1910.

NEW ZEALAND

THE BEET-ROOT SUGAR BILL

(REPORT ON); TOGETHER WITH MINUTES OF EVIDENCE AND APPENDIX.

(MR. LAWRY, CHAIRMAN.)

Report brought up Thursday, 20th October, 1910, and ordered to be printed.

ORDERS OF REFERENCE.

Extracts from the Journals of the House of Representatives.

THURSDAY, THE 7TH DAY OF JULY, 1910.

Ordered, "That a Committee be appointed, consisting of ten members, to consider all matters pertaining to agricultural and pastoral industries, stock, and commerce, with power to confer and sit together with any similar Committee which may be appointed by the Legislative Council, and to agree to a joint or separate report; the Committee to have power to call for persons, papers, and records; three to be a quorum: the Committee to consist of Mr. Bollard, Mr. Buchanan, Mr. Dillon, Hon. Mr. Duncan, Mr. Field, Mr. Hall, Mr. Lawry, Mr. Okey, Mr. Witty, and the mover."—(Hon. Mr. T. MACKENZIE.)

WEDNESDAY, THE 7TH DAY OF SEPTEMBER, 1910.

Ordered, "That the Beet-root Sugar Bill be referred to the Agricultural, Pastoral, Stock, and Commerce Committee."—(Right Hon. Sir. J. G. WARD.)

REPORT.

THE Agricultural, Pastoral, Stock, and Commerce Committee, to whom was referred the Beet-root Sugar Bill, has the honour to report that, after taking the evidence of four witnesses, and receiving a written statement and statutory declaration from the general manager of the Colonial Sugar Refining Company (Limited), Sydney, the Committee has not had sufficient evidence before it to justify a definite recommendation, and leaves the matter of proceeding with the Bill to the discretion of the Government, and that the report, together with the evidence, do lie on the table.

20th October, 1910. FRANK LAWRY, Chairman.

MINUTES OF EVIDENCE.

FRIDAY, 16TH SEPTEMBER, 1910.

SAMUEL CRAIG, Farmer, Paeroa, examined. (No. 1)

1 *The Chairman.*] Your name, please?—Samuel Craig

2 You are a farmer?—I have been farming off and on for the last thirty years in different places. At present I am at Paeroa.

3. You are aware that the question under consideration is the Beet-root Sugar Bill?—Yes.

4. Will you be kind enough to give the Committee any testimony which you may have on the question?—About twenty-five years ago Mr Graham, of the Waikato, was a very strong advocate of sugar-beet growing, and I thought I would try and grow the sugar-beet too, not with the idea of making sugar, but because I wanted to see how it would do for feeding cattle. It is supposed to be very good for feeding cattle, and I started first experimenting with it when I was living at Waipa Flats. I grew it for two years there, not on a large scale, only a few pounds or so of seed in an experimental way I found there that the roots would not grow smoothly to start with. The second season was the same, and I gave it up for a long time. When I came to the Thames Valley we started an A. and P Show, and I thought I would start growing sugar-beet again. The result was just about the same. The last I grew was about two years ago I tried some in the open paddock, and the results were the same again. I have never been able to get decently shaped roots. I could not get anything like the weight of roots that I could with mangolds on the same area. I have come to the conclusion that, as a commercial venture, and for the use of stock on the farm, it is much better to grow mangolds.

5 Have you anything further?—No, unless there are any questions I may have to answer

6. *Hon. Mr T Mackenzie*] I take it from your evidence that it would not be a success to grow beet in this country?—I have not found it so, I have tried three or four times.

7 Were you pretty careful in the selection of the seed?—I bought the seed from Yates.

8. The quality of seeds has altered within the last few years?—The last I grew was about two years ago. I have not grown any since then.

9 You have not studied the possibility of obtaining sugar from Indian corn?—No, I have not.

10. *Mr Witty*] What weight per acre could you grow of beets in comparison to the mangolds?—About a quarter of the weight.

11 What tonnage can you get per acre of mangolds or carrots?—I have never weighed it, but I have got a good average weight. I should say from 15 to 20 tons. Though it had been a very dry season, some of the mangolds stood 18 in. out of the ground. That was in sandy-loam soil.

12 Would a light soil have a tendency to create "fingers and toes"?—Yes.

13. It does not apply to the mangolds or carrots, or the beet?—The beet were the worst.

14. *Mr Buchanan.*] Have you had experience in farming outside of Waikato?—Not in this country, except in the Thames Valley and Te Kowhai

15 Any experience in the Old Country?—Yes.

16. What part?—In the North of Ireland.

17 Did they grow mangolds there?—Yes.

18. What would you take to be a fair average crop of mangolds in the Old Country?—Somewhere about 50 tons, I should say

19 In the *Journal of Agriculture* for the year 1907 the analysis of beet grown in the Waikato is set down at certain percentages of sugar Do you know anything about that?—No.

20. It says, "Beet-root grown in the Waikato District." I take it that it was taken from different farmers?—I should say so.

21 Your attention has not been specially drawn to growing beets for sugar at all?—No. I have tried over and over again to see if I could be successful, but I was not—there were too many fingers and toes.

22 What cultivation did you give to the beets during their growth?—I should think from memory that I cultivated the ground four or five times, besides keeping them clean, and thinning I wanted to cultivate trees in the orchard more than the beets.

23 You say that they had fingers and toes?—Not to a very great extent, but there was a great deal of fibre.

24. You say that you cultivated the land during the growth of the beets, say, half a dozen times, or something like that. Can you give the Committee any idea, or an estimate, of the cost per acre supposing you were growing sugar-beet for sugar purposes on a considerable scale?—No, I could not.

25 You know, no doubt, the class of land that is best adapted for the growth of beets, mangolds, &c. Is there any large area of land in the Waikato which, in your opinion, would be suitable for this class of plant that would compare favourably with the best class of land that you knew at Home?—No, I do not think there is any area worth speaking about in any one part. It is very difficult to get a large area of suitable land in any one part.

26 Would you consider this piece of land on which you grew the sugar-beet better or worse than the average that you could get for these purposes?—Where the orchard was I would consider about the average of what you would get.

27. Supposing the sugar-beet was grown to a large extent in Waikato, and the cartage was over a distance of, we will suppose, five miles, could the local bodies make arrangements by which these roads could be metalled at reasonable cost?—I think it would be very expensive there, where everything has to come in by train. There is no metal at all in Waikato.

28. Where, in your opinion, would the most suitable land be available?—The general opinion would be, between Hamilton and Cambridge.

29. Where is the metal got from?—From Te Kuiti.

30. What would be the distance to take it by rail, approximately?—If you take Hamilton as the centre, it would be about sixteen or eighteen miles from Taupiri, or more.

31 Have you any estimate of the cost of metalling, say, delivered at the railway-station?—Not in Waikato, but in our own part the metal generally costs us about 10s. per yard. Then there is carting and spreading after that. In some parts it costs more.

32. *Mr Okey*] I should like to ask, Mr Craig, how often you could put in a crop of beet. Would one crop follow another?—I should say certainly not, in the Waikato. The ground is very liable to run to sorrel after cropping

33. What would be a fair crop of sugar-beet?—I could not really say, but I should think about 10 to 20 tons, about 15 tons is the average.

34. Have you any idea of what it could be delivered to the factory for within a radius of six miles—what would be the cost per ton?—It depends upon the state of the roads and the time of year It would be rather expensive carting, especially if you had no metal on the roads.

35. Have you had experience in a sugar-beet factory?—No.

36. You could not speak of what is done with the offal or refuse?—No, but I understand that cattle can be fed on it.

37 What have you grown per acre?—I could not tell you, because I have never got a crop right through anywhere.

38. What manure did you use?—Artificial manure.

39. You have not got much hope of it being a success in Waikato?—Not from my own experience, and I have given it a good many trials.

40. *Mr Field.*] Mr Craig, you are a practical farmer, are you not?—I have been at it for over thirty years.

41 How long has your experience in beet-growing lasted?—About twenty-four or twenty-five years.

42. And you have been doing it strenuously all that time?—No, only occasionally. The results were not very good.

43. Have you ever been in any other countries where it has been grown successfully?—Not sugar-beet, only good mangolds.

44. You have got no special knowledge of sugar-beet growing?—No.

45 Can you tell us what class of land is most suitable for growing beet, heavy or light?—I think light soil is best.

46. You have never tried it on sandy loam—river-flat ground?—Yes.

47 On swampy land?—Never

48. Has it ever been tried in the Waikato?—I do not know at all. There is a large area of swampy land there with more or less timber on it. That makes it very difficult for ploughing, &c.

49. Have you any idea of the cost of getting timber out of swamps?—It depends a great lot on the class of timber

50. The timber is pretty thick in the swamps?—In some of them.

51 Can you give us an idea how much per acre it would cost to take the timber out of the swamps?—I can give no idea, but perhaps £1 or £1 10s. would clear the average acre.

52. And enable you to till it to a foot deep?—Probably.

53. When you say that you think it would not do to take several crops running, could you do it if you manured the land?—You could if you put in the proper amount of time; otherwise the expense of cultivation in the following year would be as great as in the first year It is necessary to manure in each year

54. Do you know whether you can grow sugar-beet within a certain distance of the sea?—No, I do not know anything about that.

55 You think that the success of the proposal would largely depend upon the cheapness of labour?—The cheapness of labour and the contiguity of the central receiving-station.

56. You would want all other conditions very favourable?—Yes.

57 *The Chairman.*] There is a difference in the quality of the country where you experimented at the Waipa Flats and the Thames Valley?—Yes, there is a great difference.

58. *Mr Buchanan.*] Is not the level soil of the Waipa Flats considerably mixed with drift pumice?—Not as far as I know

59. Is a little pumice not an advantage rather than a disadvantage, inasmuch as it enables you to work the soil in a freer way?—It keeps the soil from caking.

JAMES ALEXANDER YOUNG, Dentist, and Mayor of Hamilton, examined. (No. 2.)

The Chairman Will you be kind enough to give the Clerk of the Committee your full name?

Witness James Alexander Young, dentist, and Mayor of Hamilton. I have been sixteen years resident in the Waikato. I am interested in agriculture and farming, and fourteen years ago I interested myself in the sugar-beet movement, and ever since then have made a considerable study of the subject. As far as I know, there is only one other gentleman in the Waikato who has taken a deeper and keener interest in this subject, and he is Mr W A. Graham, of Hamilton. It is regrettable that Mr Graham is not at present in New Zealand, as he would have been very

