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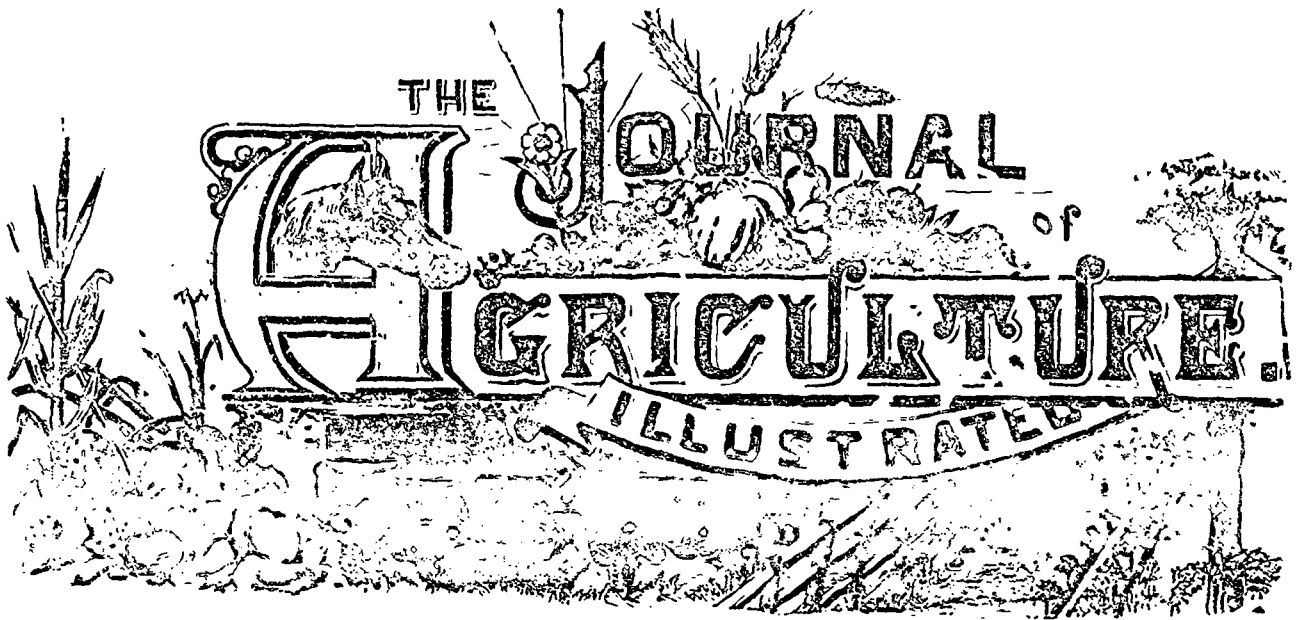
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**NOTICE.**—The subscription to the *Illustrated Journal of Agriculture*, for members of Agricultural and Horticultural Societies, as well as of Farmers Clubs, in the province of Quebec, is 30c annually, provided such subscription be forwarded through the secretaries of such societies.—**EDITORIAL MATTER.** All editorial matter should be addressed to A. R. Jenner Fust, No. 4 Lincoln Avenue, Dorchester Street West, Montreal—or to Ed. A. Barnard, Director of the *Journals of Agriculture, &c.*, Quebec.

OFFICIAL PART.

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Notice.—Herd-books.

Dr. Couture, 49 rue des Jardins, Québec, is the secretary of the herd-books and stud book of Canadian cattle and horses, and of the swine and sheep registers recently opened by the Council of agriculture.

In future, all requests for registry in the above books as well as all letters, documents, &c., connected with them, should be addressed to him.

All letters requiring an answer must contain a 3 cent stamp.

ED. A. BARNARD,

Sec. Coun. Agriculture,

Director of the *Journals of Agriculture.*

### Agricultural Clubs—Important Notice.

The agricultural clubs already in existence and those shortly to be instituted, are requested to apply to the secretary of the Department of agriculture, who will forward to them, gratuitously, for the use of their members, certain pamphlets on agriculture, and all the information on that subject that the department is able to afford them.

H. G. JOLY DE LOTBINIÈRE,  
Pres. Council of Agriculture.

### DE OMNIBUS REBUS.

*Lachine crops.*—On Monday, June 13th, I went to see my old friends the Lachine farmers. There was a visible improvement in many of the fields. The great farm of the Messrs. Dawes, some 500 acres in extent, presented a very promising appearance. The owners have taken to grow peas and beans, at last, both crops of prime importance to such extensive cattlemen. I used to worry my good friend Mr. Tuck, the invaluable manager of the estate, when I lived at Lachine, about the neglect of these plants. There are now seven acres of horse-beans and six acres of peas, and very well they look; but I do not like broadcast pulse. They should be drilled and horse-hoed like potatoes and swedes. If beans do not get plenty of air and light from top to bottom, the lower pods will not set, and it is those that are the most productive.

And another point in favour of drilling peas and beans is that at the last horse-hoeing, which should be postponed as late as possible, rape may be sown between the rows. There is no fear of this plant growing profusely enough to smother the main crop, and when the beans are out, the horse-hoe can once more pass through the vacant spaces previously occupied by them, and as no hand-hoeing is needed for rape, the expense of growing it is very trifling—a pound of seed to the acre will be quite enough, if the pulse has been drilled at 24 inch intervals. I see Mr. Dawes has at last started a small flock of ewes—not so well bred a one, though, as I should have expected—; and he would find the rape a most useful food for them: first, to fatten his lambs on, and next, to prepare the ewes for the reception of the ram's attentions. All sheep-breeders know how irritating a thing it is for the shepherd to have his ewes keep on dropping their lambs over a long period of time—5 weeks sometimes,—now, if for 3 weeks or so before *coupling*, the ewes have a good bite of rape every day, it will bring them into season all together, or nearly so, and more, there will be a large proportion of them twins. I have heard some people here say they do not want twins, if a ewe brings up one lamb well, they are satisfied. Well, I dare say, if a ewe has to pick up a scanty living on worn out "pacage," one lamb is as much as she can manage to do well, but there is not much chance of the ewes on Mr. Dawes' farms being treated in that fashion.

The *Sainfoin*, I regret to say, has been overpowered by the weeds. This I expected would be the case, as the spot where it was sown was full of water-retaining pools, and the winter of its first year was a continued succession of snow-storms, frosts, and thaws. However, what there was of it was fit to cut on the 13th June, even in this backward season, and so I conclude the position is proved, that sainfoin is a plant perfectly suited to this climate.

*Potatoes* were a good plant, and forward enough, but the weeds were evidently going to give Mr. Tuck a good deal of trouble.

It is a dreadful season and the worst of it is, that the better the land is manured, the more certain it is that the straw-crop will go down and yield a poor sample of grain. If,

as I remarked in the last number of the Journal, the 2-rowed barley was laid on the 12th June, what state will it be in after the terrible rains of the last fortnight? I shall go and look round again next week, but I fear I shall see an awful lot of destruction. Fancy; 7½ inches of rain in June fell, the average temperature of the month being, at Montreal, 60½° F., ½ of a degree higher than the average for the ten past years. The lowest reading of the thermometer for June was 52° F., on June 7th. The average rainfall for the last ten years is 3 inches, but last year only 1½ inches fell in the month. The hottest day was June 1st, 89° F.

This month of July, too, has been very wet and hot—overpoweringly close and muggy. Sunday, the 3rd, lots of rain fell, and again on Friday and Saturday, the 8th and 9th. Wheat was out in the county of Welland on the 9th. I fear the cold night-temperature in the West and North-West, will have had the effect of causing the wheat to rust; and there cannot be anything of a crop of corn in the country, as it was sown late and cannot ripen unless we have a marvellous October.

On all the low-lands, the potatoes are ruined. At St. Laurent, near Montreal, a young farmer told me yesterday, the young tubers are scalded—*échaudés*—and cannot increase in size.

Fortunately the price of cheese is fair, though butter is cheap enough to please the consumer, but the grass, with so much rain, can have no *proof* in it, and the yield of milk is by no means the measure of the products made from it under such watery conditions.

I hear that the country below Rimouski has been crying out for moisture all along! My poor friends at Métis are to be pitied: they never grow anything to speak of in the way of selling crops, and a dry summer plays the mischief with them. What induces people to stay on such farms I cannot think; though, indeed, the young men are moving up the country every season, some taking places in cheese factories, others buying or renting farms in better localities. Of these latter there are but few, as the means of the fathers are too scanty to allow of the sons receiving much money to lay out in land.

*Water.*—At the Gloucester, Eng., meeting of cheese-making farmers, in May, Mr. Embury, the lecturer, said "that drainage-water was not injurious to milk. Water had nothing to do with the production of inferior cheese. The quantity of water was of much greater importance than its quality. He thought that there was no danger that polluted water would produce polluted milk, at the digestive process always at work in the cow would carry off any bad matter present in what she drank." I do not like the practice so prevalent here of giving cows the dish-washings, &c.; but perhaps that is a final notion, as, according to Mr. Embury, there is no danger of its imparting its flavour to the milk. No one is more particular about the taste of butter than I, but I remember well the stagnant pools our cows used to drink from in England, and finer butter was never made than by our dairymaid. Wild garlic, and other abominable weeds, no doubt give an evil flavour to milk, but I do not believe we need be so particular about the water cows drink as some would persuade us to be.

*Kerry cattle.*—Have any of the *Kerries* or *Dexter-Kerries* been imported into this country? I have never met with any, at all events. Useful little beasts enough for the poor cottager in the old country, and susceptible of great improvement, no doubt. The cows of the pure Kerry breed give a fair quantity of milk, poor or rich in butter-fat according to the food they get, but they must not be judged from the stand-point

of such herds as Mr. Martin Sutton's, which, with generous feeding, averages from 14 to 18 quarts a day! They are pure black in colour, and, when fat weigh about 60 lbs a quarter, but I doubt the profit derived from fattening them is not great. I always fancy they are nearly allied in blood to the cattle of the Orkney and Shetland Isles, a herd of which a friend of mine in Kent, Eng., used to import for the use of his family, and one of which used to be slaughtered every week, at four years old. Capital beef they made, but at a dead loss of about \$10 a head.

The Dexter-Kerries are much neater made beasts, in fact they resemble greatly in form the shorthorn. Two of these cows, weighing, alive, 600 lbs. each, says Mr Allender of the Aylesbury Dairy-Company gave daily 37 quarts of milk—one 17 the other 20—and their milk-yield in a little more than 13 days equalled their gross weight. An exceptional steer gave 64½ per cent of carcase to live weight, a yield rarely exceeded by the best shorthorns. An engraving of the head of a pure bred Dexter-kerry bull will be found at p. of this number of the Journal.

