

sary even in good soils for the growth of the best roots. By good roots one means naturally roots not large but rich in sugar. The desirability of extreme care in the selection of the best seed and scientific manuring and cultivation is shown by the fact that though the beet originally contained less than 5 per cent. of sugar, it is now not uncommon to find crops averaging from 18 to 20 per cent. of sugar in the roots. This enormous increase is due solely to care in the seed-selection and in the manuring.

Manufacture of raw sugar and refining: There is little need to deal at length with the production of the sugar from the roots, but it is noteworthy that machinery and automatic contrivances have been developed and utilized to a very large extent in modern practice, both in the extraction and refining of the sugar. This is particularly of interest in a country where labour is expensive and where machinery must be relied upon if working-expenses are to be kept down. The roots after being washed clean and weighed are cut by machinery into thin slices, then washed in many warm waters, and finally pressed to get rid of the last traces of sugar. The weak solution of sugar is made alkaline with lime and concentrated by evaporation, much the same as in cane-sugar refining. The final processes of purification are washing the sugar-crystals with concentrated sugar solution, and decolorizing by means of sulphur dioxide and animal charcoal. The molasses left after the raw sugar has been filtered has been utilized in the ordinary way for the production of spirits and for fodder, and by a special process it can be treated with a salt of strontium for the recovery of most of the sugar it contains.

By-products: The sliced roots from which the sugar has been extracted is by no means waste, for it has been used freely as a valuable manure, rich in potash and nitrogenous matter. It has found even wider use as fodder for all kinds of farm-animals, which eat it greedily. At times it is dried by passing it through a furnace, and bagged for export, or, again, it may be carted from the factory in its wet condition and stored in a silo for winter feed. In the latter it decomposes, with a very rank smell, but this change does not seem to detract from its food value. Much of Denmark's finest butter is made from the milk of cows receiving a regular ration of this fodder throughout the winter.

Cost: The retail cost of the finest quality of beet-sugar—viz., loaf sugar—is about 2d. per pound when sold by the single pound. This sugar has a purity of approximately 99·9 per cent., and the low price at which it has been produced has made it a formidable rival to cane-sugar within our Empire. The ever-increasing need for sugar as a food, and the fact that cane-sugar is unlikely to be produced in larger quantities than at present, render it highly desirable that experiments should be made in various parts of the Empire to produce it on a commercial scale. New Zealand, as a country in which the industries are mainly agricultural and pastoral, should not lag behind in the matter, and our Agricultural Department should see to the planting of small experimental plots of sugar-beet in various parts of both Islands. The Dominion Analyst would readily conduct analyses of the roots, and if it could be proved that the percentage of sugar was sufficiently high, capital would almost certainly be available for the development of an important industry.

To Mr. Sidey: I have seen a good deal of sugar-beet growing on the Continent, both in Germany and Denmark, and also the utilization of the by-products. I have been through the methods pretty fully in the course of my studies. I have also seen it used as cattle-fodder in Germany and Denmark. Perhaps the conditions for growing it in many parts of Southland are not so favourable, but I should imagine that parts of Canterbury would be suitable, and I should imagine that Hawke's Bay would be rather a satisfactory place for an experiment to be tried in connection with it. I believe some experiments were conducted in New Zealand about twenty years ago; on the other hand, the development of the sugar-beet industry is more or less recent. The Agricultural Department is carrying out experiments, but I consider that they should be conducted on modern lines.

To the Chairman: Sugar made from sugar-beet can be sold at 2d. per pound readily. I think that in many countries they are using labour that would be replaced by machinery here. I am aware that under war conditions sugar is cheaper in New Zealand than in any other country. I think the production of cane-sugar is going to decrease rather than increase.

W. HINCHEY, Chairman, Bluff Harbour Board, examined.

From the point of view of industrial development it appears to the Bluff Harbour Board that the first thing to be desired is a return to the facilities for shipping commodities which were in existence before the war. In 1913, the last complete year before the war, the exports through the Port of Bluff reported by the Customs were £1,567,019, and imports £671,947—a total of £2,238,966 of foreign trade, besides a large coastal traffic. The volume of direct imports fostered by the Southland Importers' Association had increased during a series of years to 23,979 tons in 1913, being an average of 2,973 tons per steamer. The association had been promised a steamer every two months for 750 tons cargo. The Bluff-Melbourne service was in full operation, a steamer each way calling on Mondays at Bluff, with passengers, cargo, and transhipments. One of the first consequences of the war was the cessation of the weekly Bluff-Melbourne service, among the reasons given being the disorganization of trade generally by reason of the war, the Union Steamship Company having their largest vessels taken by the Government for transport purposes, and the reduction in both passengers and cargo traffic through the war. The cessation of the service produced a general outcry, the fish, oyster, timber, and fruit trades being particularly affected, and after pressure was brought to bear upon the Union Steamship Company a service was instituted which practically gave Bluff a ten-days' communication with Melbourne via Hobart or Wellington. As the war progressed the position as regards shipping became more and more confined. For the supreme effort in France the shipping ordinarily