pleased to come before this Committee. It has been demonstrated in other countries, with climate, soil, and labour-conditions similar to our own, that sugar-beet can be grown successfully, and consequently I feel there is no reason why it should not be accomplished in New Zealand. In Mr Graham's absence and on his behalf I should like to put in a pamphlet which he published in 1908 on beet-root culture (Exhibit 1). I have grown beets myself at different times for experimental purposes, with a view to demonstrating that it is possible in the Waikato to grow sugar-beets so that they will return a profitable percentage of saccharine matter, and, if carried out on an extensive scale by the settlers, it would pay them. I have a full knowledge of the difficulties in the way of the successful establishment of the sugar-beet-root growing industry I will explain them to you a little later, but first will suggest what I believe to be the only way in which they can be overcome. It relates principally to cultivation, and in that respect there is from my observation more or less prejudice at first to be overcome on the part of the average farmer in regard to agricultural innovations. It will necessitate on his part something entirely new in the methods of field-cultivation for a root crop Waikato is, of course, noted for its ability to produce prolific root crops of all kinds, but for the successful growing of the sugar-beet-root special cultivation is necessary Knowing that difficulty, my opinion is that, in order that the settler on an ordinary-sized dairy farm may satisfy himself as to the proper method of successfully growing sugar-beets, he should, first of all, not grow them for sugar purposes, but as a winter feed for his stock. We have settlers in the Waikato who have for a number of years been growing sugar-beet-roots with that object in view, and I take a typical settler, Mr John Davies, of Kirikiriroa, within three miles of Hamilton When I received word on Tuesday night that I should be wanted to give evidence before this Committee, I made it my business to call upon Mr Davies and get the latest results of his work. These are the notes I made from my conversation with Mr Davies. He has grown beets for the past fourteen years, each year as winter fodder for dairy cows. He states that all kinds of stock relish them—cows, pigs, and horses. As a feed nothing can compare with it except quantity There is no other root crop to come near it for quality He grows swedes, carrots, and mangolds each year, and has no hesitation in stating that sugar-beet-roots are far superior in feeding-quality He throws the roots whole to the stock, and they eat them with relish. He cultivates by ploughing in the early winter, say, six inches, on heavy soils he subsoils, say, another six inches. Soil is a great factor in determining the extent of cultivation necessary —for instance, land of a sandy nature he does not subsoil; it is very easy, and costs little to work. He gives his land thorough cultivation, sows seed in October, and gives liberal supply of artificial manure. The money spent, so he says, in fertilizers more than pays for itself in the crop He estimates his average return at 20 tons per acre. This year his mangolds would not keep, neither would his swedes, but the sugar-beet kept well, and some now are quite sound. I should like to say that, as far as the Waikato is concerned, Mr W A. Graham as early as 1887 took up the idea of establishing the industry in New Zealand. The movement became very popular, but for some reasons it dropped. In 1895 I became interested in the matter, and I was satisfied that it had great possibilities for the State. In 1896 the settlers took up the idea in real earnest, and guarantees were given to the promotors of a company who undertook to establish a factory for the industry in Waikato. The position was this I was one of those who guaranteed an area of beets for the proposed factory When we came to look into the whole thing the guarantee necessitated a joint and several bond for the full area by all of us who agreed to grow beets. As the company would insist upon that clause, our experience suggested, and our bankers advised, that we should not touch it, because the company would require the whole area of 1,500 acres cultivated within thirty or forty miles. Now we come to the present position. Since 1896 I have taken much interest in the scheme, and I have grown roots. I have also acted as secretary to an organization set up in the Waikato which endeavoured to get the Government to give us seed for distribution. I have a letter from the Stock Department dated the 12th September, 1901: "In answer to yours of the 2nd instant, I beg to say that the Secretary for Agriculture has been advised of the desire of your Committee, but if seed is not now in the colony it will be too late to get a supply for this season. However, a small area of roots will be grown at Ruakura, and results recorded." I received another letter from the Stock Department at Auckland dated the 19th October, 1901 "Yours of 6th instant to Inspector Ross *re* sugar-beet seed. I have written to the Secretary for Agriculture *re* the seed, and he replies, 'The Department has no sugar-beet seed for distribution.'" The farm put in a small crop of beets at that time, and, as they did not appear to make satisfactory growth, the authorities did not permit the crop to grow right through, but ploughed up the ground and put in some other crop. This was a disappointment to many of us, who had hoped to have the cause of that failure carefully recorded for future guidance. Of late years, however, I am satisfied that everything is done at Ruakura to assist farmers to investigate the cause of any failure, so as to apply the remedy I grew beets in 1902, and I sent some to the Agricultural Department, and I received a letter, which I have not now in my possession, as I gave it to Mr Graham, but the Department wrote to say that "As the beets which you sent showed an abnormally high percentage of saccharine matter, would you please send a further sample for analysis?" I sent further roots, and the Department replied on the 12th September, 1902, "Yours of 10th instant *re* beet-roots: I have to thank you for your promptness *re* these roots. The information you have so kindly given will be forwarded to Mr Aston for his information." I picked out some roots, and no special care was taken in selection other than that a "transplant" was so marked. These roots I sent down to Wellington, and in October, 1902, I received the following letter: "Analysis of Sugar-beet: Mr Aston gives the following results: The sample of sugar-beet marked 'Transplant' contained 14 per cent. of sugar; the other sample contained 18·7 per cent. Both the results are satisfactory'—E. CLIFTON, Inspector of Stock in Charge." At that time another proposition was got up with a view to establishing the industry in Waikato, and I received a letter written by Mr John St. Clair in Auckland proposing to establish

the industry in Waikato (Exhibit 2). The company would pay £1 per ton for the roots, but they would pay the farmer only 10s. for the roots supplied, and the other 10s. would go into the company for shares. I have here a cutting from the *New Zealand Herald* containing a report from Wellington of the 14th July, 1906. It might be interesting to hand this in to the Committee, because it refers to the sugar-beet industry 'Mr B. C Aston is preparing a report on sugar-beet for the Minister of Agriculture. In addition to the Waikato experiments he recommends that the Department should undertake trials in other districts with various classes of fertilizers, according to locality As far as climate is concerned, he does not see why sugar-beet could not be grown anywhere in New Zealand, provided the soil is favourable. The Waikato has the advantage of a large amount of sunlight, and a soil of medium texture, and rather free from saline ingredients. Sugar-beet absorbs salt and alkalies very readily, for it was originally a seaside plant, and those substances prevent the crystallizing of sugar One per cent. of salt will prevent the crystallizing of 5 per cent. of sugar Another use of the sugar-beet is for taking alkalies from land, and this was being done with some success in America. Beets will grow vigorously in salty soils, where nothing else will thrive, and thus the ingredients poisonous to other plants may be gradually removed. Land of this class is comprised in the Maniototo Plain, between Taieri and Naseby This is the bed of an ancient lake which left salty deposits when it dried up. Sugar-beet could be grown to clear the soil, and the roots, while they effected valuable scavenging, would be serviceable as feed for cattle." I should now like to give you some figures which I have submitted to reliable and practical farmers in our district, and I believe they can be taken in the aggregate as a fair cost of cultivating an acre of land in sugar-beets. Take, for instance, the paddock we are going to lay down is in grass. Skimming the ground, say, per acre, 6s., cultivation twice, so as to stir up the weeds and keep the rotting process going, 3s. per acre, main ploughing, not less than 6 in. deep, 8s. per acre; subsoiling from 6 in. to 8 in., 8s. per acre (this subsoiling depends upon the class of country you are working: in clay or heavy soil it is absolutely necessary to subsoil), discing, 1s. 6d.; tine-harrowing, two strokes, 2s., seed and manure drilling, 2s., seed, say 5 lb. per acre, at 2s. per pound, 10s., fertilizers, artificial (this depends greatly on the soil), say 5 cwt. to the acre, at 7s. per cwt., £1 15s.; hand-hoeing and weeding, say £2 per acre (in this connection you would chop out the roots to about eight or nine inches between); harvesting, say (safe estimate), £2 per acre. That will come to about £7 15s. 6d. per acre. I have not added to that the rent of land valued at £20 per acre, at 5 per cent., £1 Total cost to produce one acre of sugar-beets, £8 15s. 6d. In America the cost varies from £6 to as high as £10 per acre. From my own growing my calculations have always worked out at 20 tons per acre. Average crop, say, 18 tons to the acre, at 16s. per ton at the factory, £14 8s. In regard to the two items hoeing and harvesting, these are estimates only, and would be subject to some fluctuation. I have endeavoured as far as I could to make out fair calculations, so as not to mislead the Committee and public. That leaves, roughly, a net profit of £5 12s. 6d. per acre. I have to add to this, in addition to the above, the farmer will have his root-pulp back, which should be worth not less than 2s. per ton, and with careful cultivation he is more likely to get 20 tons per acre than 18 tons, and where the factory would pay £1 per ton for roots the farmer would net on the above £11 4s. profit per acre, but, of course, increased yield would increase the cost somewhat. I have not considered railway or river freights. A great advantage arising from the beet-culture is the increased productivity of the soil afterwards. That is shown by the American State Colleges' experimental farms, and Mr Graham demonstrates it in his pamphlet. I have here from farmers in the Waikato a number of letters referring to this question of sugar-beet in the Waikato, which I will hand in (Exhibits 3–7). The gentleman who gave evidence before me stated that he had, without success, attempted to grow beets at Te Kowhai. I have a letter written on the 12th October, 1901, from the President of the Farmers' Club in that district, Mr S Fullerton, which I will also hand in (Exhibit 8). I should like to put in a copy of a letter of my own written to Mr Tucker, in reply to the difficulties he points out. Mr Tucker is a farmer at Cambridge. (Exhibit 9) In evidence given before a parliamentary Committee in 1877 Mr Joyce was asked the question, 'Is the sugar considered to be equal in quality to that made from the sugar-cane? ' and he replied, "No, it is not supposed to be of quite such good quality" That is an absolutely incorrect statement, because sugar is a chemical, no matter what it is made from. I would like to put in at this stage a portion of a letter from the German and Austrian Consuls in support of my statement. It was written to the Chairman of the Waikato Beet-root Growers' Association in 1901: "We will get you the best seed—that is the easiest. We cannot supply you with a sample of beet-root sugar We do not think—in fact, we are sure none is coming to this market; the Colonial Sugar Company is taking good care of that. As we told you before, sugar is sugar Refined sugar is refined sugar, whether made from cane, beet, or old boots, for the matter of that; it sweetens according to the degree it is refined, notwithstanding all that you read in the ignorant Press to the contrary We shall be very pleased to help you and the farmers in every way we can." I should like to point out some of the objections which have been urged to the industry One of the difficulties has been the necessity for deep cultivation; another objection is the labour of thinning out and transplanting, another objection is carting on the roads (say, 5 acres, at 20 tons to the acre—that is 100 tons to be carted), another objection is the sea-air, as chlorides and alkalies in either the air or soil destroy the sugar in the beet-root, and another objection might be urged, the railway freight on the roots. At Maffra, in Gippsland, Victoria, the industry has been a failure. The failure has been due in the first instance to insufficient cultivation, secondly to improper harvesting, and not sufficient roots, as well as faults in the manufacture of the sugar Another objection was that the factory was put down in a rich district where the land was held in large blocks mostly by graziers as cattle-fattening runs. At present the Victorian Government own the plant. I should like to read an extract from the Melbourne *Age*. It is a short extract dealing with the question of that failure. "At a meeting

of the Maffra Agricultural Society on Friday a paper was read by Mr F E Lee on the sugar-beet industry The money invested so far, he said, was gone beyond redemption, but against this there was a complete plant. Farmers had gained knowledge in the cultivation of the roots, and had become acquainted with the value of the by-products for cattle-fodder, and from the experiments that had been conducted could gauge the value of the crops their land would yield. Chief amongst the causes of the failure of the undertaking was the insufficient cultivation of the land, and inability to harvest the crop and deliver the roots at the proper time. He would recommend a minimum price to be paid of 15s. per ton for beet containing 12 per cent. of sugar, and that the Government give a bonus of 2s. per ton. He thought beets could be profitably grown at 17s. per ton. The average of the thirty-five experimental plots grown this season was 13·45 tons per acre. On the motion of Mr J McDonald it was decided, 'That the Government be asked to send an officer to inspect this district, with a view of acquiring an area of land for closer settlement, upon which sugar-beet would be grown.'" Since the above, the latest advices from Melbourne indicate that the Victorian Government's efforts this year to re-establish the industry are very satisfactory, over 900 acres are under crop. In a parliamentary paper published by the New Zealand Government in 1897 a report was put in of beet cultivation in California, and I think it would be advisable to put in a portion of that report to this Committee. It deals with a specific case. (Exhibit 10.) I should like to say that for sugar purposes any beets which produced less than 12 per cent. of saccharine would not be desired at any factory I have from the State Experiment Station at Laramie, Wyoming, United States of America, the official document issued by the University of Wyoming, which I will put in (Exhibit 11). These are the market rates of sugar-beets at Grand Island, Nebraska, and are the results at the factory in 1892 On 12 per cent. sugar at 12s. per ton they paid £9 per acre. On 16 per cent. of saccharine matter at £1 per ton they gave £15 per acre. On 20 per cent. of saccharine matter they paid £1 8s. per ton for the roots. That gave a return of £21 for the acre. The by-products are valuable, and beet-pulp is used as a cattle-feed. Here I have an official statement from the Oregon State Experiment Station of 1898. I will hand it in (Exhibit 12). I have at times also been in correspondence with the University and State Agricultural Experiment Stations of Washington, Ohio, and Wisconsin, U S.A., and have studied many of their official Bulletins on sugar-beet-root culture. Now comes the question of the illustration of roots. Evidence has been given before your Committee to the effect that Waikato produces finger-and-toe roots. There are various reasons for it, but the main reason is want of proper cultivation. The ideal beet-root looks like a parsnip. If the tap-root strikes a hard subsoil it turns round and becomes crooked and the growth is interrupted. That is one of the causes making for the finger-and-toe condition of the root. Now, another cause is worked-out ground that has not been properly fertilized or rested. Another cause may be that your seed is inbred too much. You want to remember that the sugar-beet is a highly cultivated product, and is in fact a thoroughbred. We have very little chance of getting seed sent out to New Zealand that is reliable. I should like to put in two photographs, because they bear out what I have stated (Exhibit 13). I have here another illustration of typical roots grown in the United States with the tops cut off (Exhibit 14). I should like to say from the evidence that I have now given you, you can see that the cultivation necessary is of a special character and it would be necessary before the farmers attempted to grow beets for sugar purposes to be quite satisfied as to what they would have to do. I would suggest that the New Zealand Government take up this question, and that they send some one who would go to the United States to study the industry and come back and report to the country itself, or, instead, get an expert from either the United States or Germany In view of the past failures that have been made in other parts of the world, that seems to me a correct position to take up With that statement I conclude my evidence, gentlemen.

1 *Mr Okey*] I think the Committee should thank Mr Young for the way in which he has put the question before them. I should like to ask your opinion as to what you consider the best mode of carrying on this work—whether it should be a co-operative concern for growing and for manufacturing?—The position is that wherever attempts at co-operation have been made they have not succeeded. I am speaking of the United States. The feeling is growing in the States, and it is recognized, that eventually the industry must become a co-operative one.

2. You mean that a factory must be established that cannot carry on without the aid of the settler, and they have to enter into binding agreements, which must be clear against the land itself, to fulfil their part to grow the roots?—It will eventually come to that, unless a company grew the roots itself From my knowledge of it, my opinion is that there is little chance of establishing it on a co-operative basis in this country, as the capital required is so large.