*Boullie bordelaise.*—According to the last reports from England, the experiments on the best means of combating the potato-disease, by means of the Bordeaux mixture, have been highly successful. They were carried out in the counties of Devon, Chester, Lincoln, Kent, Bedford, and Camarthen. In every one of these the Bordeaux mixture was successful except in Cheshire. At each station there were three plots, to one of which (A) the dressing was applied as a preventive, twice before there were any signs of the disease; the second plot (B) received one dressing after the disease appeared, and the third plot (C) was left alone. The dressings cost about \$2 each and the net gain in sound tubers, valued at \$16 a ton of 2,240 lbs., were as follows:

|                   | Preventive (A). | Curative (B). |
|-------------------|-----------------|---------------|
| Devon . . . . .   | \$— .90         | \$12.75       |
| Lincoln . . . . . | 11.50           | —             |
| Kent . . . . .    | 61.00           | 41.00         |
| Bedford . . . . . | 17.50           | 17.25         |

In Cheshire, the net loss was \$25.00 on the preventive plot, and \$5.50 on the curative one.

In Scotland and Ireland, owing to the experiments not having been properly carried out, the dressings were rarely effective. On the continent and in the United-States, the mixture was, generally, applied successfully.

So the question seems to sum itself up thus. Will farmers lay out say four or five dollars an acre to treat their potato-crop, as a sort of insurance, with two dressings of the Bordeaux mixture? A question that involves the necessity of considering the points of prevention or cure. For it is certain that when the mixture is applied as a preventive to crops which never become diseased, there is a loss occasioned by its use of some 5 or 6 % of tubers, so that growers, by the double dressing not only incur a considerable outlay on the mere chance of its being necessary, but the risk of an actual loss as well.

Now, it seems, an addition of a certain quantity of molasses is to be made to the Bordeaux mixture to make it adhere to the leaves of the plant in case of rain. So the preparation stands:

- 20 lbs. of lime;
- 20 lbs. of sulphate of copper,
- 20 lbs. of molasses;
- 100 gallons of water.

On the whole, on all land, except low-lying spots where the disease usually prevails every time it is in potatoes, I should

defer using the dressing until indisputable signs of the presence of the scourge make their appearance. What a pity that a new duty of 1½ cent a gallon should just have been laid on inferior molasses!

*Barley.*—Has the much talked of exportation to England of barley from this country been carried out to any extent? I ask this, because I cannot find it quoted in any of the market-reports in my English papers; though, that is no guide, Canadian wheat being unmentioned too. Just as I wrote this, I saw the only quotation I have met with as yet. It appears in the Agricultural Gazette of June 20th, and reads thus:

Barley (Canadian).....22s per quarter:

This is equal to 66 cents a bushel, which is about what, if decent malting stuff, it would have fetched here last season! I dare say the weight is all right, but it will always be a job to get selections of barley of equal quality and equal ripeness. Mixed lots of wheat do not matter much, but no English malster cares to deal with mixed lots of barley. The growers and buyers in Moravia and on the Saale have been so long accustomed to supply the English market with barleys of the finest kinds—quite equal to our own Essex, Hertfordshire, and Cambridgeshire growths—that they know just what will suit our market, and act accordingly. Forgive my saying that, as I have superintended the malting of many thousands of bushels of barley, I really know what I am talking about.

*Export cattle.*—I beg to congratulate my friend Mr. Bickerdike on the prices Canadian bullocks are fetching in England as compared with the prices of England beasts. I do not suppose, however, that the trade has been a very profitable one this season, but, then, neither has the home-farmer made anything. Never mind: good times must come, sooner or later. (1)

The following prices were made at the Metropolitan Cattle-market on June 20th.

|                          | s. | d. |
|--------------------------|----|----|
| 800 lbs. Shorthorns..... | 4  | 6  |
| 800 lbs. Canadians.....  | 4  | 4  |

That is per stone of 8 lbs., sinking the offal, only a ¼ cent difference between the two lots. In sheep, though there is a wide distinction, small, well fattened, short-wools, are what the English markets want. Best Down wethers are worth one shilling a stone, = 3 cents a pound, more than big Lincolns, and our Canadian "useful old ewes," are still cheaper to buy. Will it be very long before we have neat wethers to send over? They do not want dry ewe-mutton.

*Tamworth pigs.*—Some of this breed will be for show at the Montreal grounds in September. They are supposed to carry more lean in proportion to fat than any breed extant to-day.

*Hampshire-downs.*—I have succeeded in getting a separate class for this breed of sheep. It was a sin to class them with the Oxfords—quite a modern breed—, as they are as nearly aboriginal as any animal can well be. I have nothing to say against the Oxfords, only they are a "middle-wool," cross-bred sheep, and too recently established to be depended upon for crossing with other breeds. Their originator, Sam. Drucoc, of Eynsham, began the manufacture of this strain within my recollection.

A comparison.—Thank you, very much, Dr. Hoskins for

(1) Mr. Frankland, of Toronto, says every head has lost money.

the following compliment you pay the farmers of my native country.

"If we (the farmers of the United States) were to bring our lands, by means of fertilisation and cultivation, up to the standard of the wheat-lands of England, or even of Belgium. We should double our average wheat-crop without increasing the wheat area a single acre."

Try what feeding off rape with sheep will do, dear Dr Hoskins, to begin with. It is not costly, and never fails.

*Maine Experiment Station.*—On the cultivation of cabbage. Frequent transplanting of cabbages was found beneficial, but that will not do for a field crop. In garden work, once transplanting, before finally setting out, is quite enough, though, if the plants are very early, they may be moved to keep them back. Deep-setting is better than shallow. Early-York is now out of date, as the newer sorts, the Jersey Wakefield, &c., are better.

"The early set-out *tomatoes* were the most prolific and the earliest ripe. A slight frost, when the plants have been properly hardened off in the cold-frame, does not injure them much. Do not keep the plants too long before setting out in the open air." A proof of the good sense of this I found this year: I bought some plants of Mr. Bray, florist, St. Mathew St., Montreal, and set them out on the 3rd June. Mr. Bray had no room for his till the 17th of that month, on which day he planted out some from the same cold frame as mine came from. My fruit will begin to colour this week, July 20th, his are only just in flower, long, leafless things, with a most unthrifty appearance.

"The effects of trimming were that it is a profitable way of inducing earliness. The total increase of ripe fruit ranged from 5.5 to 47.6%." The experimenters, from their account, only partially trimmed the plants, but even that paid well. Every side-shoot should be remorselessly plucked out. There will be no crop of *tomatoes* this year, as the foliage has got the better of the fruit. Mine will be almost as early as usual, but the yield will be very poor. Nothing can be healthier or more brilliantly rich than the plants themselves, but the flowers fell off before the fruit set, and the earliest fruit turned black and split: all owing to the wet weather.

"An important requisite to successful tomato growing is that the plants be kept growing vigorously; a condition involving rich soil and frequent tillage." Well, that depends: if earliness is more desired than abundance, poor land will be better than rich land. Frequent hoeings are to be given in all cases. I prefer small early fruit to large late fruit.

ARTHUR R JENNER FUST

The following changes have been made in the Prize List of the Exhibition

The class, for Oxfords and Hampshire Downs, was divided, making a separate class for each breed.

In the class for Cross breeds an extra section for, "Best ewe 1 year and over," was added, making 3 sections in all.

In the class for Fat Sheep, the section for wethers over 2 years was deleted.

In Pigs the class for Essex was changed to Essex and Tamworths.

Mr. H. Wade writes from Toronto that "there is no such breed as the Essex known in England! I knew Fisher Hobbs as an exhibitor of Improved Essex more than 45 years ago; and at the R. A. Society's meeting, July 17th, 1845, Wm. Fisher Hobbs won the prize of ten sovereigns for his "7 months-old Improved Essex sow, the prize of ten sovereigns for his pigs of 33 weeks and 5 days—old Improved Essex breeding

sow-pigs, and was highly commended for his 20 months Improved Essex sow and his 7 months old Improved Essex sow, all bred by himself": see Journal of the R. A. S of England, Vol. VI, part II. ARTHUR R. JENNER FUST.

The remarkable animal whose portrait, reengraved from the (London Live-Stock Journal) appears on page 120 belongs to a strongly marked breed very numerous in the west and middle highlands of Scotland and the western islands. They are scanty milkers and slow in maturing for the butcher, requiring five or six (1) years, but their beef is very superior when you get it, and their hides are said to make peculiarly excellent leather. The bull shown won first prize at the Royal show at Windsor. He is called Lord of the Isles 781, is a red brindle, and was calved in January, 1887, sire Glen Dhu 662, dam Maggie of Sutherland, by Quirang 1320. He was bred by the Duke of Sutherland, but now belongs to the Stud Farm Co., Marden Deer Park, Surrey.

Office of the American Jersey cattle Club.

NO. 1 BROADWAY, NEW-YORK.

June 1, 1892.

Believing that the dissemination of reliable information regarding Jersey cattle will be of great value, not only to all dairy owners, but also to every farmer and every milk and butter user in the land, the American Jersey Cattle Club has decided to offer fifty prizes for acceptable essays on Jersey cattle. In these days of keen competition the successful man must not only consider cost but quality of product. It is claimed for the Jersey cow that she meets both of these requirements in the dairy better than any other breed, and that her real merits, even at the present time, are imperfectly understood. Consequently it is contended that many dairy farmers, from lack of knowledge as to cost of production and quality of product, are losing money that might be made if their present cattle were replaced with Jerseys.

It is also believed to be a fact that in very many cases, quality is sacrificed to quantity, and that milk and butter consumers, through lack of knowledge, are paying unreasonable prices, quality considered.

At a meeting of the Board of Directors of the American Jersey Cattle Club, held May 4, 1892, it was directed that fifty prizes of \$25 each should be offered for acceptable essays on Jersey cattle. This competition is to be governed by the following rules:

1. SUBJECT, JERSEY CATTLE.—Anything pertaining to their history, value, usefulness, care, treatment, peculiarities of product, etc. It is desired that these essays shall cover as far as possible all the points on which present owners, intending buyers, persons who do not but who could profitably keep Jerseys, consumers of milk, butter, etc., would naturally desire information.

2. SIZE.—No essay shall contain less than 600 nor more than 900 words.

3. TIME.—All essays must be submitted on or before September 1, 1892. They may be sent earlier, and the Committee request as prompt attention as is practicable.

4.—CONDITIONS.—All essays submitted are to be the property of the American Jersey Cattle Club, regardless of prizes. No essay will be awarded a prize unless it is considered by the Committee to merit publication.

5. COMPETITORS.—Forty of the prizes are open to competition by men. Ten of the prizes are open to competition by women, and, in view of the great interest taken in Jersey

(1) Four years usually, but many are fattened at three

A. R. J. F.

cattle by women, it is confidently expected that many will submit valuable essays.

6. AWARDS.—Prizes will be awarded and paid within sixty days after contest closes.

7. COMMITTEE.—Well-known gentlemen will act as judges in this competition.

8. SUGGESTIONS TO NEW WRITERS —Write plainly and only on one side of the paper. Write simply, just as you would talk. Don't criticise or attack other breeds. There is more of value to be said about the Jersey than can be put in any one essay. Don't try to cover too many points, take one part of the subject and make it complete. If you wish to write more, put it in another essay. Competitors may submit as many essays as they choose.

Should you desire circulars for your friends, they will be sent on application.

