

purely an agricultural fair. Our shows on the other side have become so demoralized by attractions that scarcely any good stock are exhibited, except fast horses." So will it be with our Province if the Government does not assist the association to keep up that high standard of excellence which has followed it from the commencement. Take the estimates of the Province and see what a small proportion of the expenditure the agriculturist receives in return. Who supports colleges, universities, and such like in the cities, and who receives the benefit from them? are questions easily answered.

Let the farmers keep a watchful eye on their interests or else they will be found paying most into the coffers of the country and receiving the least.

H. C.

Paris, Ont., Nov. 30, 1888

Essay on Field Roots—their Comparative Value as Cattle Food, Cultivation, etc., etc.

BY D. NICHOL, CATARAUGUS, ONT.

To which was awarded First Prize by the Ontario Agricultural and Arts Association, 1888.

There is, perhaps, no other subject in connection with agriculture in Canada about which there exists so much diversity of opinion.

In the most advanced agricultural countries in the world "Field Roots" have, since the latter part of the last century, been gradually gaining favor as food for live stock. And now on the best stock raising and dairy farms in Great Britain the root crop is considered of the highest importance—not entirely on account of their nutritive value, but more especially because of their regulating, appetizing, lubricating, invigorating, health-giving properties.

Cattle want, and naturally seem to require, a portion at least of their food in a fresh or green state in winter as well as in summer. And it is now certain that whatever kind of food and fattening food cattle may be fed on during the winter season without green food, they are never so thrifty as those fed chiefly on roots and fodder. In Great Britain and on the continent of Europe hundreds of thousands of cattle are fattened annually on turnips and straw; and it is safe to say that the greater part of the beef and mutton of those countries is produced by the feeding of roots when the animals are not on pasture. There are about ninety parts of water in one hundred pounds of turnips and ignorant persons are likely to draw the conclusion that the water is very expensive! But it has long ago been proved that nature favors the method of water drinking which is involved in the digestion of turnips and other excellent roots. Where roots are raised abundantly they are fed to cattle in such quantities that they require no water except that which they receive in the roots. And so marked is the influence of the ninety per cent. of water administered through the medium of roots, and of the ten per cent. of what the analysis term "feeding properties," that a skilled trader can readily detect the difference between animals fed on roots and those that have been fed on more expensive substitutes.

It is also well known by experienced feeders that meat of any kind can be fed to animals with far less danger of injury to their digestive organs when fed along with a portion of wholesome roots. Roots do certainly materially assist in the assimilation of other food; so on that account their economic value is much higher than the inexperienced may suppose.

In plants subject to such different modes of treatment as field roots, their general composition and the relative proportions of their constituents are liable to great variations. The difference produced in them by wet or dry seasons, by rich or poor soils, slow or rapid growth induced by the absence or presence of stimulating manures, by far exceed that which is always to a certain extent found due to the influence of descent from different varieties. For this reason it is not possible to assign any fixed or determinate value to any kind of root; all we can attempt is an estimate based upon our knowledge of their general composition, and upon the degree of development of the individual plant or crop. In an investigation involving such chances of difference as must ever exist in the composition of our cultivated roots, the result of a

solitary determination is of but little value, as it may be correct as regards the individual but incorrect as regards the mass.

Field roots are admirably adapted for a systematic rotation, and no crop affords so good an indication of the agricultural condition of the land. On naturally poor soils, or of land exhausted by continuous cropping without a sufficient supply of manure, the poverty of the land manifests itself much more strikingly in the scanty root crop than in any other crops of a rotation; while on the other hand a high agricultural condition, or of great natural fertility, shows itself very clearly in the heavy root crops which are raised on it. It is a mistake, Dr. Volecker thinks, to give the enormous dressings of manure to rich clay land, even for mangolds, which some farmers use, and that in many cases a more economical result and certainly a better quality of roots, although not so heavy a crop would be given, if instead the land were manured in the autumn with a less quantity of farm yard dung and the seed drilled in with superphosphate or ground bone at the rate of four or five cwt. per acre, which manures have a tendency to produce early maturity in the roots.

There is no doubt luxuriantly grown roots always contain more water as a rule, more nitrogen, and mineral or ash constituents than less vigorous plants of the same age, hence large roots, generally speaking, are less nutritious than better matured roots of a moderate size. Small mangolds approach sugar beets in composition, while large sugar beets are hardly better than common mangolds.

Monster roots are always very watery and poor in sugar: the practice of giving prizes for the biggest roots Dr. Volecker calls "childish." Such roots, he says, may delight women and children, but why should prizes be awarded for monsters which generally contain so large a percentage of water.

