. Palmer, Mendota, Ill., Lady Surprise 13,957, Windsor Prince 13 955, W. T. Miller, Bowling Green, Ky., to E. A. Lynn, Boxville, Ky., Della 13,957, H. D. Nichol, Nashville, Tenn., to C. C. Reynolds, Pembroke, Ky., Sallie Carlisle 10,804, Wm. F. Allen, Manhattan, Kan., to A. M. Rollins, Manhattan, Kan., Christine 13,712, C. W. Martin, St. Louis, Mich., to Martin Henry, St. Louis, Mich., Beauty of Maple Grove 13,919, C. W. Martin to Geo. W. Buney, Newark, Ohio, Baron Leinster 13,560, J. G. Snell & Bro., Edmonton, Ont., Can., to A. W. Cooley, Coldwater, Mich., Belle of Glenwood 13,918, Lady Toronto 13,937, L. W. Ashly, Colborne, Mo., to H. W. Briant, Glenwood, Mo., Elmwood Champion 13,995, Springer Bros., Springfield, Ill., to W. A. Harris, Dardenne, M., Sprinfield, Ill.



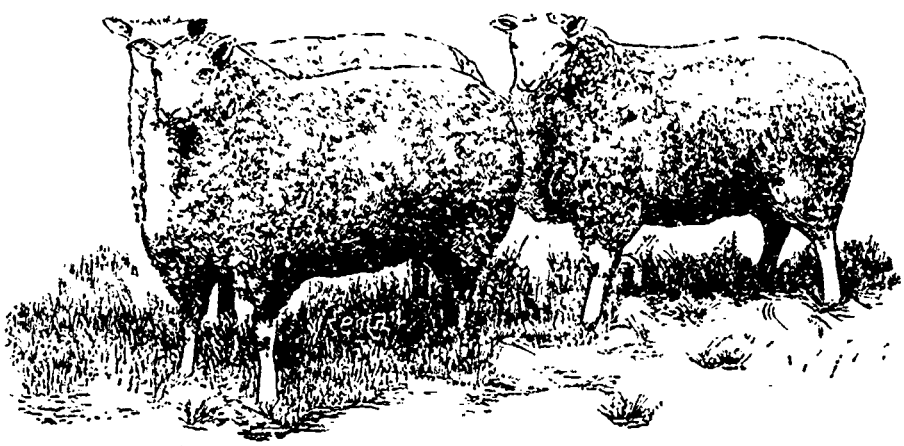
No. 8.—Leicester ram.

PHIL. M. SPRINGER,
Secretary.

The Test of Pedigree.

No observant, experienced stock breeder will deny that attention to pedigree is the touchstone to success in live-stock improvement; but a pedigree may be a good one or bad. If an animal belongs strictly to any one of the various well-established breeds, it is safe to assume that it will reproduce the general characteristics of the breed to which it belongs, unless paired with another of an equally well-established but different breed. But there is such a thing as an inheritance—a well-defined inheritance—of inferiority, running back through many generations. Such pedigrees are

quite as much to be avoided as are good pedigrees to be desired. A good pedigree has often been defined by the writer hereof as one which commences with a good animal and runs back through an ancestry all distinguished for unusual excellence for many generations, and the longer such pedigree is the better. It is important to know that the male which is to be placed at the head of a stud, herd or flock should himself be a good one; it is important to know that his two parents, and four grandparents, and eight great-grandparents were also distinguished for excellence in the points that it is desired especially to have transmitted. A pedigree, to be of any particular value, must be something more than a mere string of names. Instead of accepting the fashions that titled aristocracy may have set for us, it is vastly more important to ask: Do his steers make more and better beef from the same food than ours? What is the butter record of his cows? Have his horses proved themselves winners? Are his sheep more famous for wool or for mutton than ours? Are his pigs hardier, and do they produce sweeter hams and better bacon than ours from the same food? It is by such practical questions as these that we should try pedigrees, and we should be infinitely more concerned to know whether the immediate ancestors of an animal have been distinguished for especial excellence, than to know that the line of descent is straight from Booth or from Bates, or any other noted breeder of former years. The very *marrow* of pedigree consists in the *qualities* of the ancestry all along the line. If selecting stock from which to breed trotting horses, look at the records of the winners on the trotting turf, and judge of the merits of the ancestry accordingly. If for the dairy, search for the *butter* or *milk* records of the ancestry. This is the essence of pedigree as applied to stock-breeding.—*The Breeder's Gazette.*



No. 9.—Mr. George Turner's shearling Leicester rams.