Address all communications on this subject to the American Jersey Cattle Club, No. 1 Broadway, New-York, N. Y

Yours truly,

R. A. SIBLEY, President.

**COST OF AN ACRE OF POTATOES.**

TO THE EDITOR OF THE *Family Herald* AND *Weekly Star* :

In reply to C. D. Tylee's letter regarding the cost of a bushel of potatoes I will state our plan of preparing ground and general culture, which, if followed, will give him over 300 bushels to the acre. Choose a nice, naturally drained or tiled piece of grass land. Spread on thirty loads of good manure, as evenly as possible, then plough the manure in, turning a light furrow, immediately after haying. Then harrow four times, first with the furrow; second diagonally; third crosswise; fourth as the furrow runs; about ten days to elapse between each harrowing. Then cross plough the land about two inches deeper than the first ploughing and let it remain until spring. As soon as the land is dry enough to work, put on your spade-Cutaway, or Disc harrow (we prefer the former) and thoroughly cut up the rotten sod and pulverise the ground perfectly. Then level with a light iron harrow, and if the work has been properly done C. D. T. will find his seed bed is about five inches deep and like a garden flower-bed. Then we mark our land with a common plough by opening a furrow about four inches deep, thirty inches apart, beginning at the left hand side of the lot, as by so doing the dirt from two furrows will come together in the shape of a drill. Into these furrows our seed is dropped fresh out, good sized pieces, about fourteen inches apart. Then the seed is covered by passing the cultivator, with mould boards on, through the soil that was thrown out of the furrow by the plough. We then harrow twice with light iron harrow before the plants are through the ground; these harrowings kill the weeds. The plants are cultivated four times; the two outside teeth of the horse hoe being removed for the two last times of working. No hilling or earthing up is done, as sufficient soil is thrown in whilst cultivating to protect the tubers from turning green and also because we prefer level culture. The plants are kept free from bugs by both hand-picking at first and Paris green and water afterwards. Two applications of Paris green are generally sufficient. As soon as the potato is ripe we dig with a fork or plough them out and put them into our cellar from the field. By following the above plan and using discretion as to the proper time to cultivate, and not allowing a crust to form on the land, we have succeeded in raising over three hundred bushels to the acre. Below I give the cost of raising on acre of potatoes on the above plan.

|  |        |
|--|--------|
| Hauling and spreading manure on grass land...    | \$2 00 |
| Ploughing once about 3 inches deep (not over)... | 3 00   |
| Harrowing four times at 50c.....                 | 2 00   |
| Cross ploughing 5 inches deep.....               | 3 00   |
| Spade harrowing in spring.....                   | 1 50   |
| Leveling with light iron harrow.....             | 50     |
| Marking out.....                                 | 50     |
| Seed, 14 bushels at 40c.....                     | 5 60   |
| Dropping seed.....                               | 2 00   |
| Covering with horse.....                         | 50     |
| Harrowing before plants are above ground.....    | 1 00   |
| Cultivating.....                                 | 4 00   |
| Bugging.....                                     | 2 50   |
| Bagging and picking up say 1 man 3 days.....     | 3 75   |
| Manure $\frac{1}{2}$ value 30 loads.....         | 15 00  |
| Value of land 6 per cent. on \$40.00.....        | 2 40   |

\$49 25

This autumn on the above plan we raised one hundred and twenty bushels from one-third of an acre. T.  
Compton County, Que.

Alva Farm, Knowlton, July 18th.

A. R. JENNER FUST.

Dear Sir,—In your account of the Dairy Convention at Ormstown which appears in the May number of the "Journal" I am quoted as saying that I use "White Southern Corn for ensilage which grows 17 to 18 tons per acre."

This is an error, as for several years back I have entirely discarded the White Southern and used various Northern or Western Yellow corns and some sugar corns. I found the White Southern gave a very heavy crop, generally 22 to 25 tons per acre, but too immature to satisfy me, and I prefer 17 or 18 tons of smaller corn with an ear on every stalk, which ear should be far enough advanced to be fit to boil for table use. I find such a corn in several of the Western corns and in a corn grown largely at Sorel and a kind grown by Mr. S. N. Blackwood at Shefford mountain.

I ask this correction to be made as it is important for those growing corn for ensilage in the Province of Quebec not to waste their time, land and energies on the Southern White corn.

There are several other minor misconceptions in the report of my remarks—for instance I recommend boarding the silo round and round instead of up and down, because in the latter case there is chance for air to follow down the space between the boards, caused by the swelling and shrinking in the wetting and drying of the boards. There is just as much of this when the boards are put on round and round, but the air cannot get to the space or follow it down into the ensilage. Also I keep my barns at between 50° and 60° degrees F. and think that quite warm enough for the cows.

I am Yours truly, S. A. FISHER.

**The Building of Hay Stacks.**

EDS. COUNTRY GENTLEMAN.—I am very much pleased with the answer of "An Englishman" to Mr. Sage, on building a stack of hay. The latter has proved to us all that he knows nothing of building a stack; if he did, his hay would not turn out mouldy, as he states. Evidently he can neither perform the work nor direct its management.

I have had large stack-yards in this county of wheat, oats, rye and hay, in ricks and stacks, and have written articles on building them for this paper. Every sentence that "Englishman" utters I vouch for as true, as to keeping and quality,

and I have kept hay in stack for two years, and sold it to those who know the value of good hay at double the then price of new hay. Our whole trouble in this country is that we cannot get men to build stacks, as only English, Irish, Scotch and Canadian laborers can do it. I have seen in Canada as well built ricks and stacks as I have in any part of Europe.

This sort of building is not learned by inspiration, it is drilled into them from boyhood, as in erecting stacks or ricks, a boy hands to the operator the sheaves, butts to him and just so; then the boy attends to the ventilating of either, by drawing a tight bound sheaf of straw through the centre of stacks, or empty barrels through the centre of ricks; (1) then the proper salting. All this brings the boy up to be a staker or ricker. Then again, in thatching a boy makes the wads of straw or coarse grass, butted at end for operator to place. When finished, it is scalloped with any wood that will bend in a bow, both ends sharpened and shoved in, to keep this thatching in its place. These go all around stack or sides of rick, from two to three feet apart. The operator uses no line; all is as straight as if each gad was measured between before inserting them.

If Mr. Sage can do this, or direct how to do it, I assure him that he will not have a forkful of musty hay in 100 tons so saved. An old-fashioned hay-barrack, slatted on sides with slabs from sawmill logs, an air-chamber carried through the hay in filling it, either by a tight bundle of straw, or a barrel carried up the centre to come out at top or at the side, will be far preferable to his published ideal of a hay-mow, and cost far less money. I have seen some well built stacks of loose straw (and that is the very hardest material to build a stack of) at straw-paper factories through Massachusetts and Connecticut—quite stack yards in fact—built, I presume, by foreigners; so that Mr. Sage or others need not travel to Europe to see them. Could I have a dependable supply of English, Irish, Scotch or Canadian laborers, I should never house a forkful of hay or a sheaf of grain. Our American-born laborers are not brought up from boyhood to such useful, systematic habits of labor. Rest assured that a laborer has to learn his trade like any one else.

GERALD HOWATT.

*Mobile Co., Ala., April 24.*

**FERTILIZERS FOR TOMATOES.**—As the tomato combines the good qualities of a fruit and a vegetable, its consumption is large and is rapidly increasing. The warm soils of the Southern States bring this crop to perfection. G. Speth, at the Georgia station (B. 17) has tested the effect on tomatoes of single fertilizing materials, of combinations, and of successive applications of these. The soil was a hard clay, with a clay subsoil. The fertilizers were cultivated into the ground. The application of nitrogen or potash alone did not increase the yield on poor land. The effect of the nitrogen depended on the presence of phosphoric acid and potash. Only the complete fertilizers gave profitable returns. The yield increased with the amount of complete fertilizer used. The nitrate of soda did best in two applications, the cottonseed meal in one. Nitrogenous fertilizers were most profitable. Phosphoric acid, in double ration, not only decidedly increased the yield, but also furnished the earliest fruit. Large rations of nitrogen, especially in the form of cotton-seed meal, prolonged the time of bearing. These fertilizers were profitably applied in June, when cultivating.—*Am. Ag.*

**CORN SILAGE VS. SUGAR BEETS.**—The relative fattening

(1) No good farmer in England ever either salts his hay or makes a chimney in a stack. Hay in stack should heat equally all over a chimney draws the heat to one place. A. R. J. F.

values of fermented corn fodder and of sliced sugar beets has been ascertained at the Michigan station (B. 84), by P. M. Harwood and F. B. Mumford. Eight grade Shropshire lambs used daily one pound clover hay, 0.7 pound oats, 0.3 pound bran, and 4.7 pounds sliced sugar beets. Eight other lambs of the same breed consumed each day the same amount of grain, but 0.8 pound clover hay, and 4.4 corn silage. The beet-fed lambs averaged 36 pounds gain to each, and the silage fed 30 pounds each, in 12 weeks. The cost of 100 pounds gain with beets was \$4.38; of 100 pounds gain with corn silage, \$4.96. The average gain of each lamb on sugar beets was three pounds per week. Each lamb on silage gained 2.5 pounds per week. The nutritive value of the beet ration was 1.6; of the silage ration 1.7. The experiment indicates that, by using either sugar beets or corn silage, lambs may be profitably fattened on a light grain ration, and that for this purpose sugar beets are preferable to corn silage.—*Am. Ag.*

**EXERCISE AND SHELTER FOR STOCK.**—If free to choose between barn and field, stock will seek shelter only during storms. Experiments by J. W. Sanborn, in the dry, cold climate of northern Utah (B. 11) seem to prove that this natural inclination is also the most profitable to the farmer. The cattle ate more when in the open air than when stabled, and much of the extra food was coarse material refused in the stable. The open-air cattle gained the most weight in the same time. Four years of experiment has shown that in a dry climate stabled cattle use more feed for a pound of growth than those not stabled. Cattle kept in yards surrounded by high windbreaks did better than those kept in the open field, and better than those stabled. Steers turned out every day, and others kept loose in box-stalls, did better than those tied in stables, proving that cattle need exercise. Work horses, blanketed in the stable at night, and wearing blankets beneath their harness during the day, did not hold their weight as well as those without blankets. No trials were made with stable horses blanketed only while being worked on stormy days. None of the trial cattle were allowed a choice of shelter. No comparison was made between horned and hornless or dehorned cattle. Sheds were not tried. No experiments were made with cattle given the choice of the open field, the sheltered yard, the open shed, and the closed stable. Nevertheless, the experiments prove that exercise in pure air and sunlight is necessary to supply the healthy appetite which eats and thoroughly digests the most possible food in the shortest time.—*Am. Ag.*

#### HEN MANURE.

F. Burlington, Ont.—Q.—Can you inform me, through the *Witness*, whether hen droppings are good to put on the ground for manure, and how much to the acre? Would they be better applied alone, or mixed with something else? Ans.—The dung of all domestic fowls contains fertilizing properties similar to those of guano. Hen manure may be applied at the same rate as guano, which is usually given in small doses of from three to four hundredweight per acre. (1) It is often mixed with one-half barn-yard manure. All fowl droppings should be kept dry to avoid fermentation. It is best to compost this manure, with peat or charred earth, and instead of spreading it broadcast all over a field, it may be made to go much farther, and do more effective work by putting a small quantity into every hill of corn or potatoes.

(1) Try a ton first. The poultry dung is very trifling compared with guano. A much over rated fertiliser. A. R. J. F.