It is never advisable to devote all the area of acreage allotted for root crops to one kind of roots. In all cases and with all crops it should be remembered that as a rule the longer the interval we can arrange between the cultivation of any one kind on the same land the greater the chances of freedom from diseases and from insect ravages; therefore we should always bear in mind the desirability of substituting wherever we can other crops having about the same economic value and uses, but different in habits and growth requirements. The importance of this rule is particularly marked in regard to turnips, as will be seen when we come to consider the diseases and insect enemies to which the plant is liable. Indeed, the greater the number of different plants possessing about the same agricultural advantages that we can introduce into our cultivation, the more secure we shall be from the chances of weather and other casualties to which our crops are always subjected, and the better it will be for the health and well-being of the stock. The good effects of the change of food on stock of all kinds is readily acknowledged by all experienced farmers. By having a variety of farm products we have the power not only to afford a change of keep, but also when we find the one kind decreasing in its effects, either from its own diminishing value or from satiety in the animals to which they are fed, to be followed up by another kind giving a fresh relish, to be succeeded by still another.

Another benefit which can be derived from various root culture is that some light soils, otherwise nearly useless, can be cultivated with facility and profit; this kind of land is turned to the uses for which it is physically calculated, and by being suitably cleaned with this preparatory crop, a bed is provided for grass and other seeds, wherein they flourish and prosper with greater vigor than after any other preparation. In humus soils containing a large amount of organic matter, which in general are not favorable for the growth of cereal crops, field roots in most cases can be successfully grown, although the root is less in proportion to the top and less firm in texture than in those grown in some other soils.

Does the growing of roots for cattle food pay? is a question we very frequently hear asked. The most direct reply is, that depends on how roots are raised and how fed. There is a class of farmers who winter their cattle in byres that are not much warmer than open sheds. During cold winter weather their shivering animals are turned out daily to drink water from a hole cut in the ice; they return to their cold quarters with humped backs and distended stomachs, occasionally shaking a hind foot as if it had been stung by some poisonous reptile. This class of farm-

ers, whose agricultural operations are chiefly grain-raising on the skimming or slip-shod system, seem to be content with a crop of ten bushels of wheat or fifteen bushels of barley from an acre. It is scarcely probable that their land in its present condition would produce a paying crop of roots to be fed in a frozen state to cattle having their stomachs chilled daily by heavy draughts of ice water. Indeed, it is doubtful whether any crops produced under a shiftless, slip-shod method ever give remunerative returns; and the growing of roots as food for "live stock" does not pay unless good crops can be raised and fed to advantage. This, we think, can be done by any farmer of ordinary capacity, possessed of common sense, and land at all suitable.

It is impossible to give an exactly correct estimate of the cost of producing a good crop of roots, so much depending upon circumstances; but experienced farmers of the first class throughout the Province in giving approximate estimates differ but very little. It must always be observed that as great beneficial effects are derived by after crops of grain and hay from the manure applied to the root crop for at least seven years, so it would not be fair to charge to the root crop more than one quarter of its cost applied to the land. If forty loads of dung applied to an acre costs \$40, only about \$10 could be fairly charged to the crop of roots.

John Gibson, of Lyndale farm, reports to the agricultural press the following quantities of roots grown per acre by him: Long red mangolds, 1,500 bushels; yellow globe mangolds, 1,300, and Swedish turnips, 1,200 bushels. The cost per acre of growing the same is about as follows:

Two ploughings at \$2 per acre	\$ 4 00
Cultivating and harrowing	1 00
Drilling	2 00
Sowing	1 00
Cultivating with one horse four times	1 00
Hand hoeing twice	10 00
Pulling and hauling	17 00
Seed	3 50
Share of manure applied	10 00
	\$52 00

It will be seen by the above figures that the roots cost when stored about four cents per bushel. They are surely worth ten cents per bushel, and that leaves a nice balance for rent, taxes, cutting and feeding in winter.

(To be continued.)

Report of the Judges on the Prize Farms for 1887.

Continued

MAPLE AVENUE.

The First Silver Medal Farm.

On the morning of July 6th, our starting point again was "The Cedars." In a comfortable conveyance provided by Mr. Murphy, we were oblivious of a torrid sun and air heated as with a steady furnace, while driving to Maple Avenue, a 250 acre farm, the property of Mr. Joseph K. McMichael, Waterford. This farm includes lots 9 and 10, 6th concession Township of Townsend, North Norfolk, and lies about 1½ miles to the north east of Waterford, on the high banks of the Nanticoke, a pretty spruce like village, doing a large business in the fruit canning and other industries, and through which many rapid trains of the Michigan Central Railway run both ways every day. The way led through the heart of Townsend, a section on which nature has lavishly bestowed her gifts. The surface is undulating sometimes, at others rolling. The watercourses carry only distilled waters fit for the palate of a king. The soil is a strong sandy loam with many variations, easy of cultivation, and yet not dangerously light. The forests, though not filled with giants, contain trees of rapid development, growing, many of them, amid a carpet ground of plains grass indigenous to this locality, good, comfortable dwelling houses abound, and basement barns are creeping in here and there, betokening the introduction of another stage in the line of agricultural advancement. One of your judges, to whom the locality was strange, was more than surprised at the fine appearance of the crops in a region where the sand on the highway in many places impeded locomotion. The strength of this deceiving sand accounts in part for the fact, no doubt, that the three competing farms in this riding are all in the one township.

Passing the great high hill of gravel to the north of Waterford, and looking to the right, a stately clump