3. You will see by the Bill that it is proposed to give a bonus. Who should get this bonus, the manufacturer or the grower, or should it be divided?—The proper way would be to give the bonus to the parties who manufacture the sugar and put it on the market. The risk is not taken by the settler; the risk is taken by the people who put their money into the concern, because they would have £100,000 or more in it.

4. You would suggest that the company should enter into an agreement with the grower that they would take the roots at a certain price?—Yes, in this way: I understand that capitalists are now prepared to establish the industry in New Zealand, where the climatic conditions are such that the farmers will grow a specific amount of roots for what they call a "campaign." In Waikato we have had Russian and German experts testing our soil and our water, and your own departmental chemists have clearly stated that our soils are free from alkalies and salt ingredients, which is a very essential feature for sugar-beet-root growing for commercial purposes.

5. What amount of land would it take to keep one of these factories running?—It would require 5,000 acres in annual cultivation for a factory to deal with 750 to 1,000 tons per day—that is, 20,000 acres would be involved on a four-year course.

6. *Mr Hall.*] You say that it requires an area of about 20,000 acres to carry on a factory?—Yes.

7 Must the soil necessarily be twenty-five miles from the factory?—I am glad you have mentioned that point. We have now an illustration of where they are growing sugar-beets in England, and sending them across to Germany, and selling them at 16s. per ton; and I presume it is profitable to them. If English farmers can send their roots across the German Ocean and get 16s. per ton, we ought to be able to grow them in this country and send them by rail. In America roots are sent over eighty miles by rail.

8. The factory would have to be in a waterway or near a railway-station?—Yes.

9 Can you point to any area of land that you know of where it would be practicable to start a factory?—Yes, quite a number in the Waikato. In the Waikato we are particularly well served in the matter of facilities for transport. Apart from roads, we have the Waikato River from Cambridge and the Waipa River from Pirongia right down to the Waikato Heads, all a navigable waterway. We also are well served with the railway, and have plenty of coal in the district, and the right kind of limestone for sugar-manufacture.

10. You have allowed £2 per acre for the lifting of the crop and carting to the factory Now you say that 12s. per acre would be absorbed in the lifting and topping?—Roughly speaking, yes. That, I understand, is the Ruakura estimate.

11 You have 18 tons of material to cart and to rail to your factory for the remaining £1 12s. Now, this 20,000 acres must necessarily be a considerable distance from the railway I would ask you if it is practicable to carry 18 tons of crops many miles over a road, and then pay for the railage to the factory for the remaining £1 8s. per ton that you allowed for it?—The answer is, it can be done in other countries, and there is no reason why similar results could not be obtained in this. I have not calculated railway charges.

12 Where do you get the metal for the roads?—For the Hamilton Borough we get our metal from Te Kuiti, and our metal on the street costs us 8s. per yard. A great number of the roads are metalled with gravel. We have no stone in the Waikato, say, within a radius of twenty miles of Hamilton. We have no hard road-metal, but we have plenty of gravel, which will stand fairly heavy traffic, but, of course, we prefer the hard Te Kuiti stone where we can get it.

13 *Hon. Mr T Mackenzie.*] Unfortunately I was called away, and I have not had the advantage of listening to all your very valuable evidence, but I should like to put one or two questions to you. I note you say the experiment at Ruakura was a failure?—That was about 1901, but of late years, I stated, we have every confidence that the work done is first-class and satisfactory to the district.

14. The yield per acre—do you know what that was?—I have not the figures.

15. The question of comparative costs: Your estimate is that it takes £8 15s. 6d. per acre to deliver Have you worked out that on the basis of the results—that is to say, with the present price of sugar?—I have not calculated the price of sugar as sold, but the price which the factories usually pay for roots.

16. So that really you have not worked out the costs in relation to the yield from the sale of the sugar manufactured?—Not in these calculations. In the sugar-beet industry there are two totally different industries. In all the evidence you are taking you must remember that the growing of sugar-beets and the making of sugar are two separate industries.

17 You think that sugar-beet can be grown and sold at £1 per ton at the factory, and that under proper management the sugar-factory could then sell sugar to the retailer or the wholesaler at £20 per ton?—I would not be sure of my answer

18. *Mr. Buchanan.*] You refer to Mr Graham: what is Mr Graham?—He is a retired surveyor and Native interpreter, and in comfortable circumstances.

19 Has he had such experience as a farmer and cultivator of land as would lead you to intrust your money to him for expenditure?—He is rather a theoretical man, and is reputed to be more theoretical than practical. However, he has made a success of his own business. I would not intrust my money to him alone for a commercial venture, unless he had experienced business men associated with him. Mr Graham is a man who thinks a great deal ahead of the present time.

20. Now, take your own case. Have you had any practical personal experience in cultivation?—Yes.

21 In this country?—Yes, in the Waikato.

22 For how long?—For some years. I have had considerable practical experience in farming in the Waikato. Some years ago I was in partnership with a gentleman in the Waikato, farming. I was finding the capital and he was to take charge of the work. The partnership did not prove satisfactory, and I bought out his interest, and managed successfully in general farming I have grown wheat and oats and dealt with stock profitably At present I am interested in dairying, and would add that at times I have performed almost every kind of manual work on a small farm.

23. Did you reside on the farm?—No. I reside in Hamilton, and managed my business from Hamilton

24. That meant you did not have the practical direction your operations upon the farm devolved upon your manager there?—No, entirely upon myself I did all my labour by contract, and supervised everything myself In all my farming operations I was not resident on the place.

25. What the Committee wish to get at is the value of evidence of different kinds that is put before it, from the practical point of view?—In other words, I presume you want to justify or otherwise my evidence as to the lands in the Waikato. I claim that my evidence is justified on these grounds: that I have had practical experience, and I exercise an intelligent observation.

26. You say that you got your work done by contract?—Yes.

27 Does that mean that you mapped out a month's work, or a period of work, upon the farm, called for tenders, and accepted a tender to get the various descriptions of work on the farm done by contract?—Yes. I mapped out my work on the farm for a season, and it was all done by contract. I would go to Maoris in the locality, and say, "I want 20 acres ploughed," and I contracted with the Natives to plough for me. I went to people carting in the district, and engaged them to do my carting.

28. In sowing the seed, for instance, had you a servant acting as clerk of the works, seeing that the seed was put in and dealt with properly?—No, I had reliable men to whom I intrusted that work.

29. I think the Committee understood you to say that you considered 20,000 acres necessary to provide the supply of beets to a factory?—Yes, for a four-years course. That is a workable figure. Roughly speaking, with 15 tons to the acre that would be 75,000 tons from 5,000 acres. In regard to that matter, the manufacture of sugar from beets is carried on by the factory in what is termed a "campaign," lasting about a hundred days.

30. I find you say the cost of skim-ploughing is 6s.. What size of enclosure had you in your mind—I mean, how many acres?—I should say, for a small area, 5 acres. If a dairy-farmer goes in for beet, he would not care to take on much more than 5 acres at a time.

31 What considerations led you to that estimate of acreage?—The growing of beet-root is usually a small settler's enterprise. It takes work, and he may have difficulty in providing labour His resources may not permit him to furnish the necessary labour for a large area, that would be my reason for suggesting a 5-acre patch.

32. Do you know that on such a small acreage as that the cost of labour is liable to be prohibitive without the best labour-saving implements?—Yes; but, of course, a man who has brought out labour-saving implements can go in for larger acreages.

33. Would you be surprised if I asserted that on a reasonable-sized area I could perform the operation of skimming at half the cost that would be involved in a small area of 5 acres?—On a large scale, not at all surprised.

34. Would you be surprised that the cost would be about half or less?—I am certain that the price I have put in is a big price for skimming. Skimming, in my opinion, can be done for less. I submitted that estimate to a farmer in the district, and he said, "You are safe by putting it at 6s."

35. You put the cost of 6 in. ploughing at 8s. Now, what acreage would a team of four horses, ploughing 6 in deep, get over in a day on a large-sized paddock?—It would depend upon the stiffness of the soil and the quality of the team. We can get men to contract to plough at 8s. an acre without any trouble.

36. I merely asked you what acreage would a man plough per day with a team of four horses? —It would vary somewhat. It might be three or four acres, more or less, according to the ability of his team and the nature of the soil, not to mention the men.

37 Would you be surprised to find a man ploughing 5 acres per day upon a 50-chain length of furrow?—I am not surprised at anything, because he might accomplish anything

38. Would it then cost 8s.?—The man ploughing would make money out of it. You must strike a conservative estimate for small areas. I know some men ploughing who do make money; others again are always in debt and struggling along.

39. Would you put the cost of 6 in. ploughing and subsoil ploughing at the same rate of 8s. net in each case? Could you subsoil at the same rate as the ploughing?—This is what is usually done in our district: When we want to subsoil we reckon to double the price of ploughing, but I have had ploughing done at 6s. per acre. At Ruakura they estimate their ploughing and subsoiling at 15s. per acre. I am putting 16s. in the estimate, so that the expenses charged against the cultivation of an acre of beets may be fair.

40. You have given the cost in each case as the same—viz., 8s. The point is this: If 8s. is a fair cost for 6 in. ploughing, do you consider 8s. a fair price for subsoiling?—The operations go on together The extra work involved in the draught and all the rest of it—that is extra; that is where the difference comes in.

41 Would you amend your estimate for skimming when you realize that, instead of one furrow, you could have two for skimming, or three? Farmers frequently plough three furrows for skimming?—Yes; but not for a small area. Small farmers do not usually keep three-furrow ploughs.

42. Would you not amend your estimate in one case or the other? Is the whole thing not out of joint?—I should be quite prepared to amend it. I say, and I have stated all through my evidence, that my calculation for skimming is a conservative one. The man I am advocating is the small settler. It is the small settler, the dairy-farmer, you must primarily look to to cultivate in the beet-root industry

43. You put down the cost of hand-hoeing and weeding at £2 per acre how many times would you cultivate and hoe, both horse and hand, during the growth of the beet?—The first operation would be to thin out the plants, then, after that, horse-hoeing would be followed up as was necessary. There might be a big crop of weeds, and it might want horse-hoeing once or twice, or more.

44. How many times do you estimate the operations would be repeated during the growth? —That is entirely according to the growth of the weeds.

45. Would you be surprised at an estimate of £7 per acre for the cost of that cultivation?— Yes.

46. As to lifting, topping, and carting By what process would you lift prior to topping? —That depends upon the class of soil. Some you could pull.

47 Would you be surprised to hear that one of the members of the House paid a contractor 2s. 6d. per ton for pulling, topping, and lifting his crop of turnips into the cart?—No, I am not surprised at what any man could get work done for

48. You mean to say that it is feasible or reasonable to expect beets to be lifted, topped, set into the cart, and carted, say, an average of five miles, at the rate of 2s. 3d. per ton? On an 18-ton crop it would come out at 2s. 3d. per ton?—I submitted my figures to practical working farmers—men who know the value of work in the district—and I should say that they are reasonable.

49. The *Journal of Agriculture* gives the analysis of beets grown in the Waikato. Would you consider that a fair average of the percentage of sugar? For instance, take Hamilton. The percentage ranged from 10·05 to 14·05 The percentage in Raglan is 8·14 again, in Turakina, 13·57?—We do not know where the seed has come from; it may be taken from anywhere. I wrote to a firm in Wellington for seed, and I grew 20 per cent. of saccharine matter, and the seed had no history I should say these percentages are very satisfactory, considering that they have been grown by people who simply just grow the beets as a test, without any special care.

50. Would you be surprised to know that at Mr Spreckels's factory in California, considered at the time to be the most up-to-date in the world, because he had been to Germany—that all in the neighbourhood of 10 per cent. would be practically rejected—that they would not give a shilling per ton for them?—All below 10 per cent they would reject, however, it pays the farmer to feed his stock with them.

51 That could only be ascertained on presentation at the factory?—A cartload of roots is taken to the factory, and before the man leaves, and in a few minutes, the test is applied. With your permission, Mr Chairman, I should like to say that it would be a desirable thing to have experiments carried out on different farms, and invite the settlers to make complete records themselves. I took on that duty myself some years ago as the secretary of the Sugar-beet-growing Committee.

52 *Hon. Mr T Mackenzie.*] Do you think, if this Bill becomes law, that enterprising people, under the provisions of this Bill, will form a company to develop the beet industry?—I believe so. I have every confidence that they would do so. As the machinery necessary is very expensive, and can only be made in certain parts of the world, it would be a big help to the industry all round if the Government or State could see its way to allow the machinery to come in free of duty The Bill itself otherwise, I think, is very satisfactory

53 Regarding the prospects of success, is it not a fact that there is a great development in the improvement of machinery?—Yes, in recent years. There is one point in connection with machinery which has had this effect: In the earlier history of the sugar-beet one of the great difficulties in making pure sugar was the making of "invert" sugar, it formed what is called "invert" sugar But that has been entirely overcome by scientific investigation and modern machinery

54. I notice that in attributing the lack of success to the Australian venture you say that it averaged just about 8 per cent. of sugar The report I read stated that when being treated 9,000 tons showed 14 per cent. yet they only recovered half?—That was through faulty manufacture.

