Nitrogen was produced, and became available for the next crop. Nitrogen was the key to all manuring. The soil might be full of available mineral matters such as the plants required, but without nitrogen they were inert. Nature herself seemed to avail themselves of the free nitrogen in the air surrounding their roots. These plants had the power of storing up the nitrogen in their roots, so that as these roots decayed the nitrogen was slowly given off, and became available for the succeeding crop. Hence the known value of clover roots as a preparation for wheat, the larger the clover roots the more nitrogen they contained, and the better would be the succeeding crop of corn. Bearing in mind this well known fact, and that also it was necessary for the production of roots that leaves be also produced, that without leaves roots could not grow. Did it not come home to them, the absurdity of the restrictions in old tenants' covenants, where it was forbidden to mow clovers two years in succession, as it was thought to exhaust the land, whereas the contrary was the fact, the fertility of the soil was increased by the increase of the roots which produced nitrogen chiefly, and this power was stopped by grazing the seeds the second year. That old restriction was now of course obsolete, and it would be interesting to look forward to the time when nitrogen would be valued unreservedly as the friend of cultivators, instead of being looked askance upon, as it often was at present. The plants which nature had specially given the power to absorb the free nitrogen of the air were the leguminosae, or the food bearing plants, such as clover lucerne, sanfoin, vetches, beans, and peas, and the means used are micro-organisms—parasites which attached themselves to the roots of these plants, and by their action, either by themselves or in combination with other forms, enabled these plants, to which they attached themselves, to absorb the free nitrogen of the air. If it happened that these organisms were not present in the soil, then the plants would present a dwarfed growth and eventually die. It was thought that clover sickness might be the result of the absence of these micro-organisms, but whether this was so or not, the fact that these special class of plants had this special power of absorbing nitrogen was a fact that was of untold value to the farmer who learned how to make use of it—which was to grow as much as possible of these leguminous plants; fortunately they were well known and commonly used on most farms, so there were no ancient prejudices to overcome by advocating the more extensive use of them. Where the soil was very much exhausted and out of condition, and where good farmyard manure was not available, the cheapest and best plan was to sow seeds that would remain for three or four years, and the composition should contain a larger proportion of clovers and lucerne; the mixing of grasses with clovers was undoubtedly an evil, a necessary evil perhaps, but nevertheless an evil to be avoided if possible, because grasses did not add to the fertility of the soil, in either the same way or in such a degree as the leguminous plants. Grasses required that the nitrogen should be supplied to them, whereas the clovers, etc., supplied themselves, and when nitrogen had to be supplied it became a serious outlay, as it was the most expensive manure to buy of all the fertilisers that were used. Then the seeds should be mown as often as possible, and not fed. The feeding by stock, in preventing the leaves forming, would also prevent the roots extending, as this case it resolved itself into a struggle for bare life, and no power of increasing was left to the plant when the mowing took place. Then it was necessary to apply phosphatic manures and potash, costing probably 15s. an acre. An incidental result from growing roots after vetches was that it had been found that they were not so liable to "finger and toe." This might be in consequence of the nitrogen stored up in the vetch roots, and which provided a sufficient supply of nitrogen to feed the turnip as well as the micro-organism which caused the disease. The addition of nitrate of soda to the phosphatic manure might also have the same effect. Turning to the question of manures, he said it seemed very extraordinary that after all that was now known about the necessity of supplying plants with certain foods, after the lessons that had been taught by the result of those valuable experiments that had been carried out at Rothampsted, that there should still exist men who thought themselves especially wise, and thought that they had absolutely settled the question when they declared there was "nothing like muck;" for no one who knew anything about it would ever think that the farmyard could possibly be compared to artificial manure. There was only one sense in which any comparison was possible, and that was in the plant food which each contained, and the result of the comparison was much in favour of the artificial, both from a fertilising and an economical point of view. It was a matter of common knowledge that the liquid drainings from a manure heap contained the essence of the fertilising matters in the manure, and yet often this was allowed to run to waste. It was plant food in the most available form, and yet if those substances were extracted from the liquid and presented to some farmers in the shape of salts, potash ammonia, or phoshate of lime, they would still stick to their text, "Nothing like muck." He proceeded to quote the statements of Messrs. Lawes and Gilbert and Mr. F. J Cooke on this subject, showing the value of artificial over farmyard manure. This brought him to the point of comparison between artificial manure and farmyard; neither of them could take the place of the other, but should supplement each other, the one supplying what the other lacked, the farmyard manure supplying the decaying vegetable matter which not only acted mechanically in keeping the soil open, but also enabled the soil to absorb and hold so much more moisture than it otherwise would do—a most important property during a dry summer. The experience of Mr. Cooke clearly pointed out what should be the object of manuring, namely: to manure for the crop they wish to grow. The crops that farmers grew naturally fall into groups, which require a certain kind of manure to be in excess of other kinds, and this was called the Dominant Manure. No man in his senses should buy manures simply because they were cheap, or because some oily-tongued vendor showed him a highly-coloured testimonial. One of the most expensive crops a farmer could grow was a half-crop, and unless he supplied the crop with the maximum quantity of food it required, he never could grow a full crop. It was as essential, not only to give the land sufficient food to grow maximum crops, as it was to give an animal sufficient food to grow fat. But it was equally essential that the food given should be in due and suitable proportions to each other. A well-balanced ratio was as essential in one case as in the other. It seemed to be evident that if one kind of manure was largely in excess of any other one, that their effect upon the growth of the plant was now different to what it was when the balance of each kind was properly made. The manure that was in excess seemed to over-power the weaker manure. It seemed to be a mistake to use manures in too large doses. Little and often was the principle upon which they should be applied, and care should be taken to properly incorporate them with the soil, and applied some time before the crop required to make use of them. These facts were brought out in the experiments that had been carried out for the last three years on grass lands with artificial manures. The commonly-accepted opinion that artificial manure had no effect in a dry season had been completely disproved. In conclusion, he should like to summarise the points he had tried to lay before them:—(1) That condition of land depends mainly on the amount of vegetable matter it may contain; (2) That that vegetable matter is most cheaply and easily obtained by the laying land down to temporary seeds for four or five years; (3) That these layers should be mown in preference to constant grazing, (4) That the growing of leguminous plants such as clovers, sanfoin, lucerne, and vetches was the most economical way of storing the land with nitrogen, which in an essential element for the growth of all crops; (5) That the judicious combination of artificial manures with farmyard manure was the most profitable system of manuring; (6) That it was necessary to group the crops according to the dominant manures they require to be supplied with; (7) That the correct system was to manure the crop and not the land; (8) That there should be a well balanced ration of manures for plants, as there was a well balanced ration of foods for animals; (9) And that all manures should be used in moderation, but that enough must be given to supply sufficient food to grow a full crop.