Paper read by H. Rew at the Royal Statistical Soc.

SUMMARY OF RETURNS RECEIVED FROM FARMERS IN GREAT BRITAIN, GIVING ESTIMATES OF AVERAGE MILK YIELD PER COW IN THE DISTRICTS SPECIFIED.

| County or District.     | Prevailing Breed.      | Gross Annual Yield per Cow. | Used for Calves. | Net Yield. |
|-------------------------|------------------------|-----------------------------|------------------|------------|
| 1 Beds                  | Shorthorns (1)         | 625                         | 208              | 417        |
| 2 "                     | "                      | 525                         | —                | —          |
| 3 "                     | "                      | 456                         | 57               | 399        |
| 4 Berks                 | "                      | 810                         | 160              | 650        |
| 5 Bucks                 | "                      | 600                         | 56               | 544        |
| 6 "                     | "                      | 600                         | 56               | 544        |
| 7 "                     | "                      | 525                         | 20               | 505        |
| 8 Cheshire              | "                      | 500                         | 50               | 450        |
| 9 "                     | "                      | 500                         | 12               | 488        |
| 10 "                    | "                      | 600                         | 80               | 520        |
| 11 "                    | "                      | 450                         | 20               | 430        |
| 12 Cumberland           | "                      | 600                         | 110              | 490        |
| 13 "                    | "                      | 500                         | 80               | 420        |
| 14 "                    | "                      | 550                         | 80               | 470        |
| 15 Derbyshire           | "                      | 600                         | 80               | 520        |
| 16 Stafford             | "                      | 450                         | 25               | 425        |
| 17 Dorset               | Devons and Shorthorns. | 600                         | 81               | 519        |
| 18 Essex                | Shorthorns.            | 675                         | None             | 675        |
| 19 Gloucester           | "                      | 450                         | 20               | 430        |
| 20 "                    | "                      | 500                         | 14               | 486        |
| 21 "                    | "                      | 560                         | 40               | 520        |
| 22 Hants                | "                      | 500                         | 25               | 475        |
| 23 "                    | "                      | 650                         | 150              | 500        |
| 24 "                    | "                      | 600                         | 60               | 540        |
| 25 Hereford             | Herefords              | 90                          | 60               | 30         |
| 26 "                    | "                      | 400                         | 133              | 267        |
| 27 Herts                | Shorthorns             | 500                         | 250              | 250        |
| 28 Hunts                | "                      | 625                         | 208              | 417        |
| 29 Kent                 | "                      | 720                         | 200              | 520        |
| 30 Leicester            | "                      | 600                         | 20               | 580        |
| 31 Lincoln              | "                      | 575                         | 300              | 275        |
| 32 "                    | "                      | 500                         | 200              | 300        |
| 33 Monmouth             | "                      | 500                         | 20               | 480        |
| 34 Norfolk              | Red Polled             | 300                         | 10               | 290        |
| 35 Northampton          | Shorthorns             | 500                         | 400              | 100        |
| 36 "                    | "                      | 400                         | 46               | 354        |
| 37 Northumberland       | "                      | 700                         | 10               | 690        |
| 38 Notts                | "                      | 450                         | 40               | 410        |
| 39 Salop                | "                      | 440                         | 21               | 419        |
| 40 "                    | "                      | 600                         | 50               | 550        |
| 41 "                    | "                      | 400                         | 200              | 200        |
| 42 Somerset             | "                      | 450                         | 13               | 438        |
| 43 "                    | "                      | 475                         | 35               | 440        |
| 44 Stafford             | "                      | 450                         | 10               | 440        |
| 45 "                    | "                      | 548                         | 45               | 503        |
| 46 Sussex               | " and Channel Islands. | 500                         | 40               | 460        |
| 47 Warwick              | "                      | 530                         | 30               | 500        |
| 48 "                    | "                      | 750                         | 83               | 667        |
| 49 "                    | "                      | 900                         | 100              | 800        |
| 50 Isle of Wight        | "                      | 400                         | None             | 400        |
| 51 Wilts                | "                      | 500                         | 25               | 475        |
| 52 Yorkshire            | "                      | 912                         | 182              | 730        |
| 53 "                    | "                      | 700                         | 15               | 685        |
| 54 "                    | "                      | 600                         | £0               | 600        |
| WALES.                  |                        |                             |                  |            |
| 55 Montgomery           | Herefords              | 300                         | 10               | 290        |
| 56 "                    | Crosses, Welsh, &c.    | 400                         | 200              | 200        |
| 57 "                    | Herefords              | 300                         | 75               | 225        |
| SCOTLAND.               |                        |                             |                  |            |
| 58 Aberdeen             | Cross                  | 600                         | 300              | 300        |
| 59 "                    | Shorthorns             | 750                         | 80               | 670        |
| 60 "                    | Crosses                | 600                         | 300              | 300        |
| 61 Arran                | "                      | 500                         | 350              | 150        |
| 62 S. Ayrshire          | Ayrshire               | 130                         | 90               | 40         |
| 63 W.                   | "                      | 550                         | 110              | 440        |
| 64 Berwick              | " and Crosses          | 375                         | 175              | 200        |
| 65 Clackmannan          | Shorthorns             | 400                         | 133              | 267        |
| 66 E. Forfar            | Cross                  | 550                         | 412              | 138        |
| 67 Kirkcubright         | Ayrshire               | 400                         | 40               | 360        |
| 68 Lanark               | "                      | 600                         | 10               | 590        |
| 69 Selkirk              | Cross                  | 800                         | 20               | 780        |
| 70 Wigton               | Ayrshire               | 500                         | 25               | 475        |
| 71 "                    | "                      | 480                         | 15               | 465        |
| 72 Coupar Angus         | Crosses                | 300                         | 250              | 50         |
| 73 Sanquhar             | Ayrshire               | 380                         | 20               | 360        |
| 74 S. W. Scotland       | "                      | 600                         | 30               | 570        |
| Mean for Great Britain. |                        | 528.75                      | 93.07            | 435.67     |

(1) The "breed" mentioned in each case does not imply that the cattle are all pedigree stock, but that they have generally the character of the breed, usually with some admixture of blood. In many cases for instance, the term "Grade Shorthorns" is used, and in others where it is not used it is evidently intended to be understood.

"This dryness has a great deal to do with the mildness and nutty flavour characteristic of Cheddar cheese; it is certainly

far more influential than the soil and herbage. The whey left in the curd is less than in other systems, and contains only its proportion of fermentable sugar, consequently the fermentation which takes place while curdling is in process is reduced, as well as by the loss of moisture, which is essential to the action of the producing organisms. More of this hereafter."

Pig and Hen-Yard.

Farmer Boy, N S.—Q.—We have a rich piece of land on which there was a pig-pen and yard, also hen-house and yard, which are now removed. The place is shaded from about two o'clock in the afternoon. Is there any kind of crop that would do well on such a piece of ground? Ans.—If the pig and hen droppings were allowed to accumulate in heaps, they should be carted away, and spread on other land. It is possible for a piece of ground to be too rich and rank, and without knowing more about the plot referred to, I cannot give an opinion as to its suitability for cultivation. In regard to the shade, most crops will grow and do well if they have sunshine from dawn until two p. m.—Witness.

THE LAMB TRADE.

The following letter, addressed to the editor of the 'Toronto Globe,' is of interest to the farmers of Ontario:

Sir,—As the Canadian lamb season will soon begin, we wish to draw the attention of the farmers and dealers of Ontario to a rule that has been adopted by the dealers on this market, which is of great importance to them. It is in regard to the castration of lambs, and as it is the intention of dealers here to enforce a difference of one cent per pound between ram lambs and ewe and wether lambs, in favor of the latter, we hope you will give this letter sufficient prominence so that it will be copied by all local journals throughout Ontario, so that this fact can be fully brought to the notice of the farmers in time thereby to enable them to save thousands of dollars by having all their ram lambs castrated that they intend for market. We have always advocated the castration of lambs, knowing that it would be beneficial to all the trade, as ram lambs have always been a drag on the market, and very difficult to dispose of, but, as the farmers have seemingly ignored our advice, the dealers here have taken this action to protect themselves, and as the castration is a very simple matter, we hope that the farmers of Ontario will see the benefits to be derived by doing it; as their lambs will thrive better, will be more salable, and will always be in demand. Thanking you for the space.

G. D. MATHESON. (1)

President The Matheson Live Stock Commission Co.

Buffalo, April 23.

CAN I CAPONISE?

In the hundreds of letters that I receive seeking information on this subject these questions are generally among the first:

Do you think I could caponise without a teacher?

"If I should buy a set of tools do you honestly think I could caponise successfully by following the instructions that are sent?"

"I have often thought I should like to caponise but am afraid to try it."

(1) The flesh of uncastrated lambs is always red. At the London market, in the price of two lambs of equal weight, one castrated and the other whole, there would be a difference of from 35% to 40%. A. R. J. F.





HEAD OF PURE-BRED DEXTER-KERRY BULL.

Is it not a very difficult operation to perform ?

“ Does it require practice to do it ? ”

Every mail brings me letters with just such expressions as the above. And that this subject may become more generally understood is my object in writing articles for poultry publications on this subject.

Yes, my reader, you can perform the operation of castrating, just as well as I can, after your first two or three subjects ; but it is like everything else ; you must have confidence in your own ability to do the work.

If you go at it with fear and trembling, are afraid to give a little pain and thus save much suffering in the future, shake all over, turn pale and become weak-kneed, then you had better let the fowl alone, and don't undertake the job but let a man undertake it for you.

The idea to any one who has castrated that any such feelings should exist in any man of ordinary intelligence seems

head on them than they have got, I know I can and will.”

When a man gets so he can say and feel this honestly, then he had better get a set of tools and go at it, for he is sure to succeed.

I have prepared a series of questions and answers on this subject which I shall be glad to mail any of your readers who will send postage.

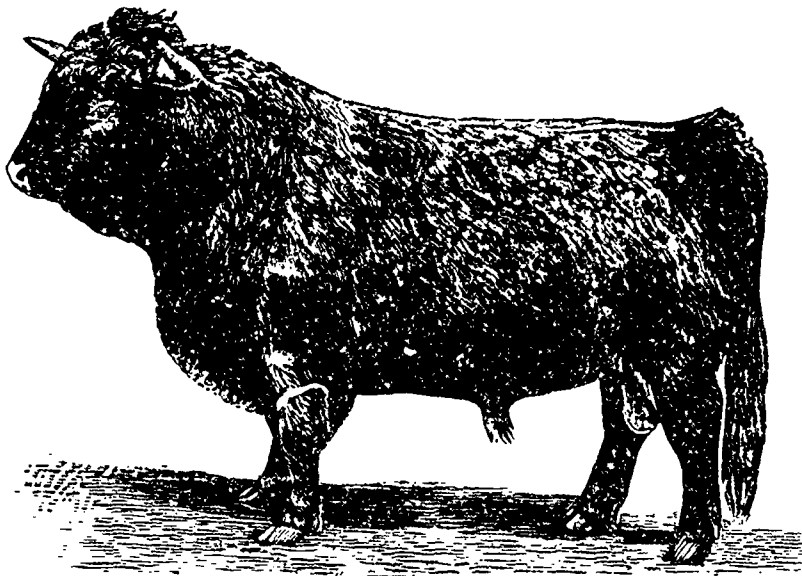
Geo. Q. Dow.