55. Do you think it will pay the farmers if they get £1 per ton?—Yes, in England they are sending roots to Germany for 16s.

56. Have you considered the question of getting sugar from Indian corn in preference to beet?—It is not so much the question of getting sugar that I am worrying about. What I am concerned about is the cultivation of the sugar-beet, and, knowing what it has done for other countries, I see no reason why it should not do the same thing for New Zealand.

57 There are some men who are pretty well up in the subject who now consider that from the same ground better results are obtained from Indian corn?—You must go on the practice of practical men. The inland frosts, I understand, would kill it.

58. *Mr Witty*] I understood you to say, Mr Young that what you had done yourself was mostly experimental?—My growing of beets has been for experimental purposes.

59 The most you had, I think, was 18·7 per cent.?—That was with old beets which had been lying for some time in the yard.

60. The mere fact of their being in a box would rather improve them than cause them to deteriorate?—That is a matter of opinion.

61 With regard to cultivation, I do not want to go into the ploughing as Mr Buchanan has done, but with regard to the carting I think you are altogether out of it. I have sent a good many hundred tons of swedes an average distance of three miles. We get our swedes packed and sewn up for 4s. per ton. The beets would cost just as much to cart as swedes would, or at any rate, the subsoiling would be on the same plane?—I stated this, in putting in the estimate for subsoiling that it would depend upon the soil to a certain extent.

62. You were going to form a company up in the Waikato, I understand?—Yes.

63 And you were advised by the bankers not to do so?—In this way: We guaranteed to grow so-many acres of beets, but when we came to execute the agreements we found that it amounted to a joint and several bond. The joint and several bond was then to cultivate 1,500 acres. It would ruin a man to be let in to cultivate more than he had ability to deal with.

64. As individual settlers, how do we know that you would be prepared to support the factory, supposing it was there? If anything else paid you better would you put in sugar-beet?—I am not going to grow sugar-beet if I can get anything better out of my land.

65 With regard to the factory that you say was a failure, all the return they got was about 13 per cent.?—I have not given you the Victorian return I have given you the fact that it was a failure, and the reasons why

66. If the Government were to pass this Bill, do you think there would be sufficient people go in for beet-growing to make it a success?—If that Bill was to pass to-morrow I do not think you would get the beet-root industry established for some years, it is a matter of carrying on a campaign among the settlers to convince them and teach them.

67. We had evidence this morning that it was not a success in two or three places where it had been tried by the one witness, and that most of the fibrous roots were very rough?—I pointed out in my evidence that it might be due to want of knowledge of the soil, bad seed, and bad cultivation.

68. You could not grow beet two years in succession?—No wise man would plant beet this year and also the next in the same soil, and I would not advise him to do it.

69 *Mr Field.*] Mr Graham is away?—He has gone on a trip to Fiji, and he will be back in a few weeks.

70. The question of soil. What soil do beets like best the poor lands?—In this country the best results for sugar so far are got from poor lands.

71 Light soil or heavy soil?—Any kind of soil, it is a matter of experience which you get on best with.

72. What about growing in sandy soil or swamps?—In sandy soil you save a lot in cultivation. In Waikato the land is on the whole more or less of a light nature, but we have to fertilize. The beets I have grown have always been grown in stiff soil.

73. What about this question of growing within a certain distance of the sea?—It is not desirable, because sugar is obtained by the action of the atmosphere. It is not a chemical in the sense that it is got from the ground. Any land that is subject to the open-sea breezes is not suitable for it, as the leaves absorb the salt.

74. What is the cost of manure per acre where you require to fertilize?—Manuring is, of course, another thing experience would indicate to you. I have calculated a medium supply of 5 cwt. at 7s. per cwt.

75 Are beets subject to any blights?—I have no special knowledge of the subject, but settlers have written to me to the effect that they have not been touched by the fly We have no pests in this country peculiar to the sugar-beet.

76. You think it would take some years to start this industry, and that the farmer would require to be educated?—Yes, to satisfy himself It will take a few years to accomplish the education of the farmer

77 What would be a fair-sized factory?—On the basis that I have calculated from, say, 5,000 acres annually, you would want a factory to deal with 750 to 1,000 tons per day.

78. *Mr. Okey*] What part of the year would the supply be required at the factory?—You start in the early winter months.

79. Would there be any need of a Sunday supply?—The factory would not stop, it would go night and day

80. What do you think of the proposed bonus? You can get sugar at 2d. per pound, can you not?—I have no opinion to offer on the price of sugar

81 You think we should not have competition from these large sugar companies?—This is the point: In the United States the effort to establish the sugar-beet industry has been one tremendous struggle against adversity Mr E H. Dyer, of California, who died quite recently, was the founder of the beet-sugar industry in America, and he fought and fought until he succeeded. The first great difficulty they experienced was the difficulty of cultivation, the second was that it was against the cane interests; but the beet is now triumphant. There is more beet-sugar manufactured in the United States than sugar from cane. I think it is a desirable industry to encourage. I have been in Fiji, and I have seen the work on the cane-plantations, and there it is done by coolies imported from India.

82. Beet is a white man's product?—It is the product of white labour, and beet-growers have shown that with reasonable protection they can hold their own against Asiatic growers. Again, sugar is purified or refined only in cool climates, and that is why the raw sugar is brought to New Zealand and refined at Auckland.

83. *Mr Buchanan*] You stated just now that poor land was better for beet-growing than rich land. Speaking to a well-known practical farmer in the Wairarapa a few days ago, who was born and reared in a district in France where you could not get out of sight of the chimneys of sugar-factories, he stated that the very strongest and best land was used for beet-sugar, and gives the best results, and even then they have to heavily manure, and give pretty long intervals between the crops of beet. What would you say to that?—I would say this that in France the people have had long experience and have gained much knowledge of beet-culture. It is produced there under the highest and most intense forms of agriculture, so they are able to get the best results on their lands. It stands to reason that with proper knowledge rightly applied the best lands must give the best results; every country proves that. France is probably the most noted country in the world for the intensity of its agriculture. I have a photograph of special interest at home of sugar-beet-roots grown in Waikato, which I was unable through the short notice to bring with me. With your permission, Mr Chairman, I should like to put it in, with a short explanatory note, both of which I will send along.

PAUL M. HANSEN, Director of the Auckland and Takapuna Tramway Companies, examined.
(No. 3)

The Chairman Will you be kind enough to give us your name?

Witness Paul M. Hansen. I may mention that I am not an agricultural person, nor have I ever manufactured sugar from beet myself, but I have been brought up in a district where it was manufactured, when I took a great interest in it, and got to know a good deal about it. A

couple of years ago Mr W A. Graham, of Hamilton, mentioned the beet-root-growing business for sugar to me, and after we had had a long conversation about it he asked me to look into the matter so as to compare his statements with my experience of it. Therefore about two years ago I took the matter up again, and I had a very lengthy correspondence on this matter with Messrs. Dyer and Co., of San Francisco. They control about thirty-five sugar-mills, and it is largely due to their courtesy that I am supplied with the latest figures. As far as New Zealand is concerned, the industry would be, of course, one of very great importance, and when you consider, Mr Chairman and gentlemen, that you consume in this country approximately 55,000 tons of sugar per annum, for which you pay approximately £1,000,000 sterling, you will be surprised in the days to come, when you do manufacture your own sugar, that you had not started doing so long before. This 55,000 tons of sugar would require, with beets at a rate of about 15 per cent. of sugar, about 600,000 tons of beets. Now, to grow 600,000 tons of beets you would require about 40,000 acres of land. Under the British four-course system this would really mean that the beet-sugar industry in New Zealand would employ about 160,000 acres of land. To manufacture the 55,000 tons of sugar a plant would be required of a capacity of 6,000 tons of beets per day, and the plant to manufacture the 55,000 tons of sugar would cost, roughly speaking, £1,200,000 for, say, six factories in various places. Now, gentlemen, from the investigations I have made I think it has been conclusively proved that you can grow beet-root of the right quality and quantity per acre to produce sugar, and I have come to this conclusion that, whether the beet-root industry is introduced by the Government or by a private company, the same thing should happen in either case, and that is, they would import an expert from Europe or the United States, because we have not an expert in this country who could definitely advise on this important matter The beet-root industry will either be a big success or an absolute failure. For a private company to start the industry it would, of course, require similar conditions as laid down in the second Part of your Bill, because a private concern would not for a moment risk £200,000 and buy 50,000 acres of land unless they were as certain as possible that the industry would be a success in this country; otherwise they would not start it. The beet-sugar industry carries, of course, a large number of great advantages for a country, and I have written out here in a short note the various advantages, and if you permit me I will hand it in, but I would mention that these advantages are from the United States point of view, and they have been actually experienced there, but I think we have a right to assume that they would in a similar way apply to this country "(1.) Beet-culture makes good farmers A beet-grower soon learns, if he did not know it before, that the best crop will only yield satisfactory results when it receives proper attention, the quality of the beets is especially dependent on the thoroughness of the cultural methods followed. (2.) Relative certainty of the crop: Sugar-beets are a more certain crop than most other agricultural crops, and beets are not liable to damage through rain, like potatoes. (3) Price known in advance Sugar-beets are the only crop a farmer can grow the price of which is guaranteed beforehand, so that he can feel certain at planting-time that he will get at least fair returns for his labour when the harvest is delivered. (4.) High returns per acre The returns per acre of land planted to beets will be higher than can possibly be obtained in the case of cereals, and will be likely to be as high or higher than those of any crop, potatoes not excepted, when the returns for a series of years are considered. (5.) Employment of field labourers A considerable amount of work that calls for extra help has to be done in the beet-field at the time of thinning and harvesting. This labour can be done by persons not able or accustomed to do hard field-work, as old people, cripples, women, and children, and a large amount of money is thus distributed in beet districts to such help each year, which distribution makes itself felt in all trades and business enterprises in the community The sugar-beet culture as an industry will prove very suitable to our Maori race, whose instincts are admittedly agricultural, and who are owners of large areas of very suitable lands for the growth of sugar-beets. (6 Cash basis for payment of beets The large amount of money distributed among the farmers flows into every avenue of trade, leaving its profits behind, finding its way to the banks, to be again forwarded on its beneficent mission, enlivening and enriching all branches of trade and assisting the establishment of new industries. Population materially increases; town lots command a double price, farming lands are in increased demand at greatly increased prices, bank deposits are sometimes tripled and quadrupled; debts and mortgages are paid off, and new farming-implements and pianos take their places, abundant prosperity obtains everywhere, and civilization is advanced. In the United States, Germany, and France the area devoted to beet-sugar growing has increased three or four times in value. This is the simple history of the industry wherever it has been established in a proper location for the growth of beets. (7) Value of refuse products As previously stated, two by-products are obtained at beet-sugar factories which form valuable feeds for farm animals—viz., beet-pulp and molasses. The dried pulp may be kept indefinitely and can be shipped great distances. According to chemical analysis and practical feeding experiments, one ton of beet-pulp is worth at least from 5s. to 7s. The cost of stock-feeding is reduced about one-half by using beet-pulp, while the supply of milk is increased and the fat remains about the same. Beet-pulp is also an excellent feed for pigs. About 50 lb. per head per day is a fair allowance for milch cows and steers, and 5 lb. per head to sheep ' There is one remark I should like to make, and that is this: I would never attempt for one moment to rely on the farmers for the first few years to grow the beets. They will do it by-and-by, but, to start with, the farmers would be absolutely hopeless. To begin with, they would have to be educated up to it, and that would take considerable time. The labour question is a big one in connection with it, but nowadays so much of it is done by the aid of machinery, as Mr Buchanan will no doubt know: they have invented new machinery by the aid of which only half the amount of manual labour is now required than a few years ago. To begin with, it will mean to grow beets by the 20,000 acres, but the 5-acre business for the small farmer will come. As to the second Part of the Bill, it is, of course, a matter for you to consider, but you can well understand that if

any company takes a big risk like this they naturally wish to be sure of your Government's good feeling towards them. The average cost per acre of beet-root is about £6 10s. in the United States, and I put it down at £8 per acre for New Zealand when grown on a large scale.

1. *Mr Buchanan.*] Would you be surprised at Mr Spreckels, who was in his time a most experienced sugar manufacturer and grower, stating that New Zealand was too close to the sea —that its climate did not provide a sufficiently ripening sun to develop sugar in the beet?—We have proved in New Zealand that we can grow beet-root for sugar purposes of the right quality and quantity

2. Would you be surprised at the possibility of our chemists here, who are not trained to the special analysis required for sugar, being mistaken in the percentage of sugar grown in New Zealand?—I should say that chemist should become a blacksmith.

3 Do you think that all chemists should be trained in different branches of analysis?—I should think, to find out the sugar-capacity of a beet-root is a comparatively simple matter, and I should think that a Government Chemist, as I understand Mr Aston is, should be able to provide an absolutely safe analysis.

