Editorial.

Cultivation of Roots.

When roots are grown as part of a rotation of crops, it is usually supposed that it makes no difference what roots are used. This is an error, for even turnips and mangels possess quite distinct characteristics, the only quality they have in common being that both are useful as a means of liberating the soil from the tyranny of noxious weeds. But keeping the land clean is only a small factor in the benefits of a rotation. It is generally supposed that a shallow crop should not follow a deep-rooted one, or *vice versa*, and that one exhaustive crop should not follow another in consecutive order. To say that a crop is exhaustive is as indefinite as to say that one food contains more nutriment than another. Clover, for example, takes large quantities of nitrogen out of the soil, but leaves it richer in nitrogen available for wheat. An excellent crop of wheat will be produced after the land is impoverished by beans; and, under many conditions, a soil exhausted for turnips will produce an abundant growth of mangels. A co-called exhaustive crop should not be regarded with dread; indeed, the more exhaustive the crop the greater will be the gain, for the profit in any case represents the difference between the price of the unmanufactured material in the soil and that of the finished article in the crop. However, there is some meaning in saying that mangels are exhaustive, for they readily take up all the most essential constituents of plant food; but this does not necessarily imply that they require a liberal general manuring. Being deep-rooted, they get their mineral constituents from the sub-soil, so that they are most benefited by a nitrogenous fertilizer; while turnips, being shallow-rooted, require phosphates. Turnips contain much potash, but this does not imply that they require this kind of manure, for if there is any in the soil they take it up very readily; but they feed poorly on phosphates. Farm-yard manure is good for all roots, but farmers sustain great losses in applying so much, instead of using half the quantity, supplementing it with special fertilizers. Besides, it is a usual custom to apply the manure of the whole rotation to the root field. This practice is exceedingly objectionable; for, although a large crop of roots may be produced, other crops reap less advantage. Large roots contain a much less percentage of nourishment than smaller ones, having much more water and woody fibre. Small roots may contain ten per cent. less water than large ones, are more digestible, require less labor and storage, and have better feeding properties. Instead of putting all the dung on the roots, it is better to apply some of it to other crops, or use it as a top dressing for meadows. Mangels require more heat for their development than turnips, the latter flourishing best in a cool, moist atmosphere. These crops should be alternated with carrots, beets and parsnips. Both carrots and mangels make excellent food for horses, and parsnips are best for dairy cows. The latter may be left in the ground all winter and fed in the spring, thereby preparing the cows to go to pasture earlier. All sub-soil feeding roots may be manured like mangels.

The Manure Heap.

This is the chief season of losses amongst the farmers. Domestic animals perish, and the golden juices of the manure heap run to waste by the drenching rains. The quality of the food consumed by the stock is a measure of the value of the heap. When it is considered that nitrogen is the most valuable part of the manure, that three-fourths of the nitrogen of the food is contained in the urine, and over 95 per cent. in the solid and liquid excrements, it will be seen how little is retained in the animal economy for the production of beef, milk, or growth. A still larger percentage of the other constituents of the food is voided. Hence it will be observed that if the animal does not increase in weight or produce milk, all the nutriment of the food will be found in the excretion—bearing in mind that the carbonaceous portion of the food which produces heat and mechanical force, is of no use as a fertilizer. The nitrogen of the urine is of direct use as plant food, and the constituents of the solid excrement soon become available for the plant in the laboratory of the soil. Farm stock may therefore be regarded as machines used for the manufacture of concentrated food for man and plants; and this machinery need never be kept idle for want of work. Hence the richer the food, the greater the profits, whether they take the form of beef, milk, or manure. If the excrements were as carefully husbanded as the other products, there would be more profits in feeding for manure than for beef or milk. It should be distinctly borne in mind that there are at least two classes of fertilizers—one which supplies direct nourishment to the plant, and another which may contain little or none of the essential elements of plant food, being indirectly useful by virtue of their chemical or physical action, such as salt and plaster. Salt was believed by some to be necessary for plant development, but it is now known that plants will flourish without it, and that the minute portions of salt found in plants already exist in sufficient abundance in most all soils. Roots, however, and especially mangels, contain considerable quantities of salt. Undue growth of straw is checked by means of salt, but where is the economy in producing a rank crop by means of valuable fertilizers and then checking it by salt? Plaster contains small quantities of direct fertilizing material, such as lime and sulphuric acid, but the small quantities required are scarcely ever lacking in the soil, the main action of the plaster being to gather and retain the ammonia. When lime is required, its application in the form of plaster is expensive. On the other hand, such applications as farm yard manure, ashes, phosphates, and the different compounds of nitrogen and potash, supply direct food to the crop, leaving the soil in a more or less constant state of fertility. If farmers could be induced to spend a portion of their vacant winter months in hauling swamp muck for the purpose of absorbing the life blood of the manure, either using it as litter or for intermixture on the heap, the pile would at the same time become directly enriched in nitrogenous material, while the more expensive application of plaster, which is often used for the same purpose on account of its absorbent properties, but slightly enhances the value of the manure. If they could be induced to utilize the carcasses of defunct animals in the way we have often pointed out, instead of feeding them to hungry vultures, and creating a pestilence in the atmosphere, one important step in the practice of economy would be the consequence.

Our Experimental Farm.

We acknowledge the receipt of the ninth annual Report of the Ontario Agricultural College and Experimental Farm, which we received about the middle of April. It contains a good deal of interesting and valuable information, but the most useful gleanings are now too unseasonable for our readers. The Report should be out not later than the 1st of February.

The departments of agriculture and live stock still continue to be the most popular in the curriculum. With regard to what is taught in practical agriculture, the Report is defective, but the live stock chapter is replete with facts. A good work is being accomplished in presenting to the students and the farmers a knowledge of the conduct of the different breeds of cattle and sheep, with their crosses and grades, and many valuable points may be gathered from the experiments in mutton and wool, the pith of which we published in a previous issue. Special prominence is given to experimental feeding for the purpose of ascertaining which products of the farm yield the quickest and most profitable returns. This investigation deserves special attention. No branch of agricultural industry has ever been reduced to a system so thoroughly as this. We have endeavored to compare the fattening standards in the Report with those adopted in England, Germany and the United States, but data are wanting. Canada omitted, the world is a unit in the system of conducting experiments in cattle feeding, but no satisfactory cause has ever been assigned why the Ontario Government should think fit to found a new school in this important branch of husbandry. The practical feeder has served a good purpose, and any standard conflicting with his, based upon chemical analyses of the food, we would condemn as unsound. The object sought by the scientific method of investigation is not only to feed well known foods more economically, but also to enable feeders to compound an infinite variety of rations including foods unknown to them, thereby dispensing with the necessity of experimenting, except perhaps so far as it pertains to different breeds and climatic conditions. The Report (page 41) states that "our winters and summers are so characteristic as to demand a complete set of animal and vegetable experiments." Having thus condemned the co-operative system, the rations fed to milch cows are compared with the German standards, and the harmony is complete. How is it that the co-operative standards work so admirably with milch cows and fail so disastrously in their application to steers fed for the block? The field experiments with artificial fertilizers are also condemned in still more vigorous language. Why then was the co-operative system introduced? Why was a new school not also founded here as well as in cattle feeding? We should have some faith in the new school if, in the whole decade of its existence, it had re-