North Epping, N. H.

The Ladies' work at the Chicago World's Fair in 1893.

We publish with pleasure the following letter showing the good work which many American ladies are doing in order to advance Household matters in connection with the coming World's Fair.

We tender to all our best wishes :



PRIZE WEST-HIGHLAND, OR KYLOE BULL, LORD OF THE ISLES.

absurd, and yet from the letters I receive I should judge that such feelings do exist.

There is no need of it at all.

Any poultry raiser would laugh at you if you told him he could not kill and dress a fowl yet it is fully as difficult to do this well as it is to castrate a fowl.

Fully as much care is exercised and it takes four times as long to do it.

Any man, woman or child that has reached the age of understanding and with only an ordinary amount of intelligence can perform the operation and should not hesitate to do so at any time.

No matter if a mistake or rupture occurs and a bird or two is killed they can be eaten and no loss occurs.

The only requisites absolutely necessary are a bright clear day with good light and a practical set of tools to work with ; no others will do.

In connection with the above it is desirable to have a handy table to work on, a quiet place to work in where one can be by oneself, and the birds to be operated upon, in proper condition and where they may be caught readily.

“ Reader, do away with this feeling of incompetency brace up and have some self reliance and say to yourself: “ Well, if Joan Smith and others can castrate a cockerel with no more

Columbian Association of Housekeepers and Bureau of information

M. S. A. Chicago, June 30 1892.

EDITOR OF THE *Illustrated Journal of Agriculture.*

Dear Sir,—In the interest of our Bureau of information I am led to ask whether you have in your office a list of Quebec women who are operating farms or who are engaged in Bee or Poultry raising or other semi-agricultural pursuit. We are in search of statistics in this direction and therefore appeal to you for any information you may have at hand. I enclose our Presidents address which explains itself. And after carefully reading I beg you will publish either the whole or a part ; for we are very desirous that all American women may have an opportunity to read the matter contained therein.

Hoping from early reply.

I am truly Yours,

MRS. THOMAS F. GANE.

425 LA SALLE AVENUE.

We have organized “ The Columbian Association of Housekeepers and Bureau of Information, where there can be an exchange of wants and needs between employer and employed ; to promote a more scientific knowledge of the economic value of various foods and fuels ; a more intelligent understanding of correct plumbing and drainage in our homes, as well as

the need of pure water and good light in a properly built house; and to consider the importance of coöperation in all departments of woman's work.

We particularly desire to arrange for the discussion of such topics as the adulteration of food and its effect upon the human system, and the study of what the human body needs in the way of nourishment. The value of all labor-saving inventions should be considered in connection with the economic use of strength, as well as the importance of bringing outside labor into the house. In this connection should come the consideration of the value of the work of specialists, thus the opening a way for the rapidly increasing industries for women.

We would call the attention of women in cities as well as in villages to the advantages offered by the study classes of the Chautauquan Societies, as well as by the University Extension courses of lectures. It has been truly said that "The test of national welfare is the intelligence and prosperity of the farmer." This being true, it is of great importance that the farmer's wives, the mothers of unborn generations, should take an active interest in the consideration of all topics in these Congresses.

We desire to obtain statistics regarding the number of women owning and operating farms—the number engaged in Bee Culture, Poultry Raising, Silk Culture, Gardening and other branches of Agriculture, with a view of directing the attention of the women of our country to these new fields of work adapted to women; and at the same time, we would emphasize by the presentation to be made, the success attending the work of the earnest, thoughtful women of our country, whose energies and skill are devoted to the development and building up of their Farm Homes.

The Woman's Branch of the Auxiliary would also emphasize the need of just recognition of and remuneration for woman's work in every field.

Therefore, in asking for members of our Advisory Council, we desire to obtain the names of women who will represent the different sections of this country, and also representative from every foreign land, all of whom will constitute the Advisory Council of the World's Congress Auxiliary on Household Economics.

THE COST OF GROWING ROOTS.

EDS. COUNTRY GENTLEMAN.—I am pleased to give Mr. Massey the information he asks for

My first crop of roots was grown in 1855. It was rutabagas. This root, however, was soon displaced for mangolds, of which I have grown nearly twenty crops, of which I have a record of the cost and product. The smallest yield is 852 bushels to the acre, grown at a cost of \$41. The largest was 1,236 bushels, the cost of which was \$51.75. But I have not been in the habit of estimating the cost of any crop grown on the basis of fancy prices for labor or manure. The actual cost of everything is, I think, the only proper basis of computing the cost of crops grown. Thus, I have never charged any crop with \$3 per day for team work, or for my own supervision or personal labor, although I have sown the seed and spread all the fertilizer for every crop grown, fearing to leave these important parts of the work to a hired man, who might be deficient in judgment.

The largest part of the cost is the fertilizer, which for the larger yield mentioned was \$22 per acre for 1,000 lb. of Mapes complete manure. The same year my yield of corn was 125½ bushels per acre, and this was grown at a cost of \$11.80 less than that of the largest crop of roots. The following are the figures taken from my record:

|                              |         |
|------------------------------|---------|
| Ten tons of manure .....     | \$17.50 |
| Fall plowing.....            | 2 00    |
| Spring plowing.....          | 2 00    |
| Harrowing.....               | 0 75    |
| Seed, four pounds.....       | 2 00    |
| Sowing seed.....             | 0 50    |
| Cultivating eight times..... | 4 00    |
| Thinning out.....            | 1 00    |
| Fertilizer, 1,000 lb.....    | 22.00   |

Total..... \$41.75

It is only reasonable that a deduction of one-third of the cost of manure and fertilizer should be made as a charge upon the following crops

I do not count anything for the harvesting and hauling to the barn and the pitting, because the tops more than paid for this part of the work. The crop of corn referred to cost \$13.20 for fertilizer, and there was no cost for seed worth counting, or for thinning out. The other work was precisely the same in every particular, as my mode of growing corn and roots is to cultivate every week. And this I am sure is the cheapest way of growing both of these crops.

The roots cost about 4 cents a bushel and the corn 32 cents without making any deduction as mentioned. If the nutritive value given in the feeding tables (viz., mangolds 14 cents, corn 111 cents per 100 lb.) is of any practical use, the same proportion, as of the cost, exactly applies to the feeding value, and thus the roots were no more costly than the corn. But it is not for the present actual value of the root crops that I advocate so earnestly their culture, but on account of their prospective value for the product of sugar. I have been much impressed with this ever since I saw the great sugar beet farms in France when in that country as a student nearly forty years ago, and what I saw there in regard to the great value of the beet crop as a material for one of the most important manufactures, as well for feeding cattle on the leaves and waste pulp, has been in my mind ever since, and I hope to live until I see this manufacture as firmly established here as it has been in Europe. It was at the same time that I saw the first silo, and that led me to advocate this improvement as strongly as I have advocated root culture. And this advocacy began 20 years ago in an article on the subject in the American Agriculturist, which was, I believe, the first mention of a silo on this side of the Atlantic. The first silo I saw, was filled with beet leaves, and the contents were being fed to the oxen, which were hauling the roots to the sugar factory. The ensilage was the product of the previous beet crop.

The exhaustive character of root crops seems to be a stumbling block in the way. I do not think this should be taken into account when it may be easily neutralized by proper fertilizing, and the crop will pay for this. But they are not so exhaustive as might be thought. The following figures taken from the Rothamsted reports show precisely what is taken from the soil by 20 tons of mangolds with the leaves. And as the crop is fed on the land, its manurial value is proportionately large with its exhaustive character. What matters how much is taken from the land if it goes to it again as manure? The figures given show the comparative character of the roots, and 75 bushels of corn, which I think may be taken as equivalent.

|                      | 20 Tons Mangolds with Leaves. | 75 Bushels Corn with Stalks. |
|----------------------|-------------------------------|------------------------------|
| Ash.....             | 690 lbs                       | 360 lbs.                     |
| Nitrogen.....        | 147                           | 84                           |
| Potash.....          | 262                           | 87                           |
| Soda.....            | 140                           | 3                            |
| Lime.....            | 53                            | 23                           |
| Phosphoric acid..... | 49                            | 38                           |

As root-growers know, if there is any dominant fertilising element for root crops, it is superphosphate of lime, and the next one is salt. The large quantity of soda in the ash explains one, but the other has never been explained satisfactorily. Nitrogen is not considered as indispensable, but yet one pound of nitrate of soda has usually increased the crop one bushel of roots. The benefit of lime is especially noticeable, and this is no doubt because it supplies the need for the lime, and also makes potash in the soil available. As one principle in the culture of roots is that it should be a fertilized crop, and that liberality is profitable, its supposed exhaustive character is not worth considering. On the other hand, it is a feeding crop essentially, and is thus one of the most desirable ones, and at the same time the clean and thorough culture is another direct benefit to the land. The value for feeding is something more to be considered. The roots are entirely digestible, and, as is well known, this entire digestibility and the laxative effects on the digestive organs go to induce the greater digestibility of the other food and maintain a condition of healthfulness. This is especially the case in regard to sheep, which cannot be kept in wholly satisfactory health and profit without roots. In the dairy, too, they are exceedingly useful, and where they are supplied to swine the fatal cholera is never dreaded.

But let me reiterate, it is the prospective sugar supply which impels me to urge the culture of roots on the farmers; for there will never be an opening for this manufacture until we become skilful root-growers. And there are millions—a hundred every year of them—in the sugar industry, and most of this money will go to swell directly or indirectly the shruok pockets of the farmers.

I admit all the force of evidence in favor of ensilage, but we cannot make sugar of it. H. STEWART.