4. What do you consider the special difficulty that a farmer would have as between beet-growing and growing mangolds, which also require thinning and careful cultivation during the whole growth? You stated that you would not rely upon the farmers, and that they would have to be educated. Is there anything to prevent an individual being shown in a very few lessons, having the right land first and the right seed, how to thin and cultivate during the growth of the beet: is there anything to prevent him being quite competent to grow the beet with a few lessons? —My reply is this: There are as competent farmers in New Zealand as anywhere else. In America you will find that each manufacturing place keeps a special expert, who goes round teaching the farmers, and this would have to be done in exactly the same way here. It has been proved that in America a farmer with no experience in beet-root crops can produce, say, 14 tons per acre; the next year, with more experience, he produces 16 and 17 tons per acre. It has been absolutely proved by statistics that the man who has been taught by experts improves rapidly The number of lessons depends upon the person himself—some would learn quickly and some would take longer

5. Have you been farming in America, and have you had any experience on the land, or is your information derived from the communications you received from Mr Dyer as to the industry in America?—I have been on the field and through manufacturing places in various countries, but I have not myself manufactured or grown However, I studied the matter so far that I can speak about it.

6. Have you been engaged in farming at all?—Never

7 Will you explain why there is so much more risk in growing beets than other crops, detailing the difficulties of the beet-plant?—Mr Young stated there were no difficulties with regard to diseases. When I handed in my statement I gave you to understand that this is the result of the American investigations, that sugar-beet is a more certain crop, and that beets are not liable to damage through rain like potatoes.

8. I think the Committee understand your point of view to be that the company that takes this up must become the owners of, say, 20,000 acres of land, and work it as a company owning the land?—They need not become the owners. They might say to your Government, 'Will you lease to us 20,000 acres for the next twenty-one years?'' Of course, the value of this land would increase.

9 Can you suggest any plan by which the company could commence operations in the Waikato district under the conditions which you have laid down to us as necessary to success?—That involves a great deal of consideration, which I could not give to it just now As to comparison with other crops, say, for instance, you grow this year potatoes, let us assume you get 5 tons of potatoes per acre next year you grow beet-root, and then grow potatoes again By then the land has been improved so much that you do not get 5 tons but 10 tons of potatoes.

10. Have you any statistics to show?—I have made a copy of one rather interesting table, which I will hand in

Crop.	Before Beet-culture.	After Beet-culture.	Increase in Pounds.	Per Cent. Increase.
	Lb.	Lb.		
Wheat	1,848	2,292	444	24·0
Rye	1,456	1,672	216	14·8
Barley	1,672	2,094	422	25·2
Oats	1,355	1,918	563	41·5
Peas	985	1,834	849	86·0
Potatoes	6,716	13,500	6,874	102·3

11 Questioning this experienced person, who was born in the beet-growing district in France, where they have had many years of experience, I understood that the beet was acknowledged to be most exhaustive in draining the soil of its fertility—so much so that it was necessary to employ the very best land and manure in order to get a good crop Your remarks would go to show that the cultivation of beet would improve the land. Could you explain?—Owing to the special way they treat it—they plough it so much deeper In America they use land for beet-root growing at the rate of £2 or £3 an acre, that cannot be good land. You are feeding the land all the time; the tops of the beet-root are ploughed into it again.

12. *Mr Field.*] What is your occupation, Mr. Hansen?—I have various occupations. I am director of the Auckland Tramways Company, and a director in several other concerns.

13. You come from Auckland?—Yes.

14. You are not in any way personally interested in the sugar industry?—Not in the least.

15. Absolutely disinterested?—Yes.

16. Where have you seen the beet growing and the operations connected with it?—In Austria and America.

17 I suppose it has been carefully cultivated and improved by experts for years?—Yes, each year It is such an important industry, there is so much sugar used.

18. The question of test: You are quite satisfied that the test is an easy one?—Yes.

19 Is it true that when a farmer delivers his beet to the factory he can have the test made without any trouble?—Say a cartload of beets arrives at the factory; they take off this cartload a small quantity of the beets, and they are cleaned, because there may be some of these beets that have much earth on them. Then they find out how much earth there is on these few beets, and they calculate this on the lot. The beets are immediately tested, but how long it does exactly take I cannot say

20. How long have you been in New Zealand?—Fourteen years.

21 Have you travelled over New Zealand?—I have been right down to Invercargill and right up north.

22. You say that you feel confident from what you have seen of this country that it is possible to grow sugar-beet successfully?—I feel confident that between Lake Taupo and Mercer there is much suitable land for growing beets.

23. In other countries, is it grown close to the sea?—Beets should not be grown close to the sea.

24. *Mr Okey*] There is no way of making small factories suit instead of one large factory?—A number of small factories would be disastrous. It would result in people wasting their money, and it would kill the industry Besides, to grow beet on a small scale is more expensive than on a large scale.

25. What about the carting question?—I looked into the question, and found that if beet-root is grown on a large-enough scale, light railway-lines could be laid down, and the beet-root sent by gravitation to the manufacturing place.

26. Suppose there could be a guarantee given, when the amount of sugar could be produced in the Dominion sufficient for the needs of the Dominion, that the tax would be put on to prevent the outside sugar coming in Would that do instead of a bonus?—I do not think that would do as well.

27 Do you think some scheme of the railway charging the same freight per ton for long or short distances would help the industry?—It would certainly help the industry Of course, as the industry would grow, no doubt two or three more plants would be established in different districts.

28. Suppose you took a ton of beet to the factory and you found it below the average, would that be the test of the field?—Not necessarily, but now you go into matters which we have not had sufficient experience of in New Zealand.

29. Would the air affect the amount of the saccharine after it has once been pulled?—No, it would not. When they take out their beet-root in America they put the beet in heaps if it is not at once required, and they put a slight covering of earth over it, and leave it for weeks sometimes.

30. Are the by-products only worth about 2s. per ton?—In America they get as much as 7s. per ton

31 Would that be manufactured at the factory into anything?—They just make cakes of it, and they can be sent to Australia or England and used as feed—mixed with hay or chopped straw

32. Would the same plant as is used for cane-sugar do, or would you want a different plant?—No doubt a somewhat different plant, but, really, as I have not sufficient knowledge of the cane-sugar industry I cannot say definitely

TOM WALLER LONSDALE, Farmer, and Acting-manager of the Ruakura State Farm, examined.

(No. 4.)

The Chairman What is your name, please?

Witness Tom Waller Lonsdale.

The Chairman Your occupation?

Witness Farmer I am the Acting-manager of the Ruakura State Farm. Mr Chairman and gentlemen, after the evidence given by the preceding witnesses there remains very little for me to say I suppose the chief thing that I can do is to give the results of the experiments at the Ruakura Farm during the last few years. I can only go back to the season of 1906, my first season there, and find we put in one acre along with the ordinary crop of mangolds in the same paddock. The cultivation was just ordinary cultivation, which we would give to any root crop, but our crop there followed oats. Of course that was necessary, as, bringing new land into cultivation, our crop had to follow oats. The method pursued there had been to sow on ridges, as we happened to have an implement which ridges the land, and it will also sow the seed at the same time. As regards cultivation, the plants are all singled, and afterwards hand-hoed, and every few weeks thoroughly cultivated with horse cultivation The result of that year's crop was 15 tons per acre of beets, in 1906, and that gave an analysis of close on 17 per cent., approximately In 1907 we again grew sugar-beet, following the same lines as in the preceding year The seed that we used was specially sent out, amongst other seeds, by Messrs. Sutton and Sons,

and was "Sutton's Improved." The return for that year was 20 tons to the acre, and the different roots gave an analysis of sugar contained of from 12·45 per cent. to 17·73 per cent. The fertilizers used were 2 cwt. blood and bone manure for this latter season, and 2 cwt. superphosphate and 1½ cwt. dissolved bones per acre. For the crop of the preceding year the manure used was 6 cwt. of blood and bone per acre, nothing else. The weight of roots averaged from 1 lb. 6 oz. to 7 lb. 11¼ oz. In some instances there were places left blank, which accounted for the larger roots. Of course, it is not necessary—in fact, it would not be the general course of proper cultivation—to put in the sugar-beet after oats. I should prefer it to follow peas, &c. I think the matter of constant cultivation has been gone into, has it not? I estimate approximately £10 per acre for lifting and delivering the crop to a distance within two miles of the paddock. There was one slight error Mr. Young made—he put the cost of carting at 12s. per ton. I think Mr Young must have been under a misapprehension, as I make it 12s. per acre on a 15- or 20-ton crop per acre. There is another item with regard to sugar-beet growing—I think it has been mentioned by Mr Young: it is absolutely essential to get pure seed. It requires an expert to detect mangold-seed from sugar-beet seed; therefore you must get the seed from a reliable source—any one who intends to grow beet for sugar purposes.

1 *Mr Buchanan.*] You think that, treated upon a commercial basis, growing from 5 acres upwards by the ordinary farmer, £10 per acre would not be an excessive estimate for the cost of cultivating during the growth, &c., including delivery to the sugar-factory?—No, I am certain it would not. He must allow for the rent of his land, and I do not suppose he would attempt to grow sugar-beet on land leased at less than £1 per acre.

2 Would you expect to be able, in the Dominion, circumstances being as they are, to get woman and child labour for beet-cultivation?—No, decidedly not.

3. Have you given any close attention to the question of analysis of the percentage of sugar—as to the getting of the percentage by analysis?—No; that is a subject which I have not studied thoroughly

4. Would the £10 per acre cover the cost of pulling the roots, topping them, and delivering them to the factory?—Yes, if the factory were not situated more than two miles away from the paddock.

5. I have an estimate here of £9 14s.: you name £10 as a safe cover?—Quite so.

6. With more reliable seeds you could get better results?—Yes, I dare say, if you had the seed reliable.

7 How much did you allow for rent when you estimated the £10?—I allowed £1 per acre.

8 *Mr Field.*] You are satisfied that better seed is obtainable than the seed you used?—I am not satisfied on that point, because the seed we used was imported from Sutton and Co. They are as reliable as any, I should say We have now seed on the farm which has been imported from California, and that we shall look upon as absolutely pure.

9 Do you know Mr Craig?—No.

10. Would you judge that he has made an attempt to grow sugar-beet by the best possible methods?—His evidence was almost completed when I came in, and I cannot say

11 What do you say as to the fitness of the large area of the Waikato land for sugar-beet growing?—I should say that it is quite suitable.

12. What would you say as to the merits of sugar-beet for stock, as compared with mangolds?—It is good sound-keeping roots, but we do not produce so much per acre.

13 In your experience of growing beet, have you produced always good sound roots?—We have always grown a very good class of root.

14. Do you know anything about the effect of sea-air upon beet?—I do not.

15 *Mr Okey.*] Do you think the percentage of saccharine in the beet will depend upon the previous crop?—That is rather a deep question, which I should not be prepared to answer

16. What month do you put in?—October

17 What distance do you plant them?—We make the rows about 26 in., and then thin out the plants to a distance of 9 in., not more.

18. You have not got the cost of growing, independent of the pulling, I suppose?—Yes, I have. I have estimated the whole cost of ploughing a paddock at £1 per acre: that was giving two ploughings and, if necessary, a subsoiling It requires to be well disced at least twice, which would be 3s., at 1s. 6d. Then three good harrowings, at 1s. per acre. Probably rolling twice after the harrowing—that would be 2s. Cost of seed and drilling, 12s. I have allowed liberally for manure—7 cwt. at 7s. per cwt. Singling out, twice hand-hoeing and horse-hoeing at quite £2 10s. per acre. Of course, the cost of manuring, at £2 9s. per acre, seems high; but this manuring would not be necessary if your preceding crop had been one which left some residual manure in the land.

19. *Mr. Buchanan.*] Would £10 per acre, cost of cultivation, include cost of manure?—I have allowed for that. I have allowed up to 7 cwt. per acre.

APPENDIX.

EXHIBIT 1.—ADDRESS BY MR. W A. GRAHAM ON THE BEET-ROOT SUGAR INDUSTRY

The Special Adaptability of Waikato Land

Twenty years ago I had the honour of addressing a meeting of Waikato farmers and residents upon the important subject of sugar-beet-root culture in Waikato, at Ohaupo, on the 23rd August, 1887, and the objects I have now in view are the same as they were then—to again impress upon Waikato townsmen and countrymen the great field for advancement with which the Waikato district is endowed by Providence in her soils, climate, rivers, limestones, timbers, and coals, and her special adaptability for sugar-beet-root cultivation and the manufacture of sugar therefrom. In 1887, twenty years ago, the consumption of sugar molasses, &c., in New Zealand was about 20,000 tons per annum; in 1906 it exceeded 40,000 tons. New Zealand can never produce sugar-cane for sugar-manufacture, neither can she ever manufacture sugar from sorghum cane. She must therefore continue to import all the sugar she consumes unless the sugar-beet-root industry is established in Waikato. New-Zealanders consume 107 lb. per head per annum (see New Zealand Department of Agriculture Report for 1907, page 100). This is all imported cane-sugar although they possess in Waikato a premier field for sugar-beet-root cultivation and beet-sugar manufacture. This is a fact worth attention, especially for Waikato landowners and business men to consider

Twenty Years ago.