RICHARD'S SUBSOIL-PLOUGH.

This is hardly a new idea. In 1874, the late Duke of Sutherland, then engaged in converting a large tract of land, in the county whence he takes his title, from a barren more to good grain-and root-bearing farms, finding it necessary to do the work by steam, as horses could not go on the land without sinking, invented an attachment to the plough very similar to the CROCHET-FOUILLEUR of M. Richard. A full description of the whole system pursued by the Duke, under his "Chamberlain," as an agent on extensive estates in Scotland is called, may be found in the Magazine of the Royal Agricultural Society of England for the year 1876 or '77. Like a great many other noble operations, it did not pay the Duke, but it was greatly beneficial to the country at large. (v. p. 53.)

COMPTON MODEL-FARM.

Experiments on crops and manures—Creamery—Fermenting-cans—Refrigerator—Daily tests of skim-milk and butter-milk—Register of cows' milk.

The following notes are taken from a report by Mr. Gigault, Asst. Commissioner of Agriculture, to the Hon. F. G. M. Dechêne, Commissioner of Agriculture, on a visit paid on the 14th, and 15th of last June to the Compton Model-Farm.

EXPERIMENTS.

LUCERNE.—The lucerne grown on the farm here was almost entirely destroyed by the frost; only a small extent of it remains, in a spot where the snow protected it.

As this plant is highly approved of as green-meat, Mr le Moyne intends to sow some more in places where the snow generally lies intact all the winter.

POTASH.—Fourteen plots, of the tenth of an acre each, have been treated with potash manure, from the "German Kali works," the effect of which will be notified to the public in the fall.

LUPINS.—The lupins grown last year were ploughed in as manure on part of the land intended for mangels. Their effect will be reported upon next autumn.

ROOT-GRAFTS.—Mr. le Moyne has set out a hundred grafted apple-trees, from M. Dupuis' nursery, almost all of which have taken well.

This spring, almost the whole of the foliage of the orchards at Compton was killed by caterpillars; even the maples were attacked by them. Thanks to the use of insecticides, the small orchard on the Model-farm escaped scot-free from this scourge.

THE CREAMERY.

Mr. Parry, the butter-maker, is giving a weekly course to the two pupils who are at present studying butter-making: Messrs. Bayle and Turgeon.

Monsieur Thérien, a former pupil of the creamery, has started a factory at Waterville, where he seems to be giving perfect satisfaction to the patrons.

At present, the Compton creamery is receiving 8,000 lbs. of milk a day, whereas, last year, at the same season, it was receiving less then 6,000 lbs.

The new creamery (see p.—of this number) is finished, and will be in operation in a few days. Many people have been to look at it, and they seemed delighted with it.

Mr. Parry gave me the following account of the new factory:

"The interior walls are finished in spruce, well oiled and varnished, except the floor of the cream-room, which is black-birch, and the refrigerators which are floored with cement.

"The separator-room is a model of convenience: the engine-room is so situated that any excess of heat that may arise in it cannot possibly find its way into the other parts of the creamery. The churning-room is placed in such a position that it must be cool at all times, while the cream-room is so completely isolated from all the rest that no bad smell can possibly enter it.

"The machinery is of the best kind and perfect in finish. The separators are the best now made, and the churn and butter-worker are of the kind specially recommended by Prof. Robertson.