### CULTURE OF STRAWBERRY PLANTS.

TO THE EDITOR OF THE *Family Herald* AND *Weekly Star*:

In man's anxiety literally to gather the fruits of his labor—he is, figuratively speaking, apt as of old "to kill the goose that lays the golden egg," and, as with other good things, so also with the strawberry plant. Being the result of artificial, or at least forced cultivation, the different varieties of strawberries are in a way liable to the same decline that we so frequently see in favorite sorts of potatoes and tomatoes whose lives of usefulness seldom exceed an average of fifteen years. In strawberries the term of vigor is happily somewhat longer. The Hovey originated as far back as 1830, was followed by the Wilson in about 1855, and the Crescent came into notice some ten years or so later. These three varieties have probably done more towards bringing the strawberry industry up to its present state of importance than all the other varieties put together. The Hovey has long since been superannuated and the Wilson is fast following its rival predecessor. Efforts are being made to restore it to its original vigor or at least to restore its lost reputation in the minds of the public, and we now hear of "pedigree plants" which I fancy like other families in the animal kingdom may have little but the reputation of their pedigrees to lean upon. In 1890 the Editor of the *American Garden* wrote to a number of the best known strawberry growers in the United States asking their opinions concerning the Wilson, the result being that he gave it as their opinion that the Wilson was failing and that other varieties were more profitable, and only one, Mr. F. M. Smith, of Green Bay, Wisconsin, wrote that it still was the most desirable berry with him. Knowing the extreme care which Mr. Smith had always taken in the cultivation of his plants and supposing that I had a strain which might

have been weakened by overcropping or want of proper attention, I sent for a dozen of his best plants. After three years of special care I can see no improvement over the old stock that I so long struggled with and they certainly stand to-day with me well at the foot of a long list of Bubacks, Haverlands, Warfields, Gaudys, Jessies, and Eureka's, as well as the older and better known Crescents, Downings, Windsors, Cumberlands, etc., etc., etc. It becomes a question then of very grave importance how these favorite and profitable varieties are to be retained in the fulness of their vigor. There is, I believe, fortunately a method which will not only accomplish this, but will also give us larger crops, while it at the same time simplifies the general plan of cultivation, and that is, never to take plants from those which have at any time borne fruit. Whether the single hill, or narrow row or matted bed system is followed, fruit is what we are after and not suckers, and the plan which I have found to give the most satisfactory results, whether with plants for sale or for one's own use, is to select in the spring the strongest young plants and to set them out on well manured soil with a good ball of earth adhering to their roots in rows four feet apart and the plants four feet apart in the rows. None of these should be allowed to blossom and no suckers allowed to start before the plants have made a vigorous root growth for themselves; say by the first of July. After this the runners are encouraged to strike out like spokes from a wheel till they meet every way, when any further suckering is checked, particularly from the forks of the runners. As winter comes on, a top dressing of fine, rotten manure will act as a protection and can be raked in amongst the plants, giving them a good start before transplanting time in spring. The next year strong plants are again selected and treated as before and in this way the strawberry fruiting beds and the strawberry plant beds are kept entirely distinct. By following this plan the extraordinary vigor of such a variety as the Crescent can be not only increased, but prolonged for many years, and when it is known that this variety has in one year produced from a single dozen plants as many as 10,000, it can be readily seen that it stands in danger of breaking down from overwork if the same plants are called upon to produce both fruit and runners at one and the same time. At present it still leads as a good all-round berry, and my own experience is only the same as most others, that the Crescent, where field and profit are the main points, stands well at the head of the list, and when fertilised with the Downing makes for a near market (I have shipped them 300 miles without any trouble) probably the best general purpose strawberry of any yet brought out.

W. A. HALE

Sherbrooke, Que.

### Is the Shorthorn the General Purpose Cow?

BY JAS TOLTON WALKERTON, ONT.

In which breed, or in the crosses of what breeds, can the general cow be found? is a question that has been many times asked, but so far as I know has not been definitely answered. Neither do I suppose will it be settled for all time by this paper. The cow that is bred for special purposes, such as for beef, either by stall feeding or grazing, or for dairy purposes, has and always will have its admirers; but after all, what the general or average farmer wants is a cow that has, to as large extent as possible, all these qualities combined.

Before endeavoring to answer the question, it might be proper to try to define briefly what would constitute the general purpose cow. Would it not, to as large a degree as possible, be the cow that when judiciously mated, the produce,

if a cow calf, in type should be equal or superior to the dam, or, if a steer calf, be fit for the market in the shortest possible time, making the highest returns for the feed consumed? Would it not also be the cow which for the feed consumed produced the greatest number of pounds of butter or cheese of the finest quality, and when she has answered her time for breeding and for dairying purposes, can be turned into beef of the highest quality at the least cost? If the line of argument so far is sound, we readily perceive that it would be of no avail to look for this cow in those breeds which are specially bred for beef purposes, neither will it be of use to look for her in those breeds which are bred exclusively for dairy purposes. Now, I presume it will require but little or no argument to demonstrate that the Shorthorn cow will nearly always produce her own type. If bred with the main object being for beefing purposes, she takes a prominent and conspicuous stand among the beef cattle fed in this country, and I think the same might be said of every other country where improved breeds of cattle are kept. As an instance, at the late Fat Stock Show held at Guelph, all the animals exhibited, with the exception of one or two, were Shorthorns or grade Shorthorns. Again, in early maturity she takes a prominent place among other breeds. A friend of mine last winter fattened a number of yearlings that were two-year-old steers when shipped in June last, and weighed from 1,400 to 1,435 lbs., and heifers of the same age that averaged 1,375 lbs., and there are many instances of them making from 1,100 to 1,200 lbs. at that age; and again, are there any finer specimens of cows, heifers and calves found in any of the breeds than we see among the Shorthorns exhibited at our agricultural exhibitions? Now, what is the record of the Shorthorn cow as a dairy cow? I am free to confess it may be difficult to prove that she comes up to the qualifications laid down in this paper, and if so, I think there are at least two causes why she does not. First, I think it may be safely asserted that Shorthorn breeders generally have paid more attention to their feeding and beefing qualities than to a good performance at the milk pail. With this I do not propose to find fault; it is not the intention of this paper to find fault, for the breeders may have good cause for the particular line of breeding which they have followed. Second, if there have been competitive tests in this country not only with other breeds of cattle, but individual records showing what can be done with a Shorthorn for a stated period—as I say, if there have been such competitive records, they have not come under my observation. I give the following, clipped from an agricultural paper, as the results of the British Dairy Show of 1890. At this show there were 437 cattle entered for the competition, and the tests were as follows.—Shorthorns, 121.1; Dutch, 115.5; Ayrshire, 93.8; Guernsey, 98.1; Jersey, 90.8; Red Poll, 69.1; Dexter Kelly, 68.1. The second prize-winning Shorthorn scored 117.9 points, but had the greatest milk yield of any in one day, being 61.3, but being under 3 per cent. in fat. So you see in Britain where some of the breeders breed for milking purposes the Shorthorn cow can show a good record. At a Farmers' Institute meeting which I attended lately, one gentleman stated that the best dairy cow was a cross between Shorthorns and Ayrshires. To get the best you will notice it required a cross with a Shorthorn. Now, is it not a fact that public opinion is a fairly safe guide in domestic matters as well as other questions? It is true that it may and does sometimes err. Well, how is public opinion on this general purpose cow question? Although we have in Ontario nearly all the breeding breeds of improved cattle, and have had them for many years, what do we find? Why, about nine-tenths of the cows kept by the general farmer are Shorthorns and their crosses. Now, you have noticed that the title of this paper was the query.

"Is the Shorthorn Cow the General Purpose Cow?" I have endeavored to present some facts and figures with the view of answering the question in the affirmative, but will leave it with you to say whether I have done so or not.

### THE TREATMENT OF PASTURES.

As with the change of weather we have a fair prospect of an abundance of grass, it may be worth while to call the attention of your readers to the injury caused by leaving in pastures the rough grass which has been rejected by cattle and sheep, in hopes that it will be eaten as fog in the following winter.

Where the coarse grass remains, the sweet and succulent grass cannot grow in the autumn, and good food is thus lost, and unless the almost valueless fog is pulled up in the following winter, the grass will not grow as it should in the spring. But this is not the only loss, for by proper treatment this coarse grass might have been made as ensilage into valuable food for the winter. This is, in my opinion, a much cheaper plan than making hay of it, as the grass is spread over so large an area, and much time is wasted by the labourers in going backwards and forwards during the sometimes prolonged operation, whereas grass for ensilage is carted and done with at once. Ensilage may also be made during wet intervals in the hay-making season.—*E.C.*

### GROWTH OF POTATOES

J. J. WILLIS, SUPERINTENDENT OF SIR J. B. LAWES' EXPERIMENTS, ROTHAMSTED, ENGLAND.

The Rothamsted experiments on the growth of potatoes for fifteen years (1876-1891) on the same ground, disclose some interesting facts regarding the effects of various fertilizers on this plant which, from an agriculturist's point of view, may be regarded as a root crop. The following summary shows the manures and average yearly produce of potatoes per cent through twelve years' experiments.

| Description of Manure.             | Marketable |        | Dis-eased. | Total Tubers | Dis'd in Total |
|------------------------------------|------------|--------|------------|--------------|----------------|
|                                    | Pounds     | Pounds |            |              |                |
| Unmanured .....                    | 3 752      | 569    | 140        | 4 452        | 3 15           |
| Superphosphate .....               | 7 280      | 630    | 308        | 8 218        | 3 66           |
| Mineral manure .....               | 7 588      | 546    | 294        | 8 428        | 3 45           |
| Ammonium salts .....               | 4 228      | 686    | 210        | 5 124        | 4 06           |
| Nitrate of soda .....              | 4 998      | 588    | 294        | 5 880        | 4 92           |
| Minerals and ammonium salts .....  | 13 314     | 812    | 336        | 15 064       | 6 26           |
| Minerals and nitrate of soda ..... | 13 146     | 714    | 1 036      | 14 896       | 7 00           |

We see that the average produce during this period under the most exhausting treatment, that is, without any manure whatever, was 4,452 pounds per acre, nearly as much as the average produce under ordinary cultivation in the United States, and about two thirds as much as in some important European countries.

By superphosphate of lime alone the produce is raised from an average of 4,452 pounds to 8,218 pounds; and by a mineral manure containing besides superphosphate, salts of potash, soda and magnesia, to 8,428 pounds, that is to very little more than by the superphosphate alone. It is evident, therefore, that up to this amount of production, the character of the exhaustion, induced by the growth of the crop on this

land, which was, agriculturally speaking, in a somewhat exhausted condition, was much more that of available phosphoric acid than of potash, or the other bases. In reference to this increase of potato tubers by mineral manures alone, it may be observed that the result is quite consistent with that obtained with root crops, having comparatively shallow root development; and in such cases the source of the nitrogen is chiefly the store of it in the surface soil. The beneficial effects of mineral manures, and especially of phosphates, are, indeed, observed generally with ripened, as well as with succulent, crops, which are spring sown, and which have, with a short period of growth, comparatively superficial rooting, and which rely, therefore, much on the stores of the surface soil.

It is remarkable that there is much less increase of produce of potatoes by nitrogenous manures alone than by mineral manures alone. Thus, by ammonium salts alone there is an average produce of 5,124 pounds, or only 672 pounds more than without manure; and with nitrate of soda alone there is an average of only 5,880 pounds per acre. The better result by nitrate of soda than by ammonium salts is doubtless due to the nitrogenous supply being more immediately available, and more rapidly distributed within the soil, and so inducing, a more extended development of feeding root. These negative results, by the nitrogenous manures alone, confirm the conclusion that by the continuous growth of the crop on this land it was the available supply of mineral constituents within the root range of the plant, more than that of nitrogen, that became deficient.

The amount of produce obtained by the mixture of both mineral and nitrogenous manures are sufficient to show that, although the land is by no means specially adapted for potatoes, the results may be taken as normal and trustworthy; and as fairly indicating the characteristic manurial requirements of the crop; and the conclusion is that, in an agriculturally exhausted soil, both mineral and nitrogenous manures are required to give full crops of tubers.

With an annual application of sixteen tons of barnyard manure per acre, supplying about 200 pounds of nitrogen per acre per annum, there was an average produce of only 11,760 pounds; the addition of superphosphate of lime raised the produce to 12,540 pounds. But by the further addition of nitrate of soda, supplying eighty-six pounds of nitrogen per acre per annum in a much more readily available condition than most of that in the barnyard manure, the average annual produce of tubers was raised to 16,904 pounds, or by 3,360 pounds more.