Twenty years ago, at the meeting of farmers at Ohaupo, Waikato, Mr George Edgecumbe, then the proprietor of the *Waikato Times*, and the late Mr Von Stürmer were appointed by the meeting to assist me to collate from my address at the time such information as would be useful for the farmers and others willing to co-operate with a sugar-beet factory to be established in Waikato. This was done, and printed in pamphlet form. Twenty years' further experience and study of the question and the results of actual experiments made only adds to the conviction then formed, that in the sugar-beet-root culture and industry rests the future greatness of the Waikato district. Her goldfields, forests, and other natural resources may become exhausted at a more or less early date, but her agricultural and her dairy industries can never be exhausted so long as industry itself and British law and enterprise prevail. Twenty years ago our dairy industry was in its infant stage, and the sugar-beet-root industry and co-operation between townsmen and countrymen was then advocated in the interests of the dairy-farming industry It is the object we still have in view In 1887 (twenty years ago) New Zealand exported very little butter (if any), in 1896 she exported 16,000 tons, valued at £1,560,000, and she exported 130,000 cwt. of cheese, valued at £340,000. In 1885 the total value of butter and cheese factories in New Zealand was only £44,000, in 1900 it had increased to £1,260,000 In 1905 there were 264 butter and cheese factories, valued at (with repairs) £2,100,000, operating on materials valued at upwards of £2,000,000. The interval of twenty years of continuous progress should form a sufficient base from which to make our calculations for the future demands and progress of our dairy and agricultural industries in Waikato and the Dominion as a whole, and as a home market for agricultural produce and manufactures.

Professor Murphy on New Zealand.

Speaking generally of agriculture in New Zealand, Professor Murphy, F.L.S, is quoted in page 451 of the New Zealand Official Year-book for 1900 as follows: "It is generally admitted that there is no part of the British dominions where agriculture, in its widest sense, can be carried out with so much certainty and with such good results as in New Zealand. The range of latitude, extending as it does from 30° to 47° south, secures the colony a diversity of climate which renders it suitable for all the products of subtropical and temperate zones, while an insular position protects it from the continuous and parching droughts which periodically inflict such terrible losses on the agriculturist and pastoralist of Australia and South Africa. Again, the climate, although somewhat variable, never reaches the extreme of heat and cold, so genial, indeed, is it that most animals and plants, when first introduced to the colony assume a vigour unknown to them before."

Imported Tobacco.

The amount of tobacco imported into New Zealand in 1906 was under 42,000 lb. of unmanufactured leaf, valued at less than £2,000, whereas manufactured tobacco imported amounted to 2,044,000 lb., valued at £198,000; cigars, 68,000 lb., valued at £25,000; and cigarettes, 2,500,000 lb., valued at £105,000—a total of upwards of £330,000 imported tobacco for the year Waikato has proved herself capable of producing the finest tobacco-leaf for manufacturing purposes, and therefore tobacco will form an important item in the sugar-beet-root industry, as it will become one of the alternating crops in lands suited to its production

The Flax Industry

The New Zealand flax industry (*Phormium tenax*) is only in its initial and experimental stages still, as with sugar-beet, but it has already, owing to raw material at hand (which source of supply is fast disappearing before the face of settlement of our waste lands), made great progress as a fibre in the markets of the world during the past twenty years, and this industry is also an associate of the sugar-beet-root industry of the future, as the lands adapted for cultivation of the sugar-beets for sugar purposes will, when thoroughly farmed, be found to be adapted for the

cultivation of high-class silky fibre of the *tihore* and other special high-grade flax-plants not known to general commerce of to-day, the fibres from which, when properly handled and understood, will reach £100 per ton. Nevertheless, the value of the flax industry for 1906 is given in the Official Year-book of 1907 as £776,106. It was only £20,000 in 1886.

Sugar-beet Values and Benefits.

In advocating the sugar-beet-root industry for Waikato specially it must be understood that, although great importance should be attached to the extraordinary sugar values of Waikato-grown sugar-beets, nevertheless the actual sugar value is the least of all the values to the producer of the sugar-beet-roots and to the district as a whole where the sugar-beet-root industry becomes firmly established, as the sugar itself can only be reckoned upon at cost-price when refined, and therefore the refiner (that is, the capitalist) must be consulted, and his capital invested made as safe as practicable in the price demanded for the raw material and certainty of supply All interests in the district, public and private, are therefore at stake in the success or non-success of their sugar-factory, for, independently of the sugar value itself, though great, the Waikato farmers' gain from the establishment of the sugar-beet-root industry in Waikato will be in their improved position in the dairy competitions of the world in their winter dairies, and to Waikato generally in their meat freezing and preserving works, especially in the early-lamb portion of that industry, in butter and cheese, ham and bacon, sawmills and sash and door factories, grain-mills, flax-mills, woollen-mills, furniture and cabinet making, coachbuilding, biscuit, brick and tile and pottery works, agricultural-implement factories, chaff-cutting, sugar-boiling and confectionery, tinware-factories, woodware and turnery, lime and cement works, rope and twine works, fruit-preserving works, jam-factories, chemical works, electric-power lighting works, shirtmaking and worsted factories, spouting and ridging works, hosiery-factories, steam launch and boat building; sauce, pickle, and vinegar factories, sail, tent, and oilskin factories; hat and cap factories, brush and broom factories, mattress factories, paper and paper bag factories, box factories, and other numerous small industries in which a few are joined together, also perfect water and transport services of a local character and communications. The sugar-beet-root and dairy-farming assuming the foremost position in this district, and the farmer, as he should do, farming the land scientifically and economically, it will become the base for stability and extension of the Dominion of New Zealand in the Pacific.

The Ideal Sugar-beet Field.

There are doubtless large areas of land in New Zealand suitable for sugar-beet-root cultivation, but for the pioneer factory for sugar-manufacture the central Waikato basin, from Huntly to Morrinsville, Cambridge, Te Awamutu, Alexandra, Whatawhata, Ngaruawahia, and Taupiri is the ideal sugar-beet field in the Dominion of New Zealand. Its fresh-water rivers, Waikato and Waipa, navigable to Cambridge and Alexandra respectively, and their waters having been analysed for the special purposes of sugar-manufacture, and certified to be suitable, with its district lime-works at Te Kuiti, producing lime by analysis 96 per cent. carbonate of lime; its coal-mines at Huntly, very suitable for the purpose, connected by rail and river-steamer, and with soils that have now been placed by careful official tests and practical proofs beyond question or doubt as to their being suitable for producing sugar-beets of very high value in sugar up to 21 tons per acre, and with a home market for all the sugar she can produce, without competing with the only cane-sugar company at present in existence in the Dominion, and which is in a most flourishing condition—the Waikato central basin must be admitted by all to be the most fitting locality for the pioneer beet-sugar factory in New Zealand.

The Prospects of the Industry

The fruit and poultry industries will reap great advantages from the sugar-beet-root industry, and these industries will become of ever-increasing value to the Dominion. But the great consideration in favour of establishing the sugar-beet industry is the fact that sooner or later New Zealand must import largely, as Great Britain has had to do to maintain her commerce with the world and her population at home—for that New Zealand will become a great manufacturing and maritime centre no one can doubt, but her area is so limited as compared with Australia and the great continents of America, South Africa, and Canada that she can never expect to rival these vast countries in quantity where land is so cheap and capable of fattening stock on natural grasses. Nevertheless, New Zealand is admitted to be exceptionally fertile and free from droughts, and is capable of producing the highest class of stock and agricultural products; therefore quality, not quantity, will be her motto. Her lands will become of such high values that they will have to be well farmed and liberally treated to enable them to pay interest on outlay and value. The sugar-beet-root culture, producing crops of from 15 to 20 tons per acre, containing by analysis 16 per cent. of sugar, with a factory established in the district to purchase at cash sugar values, the roots will provide the industrious farmer with ready money to pay for the labour and manure to make it possible for his homestead farm of 25 acres to pay and support his family in comfort, by producing a superior class of sheep, cattle, and horses for general, dairy, or stud purposes, available for the always increasing demand for such in Australia, South America, and South Africa. A visit to the Waikato District Experimental Farm at Ruakura to inspect the Shorthorn cows and the sheep and horses bred there will satisfy any one who may doubt these facts, and therefore every one who has a stake in the country should feel interested in establishing this sugar-beet industry in Waikato. In case of foreign complications and our communications and sugar-supply being interfered with for a time, what would New Zealand do for sugar? It would be of no avail then to blame any one or lament the lack of foresight. Now is the time to look this possibility in the

face—now, when peace and plenty abound to enable us to insure ourselves against adverse times in the distant, or, maybe, near, future. The facts that all the experiments made during the past quarter of a century have been fully verified by the official test made last season on the Government Experimental Farm at Ruakura prove the extraordinary capabilities of Waikato under proper and generous handling for all kinds of agriculture and manufactures based upon her specialty—the sugar-beet-root culture and beet-sugar manufacture.

Who should be interested.

This justifies our placing the position and proposals again before the Waikato farmers and residents, and advocating the Waikato Chamber of Commerce, the Agricultural and Pastoral Association, the Waikato Farmers' Auctioneering Association, and the dairy associations to co-operate and form a committee of members, practical men, appointed by themselves, to investigate the facts, with the object in view of starting the sugar-beet industry upon a commercial and financial foundation.

The Sugar-beet Association

In 1906 a meeting of those interested in beet-root culture took place in Hamilton under the auspices of the Hamilton branch of the Farmers' Union on the 6th May, Captain Allen Bell in the chair, and an association was formed to institute further tests to satisfy those who required further proof of the capabilities of the district to produce sugar-beets in quantity and quality sufficient to warrant a resuscitation of the question of beet-root culture on a practical scale. After several meetings and careful inquiry into the past results and opinions expressed by those who had made tests of farming the root in Waikato, it was decided to accept Messrs. Langguth and Co. s (merchants of Auckland) offer to forward samples of Waikato soil to Germany and Austria for careful examination and analysis, and to obtain for the association seed sufficient for a 10-acre trial test. This was done The soil from second-class average Waikato land was taken from a field that had not been ploughed or cultivated for upwards of twenty years, to represent many thousands of acres of similar lands in their present unimproved and neglected state. These samples of soils sent were analysed, and detail analysis received from Austria with the report that soils of exactly similar formation were being cultivated in Germany and Austria, and with proper farming and management were very successful in producing sugar-beets." But our Waikato lands in their present state must be well limed in the autumn months, as much as 2 tons of lime to the acre being used, and then the manures recommended were superphosphates and basic slag

The State Farm Test

Seed was received of the special kind suited to the class of Waikato soils sent, and this seed was distributed amongst members who applied for it; but it was considered best to have a public test made at the Ruakura Government Experimental Farm, which test, it was agreed, should settle the question. Application was accordingly made to the Department of Agriculture through Mr Clifton, and, their consent having been obtained, three bags of the imported test seed from Austria were handed over to the Manager, Mr Dibble. The results of the tests made are now to hand, and appear in the official report for 1907 of the New Zealand Department of Agriculture. The soils in which these beets grew, and which have returned results surpassing the most sanguine expectations, are exactly similar to the soil sent to Austria for analysis by the Waikato Root-growers' Association, and therefore the results obtained from the seed by the Manager of the Ruakura Government Farm are considered by the association to be all that they were called upon to prove, as the soil that produced 16 per cent. of sugar in a root weighing 5 lb. is similar to the soil which extends over a considerable area of the Waikato district, and does not represent the first-class land of the district, and shows what proper treatment of these soils will do.

The Beet-sugar Question

The beet-sugar question is overshadowing the cane-sugar question in every country in the western world. Even in countries and States where the cane-sugar can be grown in quantity and quality to manufacture sugar therefrom, it cannot succeed against beet-sugar where the sugar-beets can be cultivated successfully to contain 12 per cent. sugar in the root, and crops of from 10 tons to the acre (which is about the average of the Eastern States of America). The sugar-beet-root is driving the sugar-cane out of the market in the country or district that can produce the sugar-beet. In the Western States of America, in California, and also in Canada, 15- and 20-ton crops per acre are being produced, yielding 15 per cent. and upwards of sugar in the beets, but no beets weighing 3 lb. have proved to yield 12½ per cent. of sugar in America and Europe, Waikato, therefore, has established a record in producing sugar-beet-roots of 5 lb. weight, yielding 16 per cent. sugar, and we conscientiously believe it has never been equalled in any country or district outside of Waikato. The Manager of the Ruakura Government Experimental Farm (Mr Dibble informs us he has no difficulty in producing 15 tons, or even 20 tons, of sugar-beets to the acre, all under 5 lb., yielding by analysis upwards of 12 per cent. sugar We claim to have discovered in Waikato a sugar-beet-root field for New Zealand richer and more permanent in national wealth than even the great Waihi Gold-mine and goldfields are in gold, and in this discovery we have established for the Dominion of New Zealand a base for agricultural supremacy in the Pacific, and for Waikato in particular—a position which can never be wrested from her by fair means of trade. All that now remains for Waikato is to make up her mind what she will do with it. We have now twenty years' additional official data to support our contentions in behalf of the sugar-beet-root industry for Waikato.