ENSILAGE.

A set-off to the results of the cattle-feeding experiments at Woburn, so unfavourable to ensilage, is to be found in the new volume of the Highland and Agricultural Society's "Transactions" The Ensilage Committee of the Society selected twelve head of cattle for experiment, dividing them as equally as possible into two lots. The whole of the animals were at first fed on silage, a very sensible precaution, as it familiarised them with a food that would otherwise have been strange, and possibly at first distasteful to them. After two lots had been divided, one lot received a daily allowance of 30lbs. of Aberdeen yellow turnips and as much oat straw as the beasts could consume, and the other lot 28lb. per day each of silage, made partly from clover and rye-grass, and partly from the product of "a leafield hained" (1)—whatever that may mean. Both lots received 4½lb. per head daily of mixed linseed and cotton cake. At the end of a month it was found that the silage-fed animals had increased in live weight 48lb. per head on an average, while the turnip-fed lot had increased only 18lb. per head. As this extraordinary difference was attributed to a change of diet the result was excluded from the record, the experiment being deemed to have commenced after the second weighing. Four weeks later the silage-fed lot had increased in weight 25lb. per head, while the other lot had lost 2 2-3lb. each. At the end of another four weeks the cattle fed on turnips had done better, having gained 53 2-3lb. each, against 42 1-5lb. per head increase in the case of their rivals. Both lots were then turned out to grass, and the important part of the experiment came to an end. When the beasts were killed it was found that those that had been wintered on silage were, on an average, 2st. 11lb. each heavier in carcase than the others, and dressed 71 34 per cent. of their weight at the commencement of the experiment, against 67·54 per cent. for the turnip-fed lot. There is one point of similari y to be noticed between the results in Scotland and those at Woburn. In both cases silage, after a time, appears to have cloyed on the appetite or to have injured the digestion of the cattle, as they did worse on it the longer they were kept on it. This is a point that should be further investigated.

SOME "SARCHIN'" QUESTIONS.

The following letter is from one of the most thoroughly scientific farmers of our neighboring province:

Mr. Editor:—I have been following, with what attention I could, apart from my official duties, your valuable articles on artificial or commercial fertilizers. It strikes me you have not stated exactly how much of the elements—nitrogen, phosphoric acid and potash—are needed, say on common New England light soils, (1) for a full potato crop, and (2) for a corn crop—nor what difference you would make (3) for a corn-fodder crop. (4) Please give the quantities required in pounds, as we don't all know how much a barrel contains. Please state also what quantities should be used (5) for a

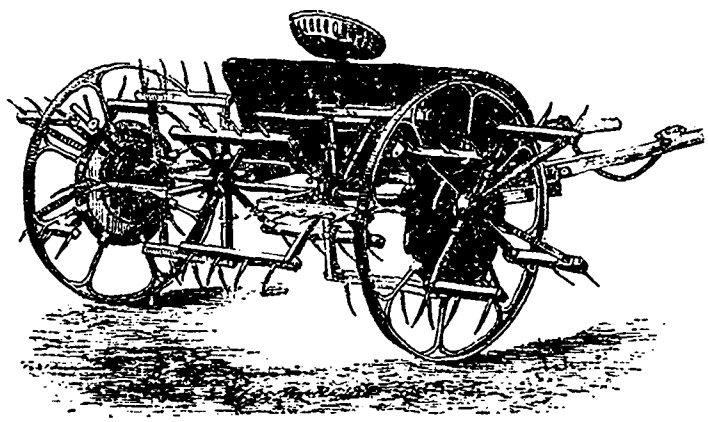
(1) "A leafield hained" means a grass-field that has been pastured, and afterwards been kept free from cattle until the herbage has grown again. A R J. F.

crop of peas and oats for fodder, and (6) for grain (peas) (7) I intend to test the *Rural New Yorker's* system of potato culture. I shall try a patch of one-fourth acre just as it recommends, and a patch of corn cultivated on the same plan—both for maturity and for fodder. Also potatoes and corn grown on the level, in well-prepared patches, but with a mixture of heavy clay and rich black forest mould and well-preserved manure.

My manure is collected in a barn cellar, but not under the stock. The stable is a lean-to to the barn; the whole faces, liquid and solid, drop into a hewn trough, and from there go into the barn cellar, which is paved with well-beaten brick clay. No water or frost reaches this cellar, and I think nothing whatever is lost.

