

whether 4, 8, or 12 years elapse before the clover is repeated, the same operations are completed every fourth year. Instead of one application of rape cake and ammonia, there will be two or three, two or three crops of roots will be plowed in, and more corn crops will be grown. The only distinction that I know of will be that the earlier applications of manure will have gone through longer periods of decay, and have formed compounds of which we know little or nothing. These compounds, however, when we arrive at further knowledge upon the subject, may explain much which is obscure at the present time. That such compounds are formed, we have very strong evidence in another field, where we endeavored to grow beans for a long series of years upon unmanured land. The crop became very small, the growth being only a few inches high. Analyses of the soil showed that it had lost a large amount of organic nitrogen, and it was very poor in nitric acid. The experiment was therefore given up, and the field was sown with barley and clover. The barley was by no means a fine crop, but the clover was magnificent, and the color of the leaf remarkable for the beauty of its green.

I have selected this experiment out of a number of others where the clover was even more luxuriant, as in all the others manure of some description was used. Here we have the fact of a soil which became poorer in organic matter, nitrogen, phosphates and potash, ceasing to furnish food for one leguminous plant, while it was accumulating food suitable for another plant of the same natural order. The soil of the garden where the clover has been grown for so long without disease, differs in two remarkable respects from the soil of the highly-manured rotation land, where disease occurred when the crop was repeated after an interval of four years. On the garden soil the accumulations from former manures were very large, and there was no fresh organic or nitrogenous manure to feed living bodies. It is quite possible that when organic matter has reached a certain stage of decay it may cease to be a food for much of the larger sorts of organic life in the soil, such as worms, &c.

Salts of ammonia appear always to have an unfavorable influence upon clover and to encourage disease. As far back as 1860 we published a map of a field, one half of which had received salts of ammonia in addition to the various other manures applied, and it was quite evident, from the size of the various blank spots, that the disease was, in some indirect way, encouraged by the application of ammonia. In a field which had received no dung or organic matter for a number of years, and had been growing barley manured with nitrate of soda and superphosphate of lime, with occasional crops of red clover, disease almost cleared off the plant when repeated after four years; but after eight years the crop was not attacked except where it joined the diseased portion, and it was evident that whatever was the cause of the disease, though it had passed over the border, it did not extend its ravages beyond a few feet. There are a few conclusions which may be drawn from these experiments:

1. That clover disease does not occur even when the crop is grown continuously, provided that the soil contains in abundance the appropriate food of the plant.

2. That clover disease occurs in highly-manured soils if the crop is repeated too frequently and sufficient time is not allowed for the formation of the appropriate food of the clover.

3. That the fertility of a soil may be largely reduced by cropping, and absence of manures, while at the same time the food specially required by the clover may be increasing in the soil. The crops grown during the process of exhaustion may be partly, or wholly plants of the same natural order as the clover, provided that they differ from the clover in certain properties of their growth and the range of their roots.

4. That although clover does not appear to possess the

same power of appropriating the mineral food of the soil as the cereal crops (for which reason mineral manures are often advantageously applied to this crop), still mineral manures cannot be depended upon to grow clover, on clover-sick land.

5. That all the evidence points to the soil as the chief source of the mineral and nitrogenous food of the clover; and if it should be ultimately proved that the nitrogen of the atmosphere played any important part in furnishing the nitrogen taken up by the plant, it is more probable that the nitrogen enters into combination with some ingredient of the soil, than that it is directly assimilated by the plant itself.

Dominion Butter Tub Factory.

We have received from Messrs. Williamson & Crombie, of Kingsbury, Q., their price-lists for their very excellent butter tubs. We have before us a beautiful, heavily tin lined tub which is highly recommended and which should be pleased to have tried by our readers engaged in dairying. The tin is guaranteed not to rust, so that the butter must keep in such tubs much better than in those not so lined. For price-lists, &c., apply as above.

The Popular Demand.

Professor Morrow of Illinois University says truly that there is a demand for horses with special fitness for heavy draught or for fast trotting, for cattle especially fitted for beef or for milk, for sheep remarkably developed in the way of either mutton or wool production, but the largest number of users of either class desire animals reasonably well adapted for more than one purpose. The horse best suited to the needs of farmers generally, or for most business purposes, is neither a heavy draught nor a typical roadster, and so of the other classes of animals, even to the hog, in breeding which too exclusive attention may be given to early maturity or to ability to lay on flesh. The professor knows what he is talking about; and he carries a level head on this question, certainly.

Cotton-Seed Meal.

Sir John Bennett Lawes of the famous English Experiment Station at Rothamsted has shown, not by theory, but by practical work upon his farm, that a ton of cotton-seed cake—a cattle food which was not known to farmers a century ago and which costs about \$31.50 per ton—is worth as a manure, after it has passed through the animals which consume it, \$28.25. This statement looks strange, but it comes from a source which is unquestioned. So it yields two, possibly three, profits. There is an increase in the flow of milk, if animals are kept for the dairy, they are in better condition, and, being so, actually consume less food, so there is a saving in forage—while, most wonderful of all, the farmer receives back, in the increased value of the manure as a fertilizer, within a very few dollars of the original cost of the feed. Can the farmer afford not to feed high? *L.C.*

The sanguine expectation of our farmers that we could keep our lands fertile by the continued plowing-in of clover was doomed to disappointment. After about fifteen years of this system of clover-growing and plowing-in, our wheat began to grow weak in the knee, and would fall so flat to the ground that it had the appearance of having been rolled down with a roller, and the wheat would be shrunken badly. The growth of straw would be large but the yield light. In the fall the wheat plant would have a healthy appearance, but in spring would change to a yellow, sickly hue, having the color of a man ill with jaundice. This sickly appearance at first showed only in spots over the field, but these spots were enlarged from year to year, and never recovered while we continued this system of clovering.

C. G.