The Cost of Cultivation

The cost of growing an acre of sugar-beets has averaged in America, Canada, Australia, and New Zealand from £6 12s. to about £8, but in all cases the higher the cost allowed for cultivation the higher the grade of beets and sugar, and the higher the returns of profit have been to the grower. In proof of this we give the record test of America (1883) and the record test in New Zealand (1907), detail costs, as it has been proved by public test at the Government Farm, Ruakura, Waikato, that 21-ton crops of beet can be grown in Waikato second-class soils by proper cultivation, yielding roots weighing 5 lb., that by analysis contain 16 per cent. of sugar Such roots should be worth 16s. per ton at a factory at present sugar-values, and the farmer should be able by a policy of co-operation and reciprocity with capital and labour to produce such a crop at £9 per acre, and independent of the sugar-beet-root tops left on the field available for food for his cows. His land being in a high-class state of cultivation ready for his winter crop of wheat or oats, beet-roots yielding 14 to 16 per cent. of sugar should enable the factory to turn out its sugar at £20 per ton on the spot, ready for its local market, thus saving freights and railway carriage on the imported sugars, to the distributing centre in Waikato. Where the local sugar-factory would be established—a 350-ton-per-diem factory—would require 1,500 acres of roots yielding 20 tons per acre to supply it with the raw material for a ninety days' sugar campaign, manufacturing sugar; an average of 15 tons sugar-beets per acre, containing 12 to 16 per cent. sugar, yields 2,700 lb. to 4,000 lb. sugar per acre. To insure a regular supply of raw material a four-course system of farming would have to be provided for, and therefore 6,000 to 8,000 acres of suitable sugar-lands, available to river or rail, should be secured on lease with the option of purchase, for the purpose of re-leasing the land upon similar terms and conditions to dairy-farmers with families, who would undertake to cultivate and produce the sugar-beets for a factory As the experiments made during the past have proved that second-class Waikato land is very suitable to produce high-class sugar-beets, 6,000 to 10,000 acres of such land should be available for lease at a moderate rent, with option-of-purchase or improvement clauses to secure the value of improvements to the cultivator

Sugar-beet and the Maori

The sugar-beet-root culture, in conjunction with the New-Zealand-flax cultivation, as an industry will prove very suitable to our Maori races, whose instincts are admittedly agricultural, and who are owners of large areas of very suitable lands for the growth of the sugar-beets and *tihore* flax, and also tobacco. The Maori people, if organized by their own chiefs and committees, under the guidance of experienced managers, would prove themselves to be competent and valuable assistants in the development of these great national industries, to the mutual benefit of all concerned. As a matter of policy there can be no doubt that these industries, if established in the Waikato, would be productive of great good in encouraging our Maori people to settle down to work and to take their proper place and share in the development of the Waikato district. To them we confidently look for the families of workers in the fields, weeding and cultivating the crops, which to them would be recreation, and work for which they are by nature suited. Therefore, as the Chief Justice of New Zealand has given his opinion publicly that agricultural pursuits must be the saving clause of our Native policy to save the Maori race, the Government should look favourably upon our efforts to develop these industries. Furthermore, apart from the belief in the financial possibilities to be secured to the Dominion by establishing firmly the sugar-beet-root industry, the impetus it will give to all kinds of *bona fide* settlement in the country districts should be a sufficient warrant for capital to support the movement and for the public goodwill to be accorded to it, providing, as it would do, for employment in summer and in winter for an agricultural and a manufacturing population of a first-class city No similar opportunity is offered to any State or people as is now at the command of the Dominion of New Zealand in its sugar-beet-root and native-flax areas in Waikato. In support of our contention we refer inquirers to official reports from the New Zealand Department of Agriculture's Annual Report for 1907, and from Bulletin No. 123 on the beet-sugar industry of Wisconsin, U S.A., April, 1905, together with extracts from my address in 1887 The question of labour is ably answered in the message from the President of the United States of America on the progress of the sugar-beet industry in the United States to the Senate and House of Representatives from White House, April 1, 1904, page 103, which we quote from.

Department of Agriculture. Chemical Division. Page 101, on the Sugar Industry of the United States. By Harvey W Wiley, Washington Government Printing Office, 1885. Mr Mackay, Washington West.

"Record Beets." Yield, 32½ tons per acre.

Cost of working 2 acres—	£	s.	d.
Ploughing and subsoiling 2 acres	4	3	4
Harrowing and clod machine	1	5	0
Rolling	0	16	8
Planting	0	8	4
Seed	0	16	8
Cultivating-machine work	3	8	8½
Hand-weeding	4	3	4
Harvesting	4	9	7
Housing, 50 cents. (2s.) per ton	6	15	3
Rent of land	4	3	4
Average cost of beets per ton, 9s. 6d.	£30	9	10½
Per acre	£15	4	11¼

DEPARTMENT OF AGRICULTURE, New Zealand, Ruakura Experimental Farm. Mr Dibble, in Waikato.

Record Beets." Yields, 21 tons per acre, 5 lb. roots and under, yielding 16·1 per cent. sugar.

1907

	£	s.	d.
Clearing scrub, fern, &c.	1	0	0
Breaking up (ploughing)	0	8	0
Discing	0	2	0
Harrowing	0	1	0
Ploughing and subsoiling to depth of 18 in	0	15	0
Harrowing	0	1	0
Rolling	0	1	6
Ridging	0	5	0
Manure, 10 cwt. at 7s. per hundredweight	3	10	0
Seed, 4 lb. at 2s. per pound	0	8	0
Scarifying, singling, and cleaning	2	10	0
Lifting	0	12	6
Average cost, 9s. 3½d. per ton.			
Per acre	£9	15	0

The official report issued by the American Government upon the beet-root sugar industry in 1885, in regard to the yield of roots per acre, states as follows: "The large differences in yield per acre shown in the preceding tables are not as much due to variation in the fertility of the soil as to the methods of cultivation. The experience of six years has shown that the average yield of beets per acre has steadily increased, and this increase has been due to improved agriculture alone. At first the farmers were largely ignorant of the correct method of beet-culture, and as this inexperience disappears the results are seen in an increase of the crop. But the farmers of these rich valleys must not be deceived by this prosperity the time will soon come when the best methods of tillage will no longer result in heavier harvests. It is far better and cheaper to maintain the fertility of the soil than to restore it. It is a wise policy to use fertilizers on rich soils: the voluntary use of these soil-foods will prevent the necessity for them which an unwise agriculture always produces."

The Waikato Valley and basins are rated amongst the most fertile of lands, but they, nevertheless, require special attention and treatment. The sugar-beet-root culture, although apparently difficult and costly to initiate, will so revolutionize results and returns that when it eventually becomes established no district in the Dominion and no Dominion in the Empire will surpass the Waikato County in agriculture and agricultural achievements, as well as in manufactures, science, and art, based upon co-operation, reciprocity, and fair trade between land, capital, and labour The Waikato Valley and basins are not rich—they are poor—but they are sensitive to liberal treatment and good management. They require capital, time, and hard work to reclaim them from the waste in which they at present are, as the riches of the great Waihi Mine were hidden in the hungry sulphide reefs which were useless to the ordinary miner without capital and science at his back to support him with requirements to enable him to develop the mine of wealth surrounding him. So with our refractory second-class deposits of soil, which constitute the great Waikato middle basin: they require special treatment, and capital, and appliances requisite to enable the agriculturist to recover from the atmosphere, through the medium of the refractory soils of Waikato, that inexhaustible supply of vegetable wealth, sugar, which will more than recover all the costs for labour and manure expended in exploiting them, leaving him in possession of a truly British homestead, which will not be rivalled by any other country under the sun. Surely if this be so, that the sugar-beet industry wherever it has been established has revolutionized agriculture, and elevated it to a high place and standard in the State, then it is the duty of all to assist in establishing this industry in Waikato, which has proved herself so eminently suited for it as a base for her dairying and manufactures to stand upon and overcome all outside competition. This can only be accomplished by co-operation, reciprocity, and fair trade between land, labour, and capital in Waikato.

EXHIBIT 2.—LETTER FROM MR. JOHN ST CLAIR, AUCKLAND

Box 275, Auckland, 13th May, 1902

DEAR SIR,— *Sugar-beet in Waikato and Waipa.*

On behalf of a powerful syndicate, who have underwritten the necessary capital with which to float a strong company to purchase and erect suitable plant for crushing and refining sugar from sugar-beet roots in Waikato, I am authorized to make the following proposals, with a view to the establishment of this important industry in the Waikato and Waipa districts:

1 The farmers, settlers, and Maoris of the district will be required to enter into a guarantee to grow 5,000 acres of sugar-beet roots each year for a term of twenty-one years, with a right of renewal, and sell the same to the company at the rate of £1 per ton, delivered at the crushing-factory The roots to be grown in accordance with the printed instructions issued by the company, and under the supervision of its expert, who will inspect and give advice or instruction to growers free of cost. During the first two years, the payments are to be made for roots by one-half cash on delivery, and half in fully paid-up shares in the company and during these first two years the company will supply free of cost one-half of the seed and manure required, and

advance the other half of the seed and manure at cost-price, to be deducted from the price paid for roots delivered. From the third year on, all roots are to be paid for in one-half cash and one-half paid-up shares—that is to say, each grower will receive £1 per ton for roots delivered at the factory for one-half the area grown by him, and fully paid-up shares in the company for the other half, such shares to be held for the growers by a committee to be elected by the growers and the company, in trust, and the growers shall receive all the dividends and profits accruing on such shares from the third year on, but the shares shall revert to the company at the end of twenty-one years, unless the grower or his heirs renew the agreement to continue growing for another twenty-one years.

2 The area required to be guaranteed will be 5,000 acres on a four-years rotation of crops, so that a total area of 20,000 acres will require to be provided. The guarantee will require to be in form to the approval of the company's solicitor, and be registrable against the land as a security for the performance of the contract by the growers.

3. In cases where the land is already mortgaged, or where the mortgagee declines or objects to join in the guarantee, the company will be prepared to find the money to pay off the mortgagee and to take a fresh mortgage on terms similar to, and at the same rate of interest as charged by, the Government Advances to Settlers Department whereby the principal and interest are paid off in thirty-six years and a half

4. The company will supply the best varieties of sugar-beet and manure at cost-price, payment of which will be deducted out of payment for roots delivered at factory; but seed and manure supplied to grow roots purchased for shares in the company will not be charged for This concession is very valuable, and amounts to equal to £20,000.

5 The company will, if required, plough and cultivate the land with special steam-ploughs or oil-engine ploughs and other labour-saving machinery, at a cost of about one-half the present contract price of ploughing, &c. by horse-labour.

6 The company will sell to growers on easy terms, by instalment or hire system, all necessary ploughs, cultivators, drills, and farm-implements, which will be obtained at wholesale prices from the best makers.

7 The company will advance money up to £5 per acre on the area of roots grown for shares in the company, for the first two years, in three instalments—(1) during seed-planting, (2) weeding, and (3) during harvesting, towards the cultivating of the crop, and to be paid back by equal instalments, with interest at 3½ per cent. per annum, extending over ten years, commencing from the third delivery of roots, such advances to be secured on the collateral guarantee of the growers, who shall form themselves into an association under the Unclassified Societies Act, and elect a committee of management.

8. The company will take delivery of roots at any suitable landing on the Waikato or Waipa River banks, into barges, and growers will pay a small charge for use of barge and towage to factory to be deducted from price of roots. It is confidently expected that, the cheap river freights being brought into competition with the railway Government will make a specially low rate for the haulage of roots by rail.

9 The factory will be erected on the most suitable site, to be selected by experts, but such that it can be served by both railway and river steamers.

10. The growers will have the preference in the purchase of loose or compressed pulp, and molasses, for food for stock, which will be delivered by the company's steamers on the river-bank at the lowest payable price, as arranged, but for their own consumption only.

11 To cover the cost of organization and flotation, the growers will be required to enter into an agreement to pay the promoters royalty of 6d. per ton on all roots sold by them to the factory for cash during the said term this royalty to be secured by registration of agreement against the land.

12. The amount of shares for the half-area of 5,000 acres of roots to be paid for in shares fully paid up will amount to 38,000

13. The profits and dividends to growers on these shares for nineteen years is estimated at £149,998, but will probably be more.

14. In the first year the company will give prizes (1 of £100, (2) £50, (3) £25, for the best growers' exhibit in quality and quantity Following other satisfactory results, other inducements will be offered to growers.

Yours, &c.,

JOHN ST CLAIR.

Mr J A. Young.

EXHIBIT 3.—LETTER FROM MR. E J ROGERS, KIRIKIRIROA.