I intend using ten double horse-loads of each manure, clay and black mould per acre, in the drills, on light, sandy soil, and to add some bone-meal and ashes to the above in another patch. Please state what you would advise under the circumstances, and how I can improve on the above.

I have been feeding milch cows this winter on a mixture of fair hay, which cost me from $6 66 to $8 a ton, delivered. Also, with a mixture of crushed peas and oats and linseed—ground together in the proportion of one part linseed to six of oats and three of peas. This mixture costs me $28 a ton, delivered. Ten pounds of hay, five pounds of straw, cut fine, wet and steamed, and three pounds of grain mixture per head of stock. Heifers in milk, weighing not over seven hundred fifty pounds, live weight. Now, according to all tables of food values, the hay is infinitely cheaper, at the above rate, than would be the grain mixture, or cotton cake, bran, etc. Please give us, your attentive readers, your views of this important subject of various American cattle foods for cows, from the feeding standpoint, and for manure production. It strikes me that these tables of comparative values have not been made from the milk-producing standpoint—especially as to the manurial value—but from the beef-fattening basis. If we remember that a common cow, on common food, produces an average of twenty pounds of milk daily for several months; that this is equal, in food value, to ten pounds of dressed beef; that the same food as taken by the cow could not possibly produce over one pound of dressed beef, if it could approach it, we are forced into the conclusion that the manure from the cow must necessarily be the poorer—as compared with the fattening ox—as so much more has been extracted from it in the milk production. Now, it strikes me that this important question of comparative values of manure from various foods deserves careful study, and if such study has been reported, I for one would be most thankful for the results.



No. 10.—Double-action tedder.

With my best acknowledgment of your most valuable labors for the farming interests of America—not of Vermont alone, by any means—and wishing THE WATCHMAN the full success it deserves. I remain most truly yours.—QUEBEC.

REPLY BY THE AGRICULTURAL EDITOR.—Though we know our correspondent's letter to be entirely friendly, yet the form in which he puts his questions almost looks as though he wanted to see how much we think we know about this deep and difficult matter of the exact adaptation of fertilizers to crops. But long experience has "taken the conceit" all out of us, and we are quite ready to say "don't know" to a vast number of questions that might be put to us.

First, then, we don't know exactly how much of each fertilizing element is needed for the potato crop, even on our own farm. But for potatoes, when no other fertilizer is used, we should not think of using less than six hundred pounds to the acre of a fertilizer having, say, the following analysis;

Available phosphoric acid.....	10 per cent.
Available potash.....	6 per cent.
Available nitrogen.....	4 per cent.

This not only agrees with our own experience, but is the same formula, or nearly the same, as the Mapes Potato Fertilizer, with which potatoes were grown at the rate of over one thousand bushels to the acre on the experimental farm of the *Rural New Yorker* on Long Island We have visited this farm The soil is lighter than our own. The cost to fertilize as above, including application, would not exceed ten dollars per acre. We should sow it broadcast on the furrow, and work it well into the soil with a disk harrow or similar implement, and plant the potatoes in drills, cutting two eyes to a piece, dropping these sets ten inches apart. The plowing should have to be not less than eight inches deep, the drills made five inches deep, and not hilled in cultivation. The *Rural's* big crop was grown with spade culture, but with plow culture on large areas we believe that there are many varieties of potatoes that will yield from four hundred to six hundred bushels per acre, when manured as above. (1)

For a corn crop grown for grain we should want a fertilizer to analyze nearly as follows:

Available phosphoric acid.....	15 par cent.
Available potash.....	5 per cent.
Available nitrogen	5 per cent.

This is higher than Mapes' corn formula on phosphoric acid and on nitrogen, but lower on potash. For a fodder crop more potash and more nitrogen (both of which have a strong effect on leaf growth) are wanted, say about as follows:

Available phosphoric acid.....	15 per cent.
Available potash.....	7 per cent.
Available nitrogen.....	6 per cent.

For corn we would use five hundred pounds per acre, and for fodder seven hundred pounds.

We believe that the fodder formula would answer for oats, and, with the additional application of six bushels of salt to the acre, for wheat, but would apply only five hundred pounds to the acre for either grain. We manure for peas about the same as for potatoes, except that three per cent of nitrogen is enough, except in a poor soil.