Comparing these results with those obtained by artificial manures alone, we find that barnyard manure, which, besides an abundance of mineral matters and a large amount of organic substance, rich in carbon, supplied annually about 200 pounds of nitrogen, gave considerable less produce than an artificial mixture of mineral manures and ammonium salts, or nitrate of soda, supplying only eighty-six pounds of nitrogen per acre per annum. The fact is, that it is only the comparatively small proportion of the nitrogen of barnyard manure which is due to the liquid dejections of the animals, that is in a readily and rapidly available condition; while that due to the more or less digested matter passing in the fæces, is more slowly available, and that in the litter remains a very long time inactive. Hence, the addition of nitrogen as nitrate of soda to the barnyard manure had a very marked effect.

The last column in the table shows the average percentage of diseased tubers under each condition of manuring. It is seen that without manure, and with purely mineral manures, the proportion of diseased tubers is much less than where nitrogenous manures were applied; and again, that it was less where the nitrogenous ingredients were applied alone, than when in conjunction with mineral manures; and where,

consequently, the luxuriance of growth, and the amounts of produce, were the greatest. The experiments further show that the potato disease, though largely dependent on season, developed much more in tubers grown by highly nitrogenous manures, and containing a juice rich in nitrogen, than under ordinary conditions. It is also shown that a result of the disease is a destruction of starch, the formation of sugar, the loss of organic substance, and the growth of the fungus at the expense of the material of the tuber.

RESULTS OF ROTHAMSTED POTATO EXPERIMENTS.—1. The amount of disease was not enhanced by the continuous growth of potatoes on the same ground. 2. The disease was increased by fertilisers rich in available nitrogen. 3. The disease changed much potato starch into sugar, and the fungus fed at the expense of the tuber. 4. The continuous growth of potatoes on the same land did not so much exhaust the available nitrogen, as it did the supply of mineral constituents within the reach of the roots. 5. In a wornout soil, both mineral and nitrogenous fertilizers are required to give full crops of potatoes.

### ARTIFICIAL FERTILISERS

A general meeting of the members of the Norfolk Chamber of Agriculture was held on Saturday at the Agricultural Hall, Norwich, to hear a paper read by Mr. Thomas Brown, of Lynn, on "Artificial Fertilisers." The President (Mr. C. S. Read) was in the chair, and, in directing attention to the subject for consideration, reminded the meeting that a Commission was sitting to consider whether artificial manures and feeding stuffs should not be placed under some restrictions as to their purity.

Mr. Brown, in the introductory part of his paper, said Sprengel was the first to investigate the properties of soils, and to demonstrate in 1839 the importance of the mineral constituents therein. It was in 1840 that Liebig, in his great work ("Organic Chemistry in its Application to Agriculture and Physiology") built up the science of agriculture, demonstrating that "humus" is priceless to build up plant life, that plants derive their acid from the carbonic acid of the atmosphere, that their hydrogen comes from water, their nitrogen from ammonia in the air and the soil, their sulphur from the sulphates which abound in all soils, and that the mineral matter constituting the ash of plants is supplied from the soil, that this mineral matter is absolutely essential to vegetable life, and that the fertility of a soil cannot be maintained unless the mineral substances which are withdrawn by cropping are restored. He demonstrated and established by experiment his four laws of husbandry:—(1) A soil can be termed fertile only when it contains all the materials requisite for the nutrition of plants in the required quantity and in the proper form. (2) With every crop a portion of these ingredients is removed. A portion of this portion is again added from the inexhaustible store of the atmosphere. Another part, however, is lost for ever if not replaced by man. (3) The fertility of the soil remains unaltered if all the ingredients of a crop are given back to the land. Such a restitution is effected by manure. (4) The manure produced in the course of husbandry is not sufficient to permanently maintain the fertility of a farm; it lacks the constituents, which are annually reported in the shape of grain, hay, milk, and live stock. These laws formed the basis of modern and scientific agriculture. Liebig may have unduly exalted his "mineral theory," but the world-famed labours of Messrs. Lawes and Gilbert had demonstrated that a soil well supplied with minerals, but devoid of nitrogen (nitrogenous plant food), is as infertile as one containing an abundance of nitrogenous matter, but deficient in the mineral—ash—constituents. It was

recognised to-day that by cultivation without return, soils lose to their detriment, phosphates and nitrogen, and some few potash and lime. Soils of very inferior natural productiveness can, by the application of these four bodies, be raised to a high condition of fertility. The remaining constituents of plant ash, mysoda, magnesia, alumina, iron, silica, sulphuric acid, and chlorine may be ignored, an abundant supply existing in the very poorest cultivated soil. Having examined the "nitrogen theory" of Sir J. B. Lawes, the importance of which he thought had been exaggerated in the same way that Liebig's "mineral theory" had been exaggerated, Mr. Brown continued:—

I was invited by our president to address you on artificial manures. Now, what are artificial and what are natural manures? If I hastily run over the names of the substances in common use here or elsewhere, you will see how difficult it would be to decide which are and which are not artificial. We have farmyard manure, stable dung, and animal droppings in general, marl, lime, crag, rape, and other seed, cakes, malt dust, greaves, soap boilers' waste, meat refuse, soot, guano, bones, basic slag, ground mineral phosphates, gypsum, wood ashes, blood, horn, and leather meal, hair waste, skin, salt, town refuse, dried sewage, fish refuse, gas lime, seaweed, ivory turnips and dust, superphosphates, bone manures, nitrates of soda and potash, sulphate and chloride of ammonium, kainit, carnelite, and muriate of potash. Now sulphate of ammonia differs little from soot, save that it contains about 25 per cent. of ammonia, and soot about 5 per cent. Bones in the rough are, I suppose, natural, but ground fine are artificial. A crag containing 4 per cent. of phosphate of lime is, I presume, a natural manure, but the fossils in the crag, containing 55 per cent. are artificial. This classification is purely arbitrary. All are in a sense artificial, all are natural bodies made available to the farmer by human labour. As a chemist, I should prefer to classify such matters as phosphatic, potassic, calcic, or lime-giving, nitrogenous, or as compound manures, the latter including such bodies as bones and guano, which would be both calcic, phosphoric, and nitrogenous. The fertilising materials of former times may usefully be also so classified. We shall find that marls, clays (so-called), crags, sea shells, supplied phosphates, lime, and potash, wood, ashes, supplied potash, and soot, malt dust, blood, hair and skin refuse, seaweed, and other organic bodies supplied nitrogen. Our forefathers did not know why marling was useful, nor why some marls gave such excellent results, while others were almost inert. Had they known that some deposits were rich in phosphates and potash, and that others contained mere traces, and that it was the presence or absence of these elements that gave the value, they would have saved themselves much useless labour in working worthless deposits. The marked results that followed the use of some organic bodies led to the adoption of the "humus" theory; the humus gained the credit of that which was due to the nitrogen therein. Hence frequently bodies were used that were comparatively worthless, and the absence of result was attributed to the weather, or to other surrounding conditions. Science having explained to us the basis of this classification, we are in a position to make a preliminary examination of any body, and thereby to ascertain how much it contains of either of these fertilising properties, and to select or reject accordingly. It leads us naturally to select those that are richest in those elements our soils or crops most need, more especially if the cost of the element required is cheaper per lb. weight, or, as we generally speak, per unit, in the concentrated form. To illustrate, no one who has made himself acquainted with the principles we have been considering would to-day cast 40 loads of marl upon his fields (the marl containing 6 or 7 per cent. of phosphate of lime), in order to supply to his soil 5 or

6 cwt. of phosphate per acre. He knows how to supply this substance at a much less cost. (Allow me to state here I am ignoring the cases where lime is needed, for in these the marl constitutes the cheapest source of this article.) There are still left a few of ancient ways, who lament their inability to marl their fields, and who doubtless look with affection at the great pits remaining in ruins. Nor will any but the obtuse look to town refuse as a source of nitrogen, even when it is nicely sifted and placed in bags labelled guano. Those abreast of the times know that a body containing less than one per cent. of nitrogen will not pay the cost of carriage and distribution, but will resolve to obtain this substance in a more concentrated form. I think I shall be justified in passing by without attempting a description of the many manurial bodies that are, so to say, "out of date," and in noticing only those, the names of which I suppose I ought to say, from the survival of the fittest and natural development, at once enter our minds when we speak of artificial manures. We have then in the market phosphates offered as superphosphates, basic slag; potash as kainit, or muriate of potash; lime as gypsum, or quicklime; and nitrogen as nitrates; sulphate of ammonia, wool refuse, soot, greaves, and rape cake. Then we have a mixture of phosphates and nitrogen in guano, bone, and bone manure, and dried fish and a combination of nitrogen and potash in the nitrate of potash. In addition to these we have a considerably long list of prepared compound manures, as corn, turnip, mangel, potato, grass; &c, manures made up of varying quantities of the former mentioned phosphatic, potassic, calcic, and nitrogenous bodies.

Having classed our substances, the question each one here may be supposed to ask is to which class should I turn my attention? and which of the bodies in that class will serve my purpose best? To the first question I can reply without hesitation that phosphates are needed, and repay application on almost all our soils. So much has been removed in corn, in meat, in milk, in roots, that even the fertile virgin soils of America are showing exhaustion. Last year it is computed that much over 1,000,000 tons of phosphatic manures were used in North America. In the February number of the American "Journal of Analytical and Applied Chemistry," it was stated that over 500,000 tons were used in the Southern States of the United States alone. Even the rich and deep soils of our marshlands are greatly benefited by the application of superphosphates. Again, nitrogen is demanded by almost all our soils, the few peats, moulds, and rich alluvial soils being excepted, unless a very severe system of cropping has been adopted. In marsh land very little nitrogen is used or needed beyond that supplied in feeding stuffs. It should be borne in mind that feeding cakes yield 1 cwt. of nitrogen in every ton consumed, that is, a ton of linseed cake, unless waste is allowed, supplies as much nitrogen to the farm as 5 cwt. of nitrate of soda, so that the farmer who buys cake supplies artificial nitrogen as surely as he who top dresses his wheat with nitrate of soda. Potash is deficient in many long-cultivated soils, but in others there exists a sufficiency for hundreds of years of ordinary farm practice, without even approaching the exhaustion line. Actual experiment alone will decide whether its application is called for or not. It has always seemed to me possible for a farmer to keep an exact ledger account of the stock of available vegetable food in his fields. Almost every work on agriculture gives the amounts of food substances existing in a ton of wheat, of barley, or of potatoes, in a cwt. of beef or mutton; in a tod of wool; or in a gallon of milk. He may thus, by a simple calculation, easily obtain the exact amount exported from the farm, which will form the debtor's side. He may with equal ease ascertain the amounts brought to the farm in superphosphates, bone manure, cake and nitrates, which will complete the cre-

dit side. One short step further will show him on which side is the balance. Time will not permit me to give an illustration, but I may be allowed to give as my opinion that on well-filled Norfolk farms the balance will every year be in favour of the farm. I prefer not to give my opinion respecting an opposite class. I will also dare to remark that it might be a useful exercise for landlords to do a little of such book-keeping: they would value a good tenant the more.

