

was a luxury, that the horse had to be fed and cared for daily whether it worked or not, whereas the motor cost nothing while idle.

I made many inquiries about tractors while in America. Mr. Grisdale, Director of Dominion Experimental Farms, who has opportunities which few others have regarding the value of these, was emphatic in pronouncing against the use of heavy tractors for field-work such as were used extensively throughout Canada some years ago, but says there are great possibilities in regard to the smaller type now being introduced. Others whom I questioned were just as emphatic in respect to heavy tractors. I also had an opportunity of visiting a large establishment in Waterloo, Iowa, where tractors and other farm implements were manufactured. The foundry, machine-shop, and other departments covering 10 acres of ground. I discussed tractors with the manager, who informed me that the heavy tractors for field-work were being discarded, their place being taken by small, powerful, and simply constructed tractors, which it is claimed, are capable of doing everything on the farm that horses can do, and everything that the heavy-duty stationary or portable engine can do, being self-steering while ploughing, and turning within their own length. These light but powerful tractors were being improved and perfected, considerable progress having been made in this direction within the last few years. It is stated that the heavy tractors did great injury by packing the soil to such an extent that the growing crops were visibly injured wherever the wheel-tracks had passed.

As a member of the International Jury of Awards appointed by the President of the Panama Pacific Exhibition, San Francisco, in group "Agricultural implements and farm machinery," I had an opportunity of examining all tractors on exhibition, and considering their merits upon which awards were finally made. The entries were not numerous. For the tractor which received the Grand Prize in that class, "The Caterpillar," it is claimed that its caterpillar or endless track-like attachment admits of its travelling over country where round-wheeled tractors would get bogged, and that in field-work, owing to this same attachment, the large area in contact with the ground distributes the weight and so prevents packing, and gives grip enough to propel the engine and its load without slipping and waste of power.

Motor power is undoubtedly the coming force in farm-work, as it has transformed the work in manufacturing centres. There are difficulties in working the land to be overcome, but they are not insurmountable. To-day the farmer is calling out to anybody who will provide him with better tools for tillage and haulage and labour-saving implements to counteract the dearth of horse and manual labour. The agriculturist knows what he wants, while inventors and manufacturers are lagging behind. The possibilities of the motor plough and tractors are very great, and under fairly favourable circumstances their utility and economy have already been proved. The fact that these tillage machines are already in active service on numerous farms both in America and Great Britain, and other countries as well, and doing excellent work, is perhaps the best testimony to their having come to stay.

#### CONCLUSION.

Throughout my report I have not offered any recommendations either in educational matters or departmental practice, believing that these were matters of policy governed largely by financial considerations. But if there is one fact that impresses the visitor to Canada (and in a lesser degree the United States) it is the enormous sum that is spent on the education of the farmer and the farmer-to-be.

Canada, whose prosperity is not more closely bound up in the soil than New Zealand's, is concentrating on the agricultural education of the masses (one might almost say) in a manner that compels the warmest admiration, and is doing so through a variety of channels and in a way that is never opposed to a self-reliant policy. This last fact is to be noted in the encouragement of the co-operative movement and the elimination of the middleman. Money, in fact, is spent on education chiefly among those who are to be the future farmers and farmer's wives of the Dominion; secondly, among those who are the struggling farmers learning their own business as they go along; and, thirdly, among those who, while popularly regarded as successful farmers, have yet to learn and practise the finer points of scientific farming. The County Agent or Farm Demonstrator is the leaven at work in the mass of American farmers, while the agricultural colleges are creating a new type of scientific farmer who takes with him to the farm not an accumulation of theoretical knowledge, but the experience gained in his own actual practice of methods approved by the highest authorities. One is forced to the conclusion that the steady pursuit of agricultural education is bound to give Canada an advantage that will outweigh in time any disadvantages that are suffered through rigorous climate and comparative difficulty of transport. In the matter of agricultural colleges, experimental farms, and the general dissemination of farm knowledge, New Zealand, compared with Canada, has hardly touched the surface.

Reference has been made to the fact that both in the United States and Canada the most important activities of the Federal and Dominion Departments of Agriculture are maintained and controlled by an expert staff at central experimental stations located close to the respective seats of Government. The work is specialized, and yet co-ordination and co-operation are effected by the possibilities of frequent personal contact between the officers at the central station. Investigations of national matters, as distinct from purely local problems, are undertaken at these central stations, and from them at the same time are controlled branch experimental stations throughout the country, and all the various educational propaganda emanate therefrom. This organization is quite the reverse of what obtains in New Zealand, where we have an expert staff located in the City of Wellington, while such experimental stations as we have are managed by good, practical men who, however, have had no specialized scientific training in agriculture.