We do not think there is any advantage in deep culture for

(1) I need hardly say that I am entirely in favour of not hilling up potatoes more than is necessary to prevent their greening.
A. R. J. F.

corn in our climate. On the contrary, we think plowing over five or six inches deep is a disadvantage. The roots of the corn want all the sun-heat they can get, and want their fertilizing material near the surface, too. Where ten loads of such manure as "Quebec" speaks of are applied to the acre, two hundred fifty pounds of fertilizer is enough. When so small a quantity is used it is perhaps better to scatter it in the hill or drill. (1) As the manure furnishes abundant nitrogen, only a mixture of phosphoric acid and potash is needed, say.

Available phosphoric acid ..... 15 per cent.
Available potash ..... 6 per cent.

Regarding the fodder rations named by "Quebec," we agree that where hay is so cheap it ought to be used very freely, and for store cattle or cows not in milk it would probably be sufficient. The grain mixture seems to us a good one, and for fatting beasts and cows in milk we would use it as experience might seem to dictate We are not an expert in cattle-feeding, and would rather have some reader who has experience tell what he knows in this connection.

We never would feed for manure production as an objective point, for we don't think it could be made to pay.(2) Rich food produces rich manure, it is true, but we should disregard this point in feeding, entirely, and look exclusively to the health, growth, milk, wool and other merchantable products of our stock, leaving the manure to be what it would be under the circumstances.

From the experiments of Professor Sanborn (late of the New Hampshire and now of the Missouri Agricultural College), the European feeding table need readjusting to meet American conditions. Professor Sanborn has got the same results with less feed almost always, or better results with the same feed.

A word may be needed as to the composition of fertilizers, to get the desired percentage of each element of plant food as given above. But now that we can buy fertilizer materials in bulk, with a guaranteed composition, it is a question only of very simple mathematics to make any desired mixture with ease. For nitrogen we have sulphate of ammonia, nitrate of soda, dried blood, dried and ground meat, etc., while for potash we have ashes and the potash salts, and for phosphoric acid ground bones, plain superphosphates, etc. By "available" we mean in a condition easy to be taken up by plant roots. All the above forms of nitrogen and potash are available, and for phosphoric acid a plain superphosphate, finely ground steamed bone, or fine raw bone treated by the wet ashes process, answer all requirements. DR HOSKINS.

(1) Hardly, with corn. The filamentous roots so completely occupy the ground, when the corn is four feet high, that they are sure to find the food. In the case of swedes, &c, all the fertilisers should be in the drill to start the plant out of the reach of the fly A R J F.

(2) Neither do I. A R. J. F

NON-OFFICIAL PART.

TRICKS ON THE TRACKS!

Dangers from which Engineers Save the Public and Themselves.

The Railway Review.

One who is accustomed to railway travelling can scarcely realize how much he is dependent for safety upon the engineer.

Added to the responsibility of their station, engineers are also in constant danger of accidents caused by the tricks of jealous rivals.

This rivalry, it is said, sometimes prompts to the doing of utterly mean tricks. A Nickle Plate engineer after his very first trip was laid off because he had "cut out" all the bearings of his engine. He was re instated, however, after he proved that some rival *had filled his oiling can with emery*. Another new engineer was suspended for burning out the flues of his boiler. Through grief at the loss of his position he died, and then a conscience-stricken rival confessed that *he had put oil in the tank* so that it foamed and showed water at the top gauge, when in reality there was scarcely a quart in the boiler!

These immense jealousies, together with the terrible anxiety incident to their work, has a terribly straining effect on the nerve, and statistics tell us that, though Locomotive Engineers may look strong and vigorous, they are not at all a hearty class. Ex-Chief Engineer A. S. Hampton, Indiannapolis, Ind., (Div. 143) was one of those apparently hearty men, but he says: "The anxiety, strain and jolting came near finishing me." His sufferings localized in catarrh of the bladder, but he used Warner's safe cure faithfully for twenty weeks, and now exclaims, "I am a well man." T. S. Ingraham, of Cleveland, Ohio, assistant Chief engineer, and other prominent members are also emphatic in its praise.

The Locomotive Engineers' Brotherhood has 17,000 members and 240 divisions. Its headquarters is in Cleveland, Ohio, where Chief Engineer Arthur for twenty years has exercised almost dictatorial sway. It was organized in August, 1863, by the employés of the Michigan Central. It has given nearly two million dollars to the widows and orphans of deceased members.