The answer to the second question. Which body in each class will answer my purpose best? must depend on circumstances. If phosphates alone are required then mineral super or super and bone meal will as a rule be the body indicated, there being very few Norfolk soils where basic slag will prove so effective. If, as is generally the case in our country, nitrogenous as well as phosphatic food is required, it will depend on market prices whether guano or bone manure should be purchased, or whether so much superphosphate and so much nitrate of soda or sulphate of ammonia should be bought separately and mixed together on the farm before distribution. A very simple calculation will always decide this. For instance, to-day superphosphate of about 27 per cent. can be bought at say £3 per ton home, this at 2s. 3d. per unit. Nitrate of soda yielding nitrogen equal to about 19 per cent. of ammonia can be had at £9 per ton, equal to 9s. 6d. per unit, and sulphate of ammonia yielding about 25 per cent. of ammonia at £10 10s. per ton, or 5s. per unit. A farmer wishing to calculate whether guano, dissolved bone, rape cake, or mixtures of superphosphate and nitrate of soda or superphosphate and sulphate of ammonia will work a simple problem as follows: Guano containing 31 per cent. of phosphate and 14 per cent. of ammonia sells at £14 per ton. Allowing that these phosphates are equal in value to those in superphosphates, and that the ammonia has a value equal to that in nitrate of soda or sulphate of ammonia (a very favourable admission for the guano), we find that the 31 per cent. of phosphate are worth 31 by 2s. 3d., or £3 9s. 9d., whilst the 14 per cent. of ammonia at 9s. 6d. per unit will be worth £6 13s., hence the united value will be £10 2s. 9d. per ton. I am hence compelled to conclude that guano is a very dear source of nitrogen and phosphate, and that the farmer will be well advised to buy superphosphate and nitrate, or superphosphate and sulphate, and mix his own guano. Applying the same method to dissolved bone, which will contain, say 37 per cent. of bone phosphate and 3 per cent. of ammonia, we calculate 37 by 2s. 3d., £4 3s. 3d., and for the ammonia, 3 by 9s. 6d., 28s. 6d., or the total value will be £5 11s. 9d., at about which price pure dissolved bone may be obtained. Applied to rape cake containing 6 per cent. of ammonia and 1 per cent. of phosphates of lime and potash, we have 6 by 9s. 6d., £2 17s., plus 4 of phosphate at 2s. 3d., or 9s.; and potash worth 3s. 6d., if required, will give a total value of £3 9s. 6d. per ton, at which it is questionable whether pure cake can be purchased. The market prices of these bodies are continually varying, but their unit value and their percentages which should be guaranteed, can always be known, and, therefore, their intrinsic value easily secured. As a manure manufacturer, I am probably prejudiced, but I would suggest that mixtures may be made more perfectly by the machines of a manure factory than by the ordinary farm labourer. Moreover, the manure manufacturer may be supposed to be in a position to produce any compound quite as cheaply as the farmer at home. Hence it will be a considerable gain to the busy farmer could he be certain that he could obtain, at a fair price, just the mixture he needed for any special soil or any particular crop. But those with the largest experience dare not, and do not, so buy, because they know it is doubtful if the compound will not be too costly, and, in the absence of the necessary guarantee, it would be difficult

to obtain any redress. It is affirmed by the Manure Manufacturers' Association that guarantees are always given. But where are they to be seen? I have the circulars of many manure manufacturers. The prices are given, the quantities recommended per acre are stated, but the composition is, as a rule, not recorded. I have here a circular where the composition of the compounds offered are given. I will refer to one only as a fair example. Minima and maxima percentages are tabled, as you will see by reference to the circular. I will calculate the intrinsic value of the one taken by assuming that the maxima are present. We will adopt the same unit values as before. We have 22 per cent. of soluble phosphate at 2s. 3d., or £2 9s. 6d., plus 13 bone phosphate, which I value at the price of raw bone in bone dust; or at 1s. 6d., or £19s. 6d., plus five units ammonia at 9s. 6d., or £2 7s. 6d.; and 77 sulphate of potash, or say  $3\frac{1}{2}$  of potash at 3s. 6d., or 12s. 3d., which totals up to £6 8s. 9d. The price quoted is £9 15s. per ton.

I should waste time to repeat this calculation on the other manures. I hope I have been sufficiently clear to enable you to repeat the experiment at home. It must be wise counsel to suggest to every farmer that he should first ascertain by repeated trials what manurial substances give the best returns on his soil. Secondly, that he should, in the present state of the manure market buy those substances singly and by guarantee; and thirdly, having ascertained the composition of each simple body through an appeal to the chemist of this chamber, then carefully and thoroughly mix together and apply the mixture. In Belgium, in France, in America this is now seldom necessary. Let me refer to Belgium to illustrate my meaning. For eight years the Belgian Government has maintained seven agricultural stations, where besides conducting experiments and original research, the chemists are bound to analyse without charge any sample of a manure sent by a farmer buying more than half a ton, or of a feeding material where five tons are bought. The composition of such manure or feeding stuff must be given by the seller with the invoice. This practice has afforded to the farmers such familiarity with the terms of the analytical table, with the modes of calculating the values therefrom, that both fraud and imposition are becoming things of the past. The number of analyses made is now growing fewer, so that the English critics of the system urge that in a few years the staff of chemists will have nothing to do, and will be thrown on the wide world unprovided for. Had we in Norfolk an agricultural station of this nature, with a skilled naturalist, qualified botanists, and chemists, should the analytical test work fall off, can you imagine the Technical Education Committee of your County Council being unable to find these scientists occupation? How many are the problems of animal and vegetable physiology that remain to be solved, and which might be so well attacked by those not worried by matters of profit and loss? How many obscure questions are offering and will offer themselves in the future in practical agriculture? And should original research ultimately fail to demand their attention they could even be so sent to demonstrate at the various educational centres in the county. The educational results that would follow the adoption of a scheme similar to that already fully established in the foreign countries I have named would, I believe, be most salutary. The economic effects would not be inferior. A quarter of a century ago England was the only country where artificial manures were consumed. In 1867 Germany imported only 16 tons of nitrate of soda, and last year 460,000 tons. The chemists of France, Germany, and the United States of America bewailed only fifteen years ago the stupidity of their countrymen in not increasing their scanty crops by the use of phosphates, potash, and nitrogen, as England was doing. A revolution has followed the estab-



ishment of Government stations in those countries. Their consumption of these manuring substances now exceeds that of the British Isles, and, through the spread of scientific knowledge on the continent of Europe, the very small farmers now seek the aid of the chemist. The increased production thereby secured may greatly account for the increased import to England of agricultural produce, and consequently to the low range of prices that have ruled in our markets, and last year's extraordinary harvest in America may be in no small degree referred to the use of phosphates, potash, and nitrogen on areas that, by a system of exhaustive culture, were becoming sterile. The conclusion of the whole matter may be summed up in these recommendations:—1. Seek for phosphatic plant food in superphosphates or in bone manure, if priced fairly; 2. for nitrogenous plant food in nitrate of soda or in sulphate of ammonia, 3. and for potassic plant food in kainit or muriate of potash; and, finally, buy with a guarantee, and seek the advice of the chemist appointed by this chamber.

Mr. J. B. Ellis moved a vote of thanks to Mr. Brown for his very instructive and exhaustive paper, and asked what was the action of nitro-plants. Mr. Brown stated, and other chemists said, that the nitrogen to these plants was absorbed from the air. But he could say from his practical experience that with a little addition of nitrogenous matter to the land the vetches and clovers of Norfolk would be of much greater bulk than they otherwise are. Beans on heavy soil were made more bountiful by the addition of muck. If they followed science too closely without going into practical trials also they might be led somewhat astray by the chemist, and find that they were not so well off at the end as at the beginning. (1)

Mr. C. Cozens-Hardy seconded the vote of thanks.

Mr. Brown said he always regarded muck as a potash manure, for there was considerably more potash than ammonia in farmyard refuse. Farmyard manure contained potash and lime. Vetches, in his opinion, required potash. When he grew vetches in pure sand in pots there was scarcely any difference in the growths of the plant in pots in which there was no nitrogen and in the plant grown in pots to which nitrogen was added.

The Chairman expressed his gratitude to Mr. Brown for the singularly instructive and interesting paper he had read, which had the great advantage of being thoroughly practical. He said he had thought that Mr. Brown would probably have told them something about the evidence he and Mr. Sapwell gave before the Royal Commission on the adulteration of feeding stuffs; but, perhaps, he would do that on some future occasion. He fancied the English people were getting into the habit of depending too little upon themselves, and too much upon what the Government could do for them. He learned from Mr. Sutton that a very excellent Act, in the passing of which he took great interest—the Food and Drugs Act—was not put into force in the county of Norfolk as it ought to be; and, indeed, he might say generally that legislation was frequently disappointing because of the difficulty of enforcing it. Even in the case of the Agricultural Holdings Act, it was not so much the Act that was at fault as those who had to administer it.

The resolution was carried, and Mr. Brown briefly acknowledged the vote of thanks.

#### A short Trip through some of the Parishes North of Quebec

I have lately had the honor to be commissioned to visit several of these in the interest of Agricultural progress and I am surprised to find that in the Laurentide range there are such admirable facilities for dairy and sheep farming. The

(1) Bravo!

intervalles are rich in alluvial deposits which extend far up the hill sides producing abundant crops of herbage, in many cases, naturally, and where they have been seeded, with proper permanent pasture in meadow grasses. They were as fertile and productive as could well be desired. If the farmers go on progressing, as many of them now are beginning, this region will be as productive as that which has been considered more favourable to farming in other counties. The mountains are well wooded and many of them give shelter to the lowlands and keep up a more uniform degree of temperature than on large flat surfaces of country.

It is in these places where the silo and the butter factory would be of the greatest advantage. Being far removed from the market and having only distant communication by railway, it is necessary they should deal in as portable articles as possible, and feed all the animals they can, so as to give them a good stock of manure which the more fortunate dwellers in city suburbs can easily obtain, but which they can only have by making it; and then have the produce of their stock turned into articles for consumption, the freight on which will be an inconsiderable item of expense in comparison to its value in the market.

It is in such localities that the lecturer can do the most good, because their lack of easy communication with the outer world precludes the possibility of the people being as intelligent on any subject as those who are in daily contact with men of business, and hence they are more likely to go on in the old jog-trot way of their forefathers, while those with better opportunities of acquiring knowledge leave them as much in the rear as is their parish as to its position on the map.

In most, in fact, in all the places I visited, I found the farmers received the information I had the pleasure to offer with avidity and full appreciation of my advice, but complained of their inability to follow it for want of means. This I had to overcome by recommending them to begin a better method of farming on a small scale, improve a small patch of land, however small, thoroughly, and then proceed as the means of doing so came to them, which they certainly would.

One man, especially, was deeply interested in the silo system, and wrote me a letter suggesting that it would have been well for the executive to have offered a bonus to the first man who would build a silo in each parish instead of a premium to the best. How far his ideas are correct I leave to wiser heads than mine, but I am certain that these men of all others ought to be encouraged to build silos and grow suitable forage, because that is the only means in these isolated places by which their condition, as farmers, can be materially improved.

GEORGE MOORE.

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