DEAR MR. YOUNG,— Kirikiriroa, 8th October, 1901

In reply to your inquiries about sugar-beet culture, I beg to say that I have grown the roots in small areas for a number of years. My experience is that it is the best root feed for stock that I have ever grown. Cows, horses, sheep, and pigs eat it, and seem to like it. It is one of the best-keeping roots out. I generally feed the turnips first, the carrots next, and the sugar-beets last, as they keep the best, and are just as good at the end of the season From my observation they are better feed than mangolds. The only fault I found about them was that the roots had a tendency to go to fingers and toes, which makes them difficult to lift, otherwise they grew well and large. I used to plough about 5 in. or 6 in., and then break up the ground as for carrots, and drill in just the same. I used the Planet Junior hand-drill. I found them no worse to look after than either carrots or mangolds, as far as the weeding was concerned. I used generally to put seed in about middle of October. I am prepared to put in a small area again if I can obtain seed.

Yours, &c.,

E J ROGERS.

EXHIBIT 4.—LETTER FROM MR W TUCKER, CAMBRIDGE

DEAR SIR,— Cambridge, 7th October, 1901

According to my promise I hereby give you a brief account of my cultivation of sugar-beet. My first experiment was to skim the land in May, and let it lie until the month of October, and then I ploughed it 6 in deep, and then worked it down fine, and drilled in the seed at the rate of 5 lb. per acre, with about 3 cwt. of artificial, or at the rate of 3 cwt. manure per acre of superphosphate and bone, about equal parts, all put in with the Planet Junior drill, known as the 'hilldropper', the seed put in 8 in. apart. The seed came through all right, but the small birds took it directly Results very unsatisfactory—about 8 tons per acre, and very bad to harvest, owing to so much roots. At the second trial the land did not need skimming, being broken up the previous year I added stockyard manure in this case, about 8 to 10 tons per acre, and about 2 cwt. artificial manure, with superphosphate and bone, and a little kainit, which I found afterwards was a mistake. Kainit or salt should not be included in the mixture. Results, roots much larger, very coarse, and rooty not suitable for factory purposes. Feeding quality I estimate from 20 to 25 per cent. better than the average mangold. The harvesting very troublesome, as in the first trial, and in all other trials. Results have been very unsatisfactory; whether the seeds or manure, or both, are responsible for the one part or not I cannot say, but the small birds are responsible for the other In all cases the seed was drilled in with the Planet Junior "hilldropper

Any information you can give me as to its better cultivation, and the kind of manure to be applied, and how much should be put in, will oblige, Yours, &c.,

Mr. J. A. Young W TUCKER.

P S.—When you have got the seed ready for distribution, please do not forget my application. I think you promised me a pound of each variety.—W T

EXHIBIT 5.—LETTER FROM MR. J D P MORGAN, TAMAHERE.

DEAR SIR,— Waikato Farmers' Club, Tamahere Branch, 25th September, 1901

The matter was brought before our last meeting, held on the 28th August, but beyond testimony to the effect that sugar-beet had been successfully grown in Waikato, there was no information of value forthcoming. Yours, &c.,

J D P MORGAN, Chairman.

J A. Young, Esq., Hon. Sec. *pro tem.* Sugar-beet Association, Hamilton.

EXHIBIT 6.—LETTER FROM MR. LINDSAY JOHNSTON, TE HAROTO, OKETE

DEAR SIR,— Te Haroto, Okete, 7th September, 1901

I see by the *Waikato Argus* that you would be glad for any hints regarding sugar-beet growing I am sending you, by Monday's coach from Raglan, a sample of what I grew last summer. The seed was procured from Government, sown in drills 2 ft. apart, and the young plants thinned out to 1 ft. between each. The average weight per root must have been about 10 lb.

Yours, &c.,

Mr. J A. Young. LINDSAY JOHNSTON

P.S.—These beets were not specially grown, and so far as I can see they are a heavier crop than turnips, and grown with very little more trouble or manure.—L.J

EXHIBIT 7.—LETTER FROM MR. T B. HILL, VALLEY HOME, RAGLAN

DEAR SIR,— Valley Home, Raglan, 6th August, 1901

I wish your newly formed Sugar-beet Association every success, and, as I have almost all my lifetime been more or less an experimental cockatoo farmer, I will give you this season's experience of my quarter-acre section of sugar-beet.

The seed was given me by a neighbour, who raised it from seed he obtained from the Government. It is quite different from what I have previously grown at various times, as some of the roots are pink and some dark red throughout. The ground was originally tea-tree, and was broken up the previous year and I took a crop of turnips off it. It was ploughed in ridges, and the seed dibbled in in rows about 27 in. apart, and the seed 9 in., and a bag of K.P and Co.'s sugar-beet manure sown over the ridges, and raked in The seed was put in on the 2nd November last. The roots average about 2¼ lb., and about 29 tons to the acre. Mr Day is quite right in saying the roots have a tendency to grow too coarse and big, and especially when grown near the sea; and the larger the roots the less saccharine matter they contain, as the salt spray from the ocean has a tendency to destroy the saccharine principle. This I found very much so some years ago at Ruapuke. My neighbour, Mr Lin. Johnston, of Te Uku, to whom I gave some of the seed, has them very much larger than mine. This I attribute to being nearer the harbour The labour on them, no doubt, is a serious drawback, as very few can be pulled by hand.

The growing is no difficulty if the sugar percentage is right. My idea and experience is that at Raglan, Aotea, and Kawhia we are too near the sea. I made some treacle one year, but it was not sweet enough, but made very good blacking

I may say the Red Top sugar-beet, grown from seed obtained from Messrs. Yates and Co., was by far the most uniform crop I have ever grown.

I quite concur in the remarks made by Mr W E Gwillin, in his paper on sugar-beet, that No country in the world is better adapted for the growth of this valuable root than New Zealand.'

In conclusion, I only hope all Mr Gwillin says may be realized, and no one will, I know, be better pleased than our old friend Mr W A. Graham, who I hope will be spared to see it established and carried out successfully in Waikato.

Any information I can give you I shall be very happy to give, and with kind regards, believe me,

Yours, &c.,

Mr J A. Young. T B. HILL.

EXHIBIT 8.—LETTER FROM MR. S FULLERTON, PRESIDENT FARMERS' CLUB, TE KOWHAI

DEAR SIR,— Te Kowhai, 12th October, 1901

At our last meeting it was decided that I should forward to you my experience in sugar-beet growing as an answer to the request expressed in your letter

I obtained a sample of White Belgium seed I sowed it on the 23rd November, and transplanted on the 13th February I used blood and bone manure, at the rate of 5 cwt. per acre. I hilled-up the plants once only, and rose the plants in May, and then they weighed an average of 3 lb. per root. I consider, had the seed been sown in drills about the 1st October, and not been transplanted, they would have given an average of 5 lb. per root.

I condemn transplanting, on the ground that it produces too many small fibres.

If the land is well cultivated the roots require but little working to protect them from the sun, as they have a tendency to grow into the ground.

I experienced no trouble from the fly

For beet-culture the land required should be skimmed in December, disced and ploughed in March, again ploughed in May, then left till the latter end of September, reploughed, harrowed, and the seed drilled in By this treatment you will save labour, and have clean ground free from weeds, and your plants will be undisturbed by weeding

I consider a crop of sugar-beet such as I have mentioned would give a yield of from 20 to 25 tons per acre.

To my mind the greatest trouble that stands in the way of growing sugar-beet for sugar purposes, in conjunction with winter dairying, is the carting to a central factory, as it would be worth as much to cart the pulp back as it would to cart the beet there. If juice-extractors could be worked in the various districts where beet is grown, there is no doubt that this industry would be a great boon to the Waikato farmers, as the soil and climate are so admirably adapted to sugar-beet culture. Wishing you every success in your new venture, I remain,

Yours, &c.,

S. FULLERTON, President, Farmers' Club.

J A. Young, Esq., Secretary Sugar-beet Committee, Hamilton.

EXHIBIT 9.—LETTER FROM MR. J A. YOUNG, DENTIST, HAMILTON (WITNESS).

DEAR MR. TUCKER,— Hamilton, 9th October, 1901

I thank you for your valuable contribution to me on your experience of sugar-beet culture.

After careful study of your letter I came to the conclusion that, apart from the small-bird trouble, your only fault to find as a result of your experience is the fingery nature of the roots, rendering them difficult to lift and then clean after Three things generally are conducive to the finger-and-toe formation in the sugar-beet-root: (1.) Seed inbred too much in endeavouring to obtain high percentage of sugar. (That is not likely to be the cause of your failure, as seed of that sort would hardly be sent to this country) (2) Worked-out soil. By that I mean taking a third crop off the same ground. The best results are obtained by growing beets on the same soil only once in four years. That is the experience in California and Oregon, in the United States. An abnormally heavy grain crop usually follows the sugar-beet. (3.) Want of deep cultivation. This I really believe to be the cause of your trouble. No success worth calling such will be obtained until the land is worked down to 12 in. from the surface. Therein is the whole secret of successful sugar-beet-root cultivation. You would need to plough 6 in. and subsoil another 6 in. I am given to understand that very little cultivation of that sort is done in Waikato. If your land is good, and has been well worked, no doubt for a small area you could nearly get down 12 in. with the plough. The sugar-beet-root is different to your other root crops. It is the nature of it to grow in the ground, while your swedes and mangolds—white carrots too—grow mostly above the ground. As soon as the tap-root in the beet, which in good maturity is from 10 in. to 15 in long, strikes the hard unbroken subsoil, it either turns off at an angle or stops there, and other roots strike out from the main root, hence you see a good cause for your fingers and toes. I hardly think your manure had much to do with your trouble.

Probably the finest root feed in the world for stock is the sugar-beet. Mineral and salt manures would help to make the roots large and suitable for feeding, but would be ruinous to them for sugar-manufacture. Ideal sugar roots are small—from 1¼ lb. to not more than 4 lb.

The Government have promised me seed for distribution for this season if it is procurable in the colony They will want to be quick about it, anyway, you could sow quite up to February I believe sowing after the middle of October would get over a lot of the small-bird trouble, as after that there is generally plenty of green feed for them. In any case, small cultivations suffer most from the small birds. I will not forget you if I get seed.

My idea is that the dairy-farmers should cultivate small areas of sugar-beets as winter feed, and the experience so gained would put them in a position to say if they could cultivate on a large

scale suitable to warrant the establishment of the beet-sugar manufacturing industry. From my study of the subject, which has had particular reference to the United States of America, it leads me to believe it is to be an industry not far behind the dairying, if not equal in its far-reaching effects upon the prosperity of the farmers and community generally It has simply revolutionized those western States of North America, with a climate and conditions similar to this country, where it has been established, and, strange to say, it is only since 1890 that it has been a success in those countries. Farmers and factories had been ruined by the score up to that date, and it was not until they went in for deep cultivation that they succeeded. No black or coolie labour is employed in the beet-fields. The whole conditions are similar to this country, ordinary labour, according to ability, being paid from $1 to $1½ per day for work in the fields.

I hope I am not wearying you with this long epistle. The subject is a large one and worthy of unprejudiced investigation on the part of our Waikato farmers. If they would help the development of the sugar-beet industry, they would by its consummation put from 25 to 75 per cent. and more on to their land-values, which would mean actual cash in their pockets. If it has done that for other countries, there is no reason why it should not do the same for this.

I shall be pleased to give you further information on the subject if I am in a position to do so.

Yours, &c.,

Mr W Tucker, Cambridge West. J A. Young.

P.S.—For your purpose, for the present, the usual formula for root crops would do in the way of manure.

EXHIBIT 10.—EXTRACT FROM PARLIAMENTARY PAPER H.-21, SESSION II, 1897 COST OF CULTIVATION IN CALIFORNIA.

Among the very successful sugar-beet farmers on the Chino Ranch are the Gustafson Brothers (Louis, Victor, and Charles). They came to Chino three years ago without any capital whatever, and commenced beet-farming on their own account, doing their work themselves thoroughly The result was that they have been successful in every crop they have planted. They bought 20 acres of choice land for £35 per acre, and they have to-day a clear deed, having paid for it from beets raised on the land. They have for the 1893 season kept a carefully itemized account of their expenses of their 20 acres of beets, including their own work (which they counted at 6s. per day, and which amounted to £55). They harvested from the 20 acres 436 tons—that is, 21 tons 16 cwt. per acre—for which they received 18s. per ton The figures are,—

—	Cost of growing 20 Acres.	Cost of growing 1 Acre.	Cost of producing 1 Ton of Beet-roots.
	£ s. d.	£ s. d.	£ s. d.
Ploughing	8 0 0	0 8 0	0 0 4·4
Harrowing twice	2 8 0	0 2 4·8	0 0 1·3
Seed	6 0 0	0 6 0	0 0 3·3
Sowing ..	1 12 0	0 1 7·2	0 0 0·8
Thinning	16 0 0	0 16 0	0 0 8·8
Cultivating twice	2 8 0	0 2 4·8	0 0 1·3
Weeding	4 0 0	0 4 0	0 0 2·2
Topping	21 12 0	1 1 7·2	0 0 11·8
Ploughing out	8 0 0	0 8 0	0 0 4·4
Hauling	34 17 0	1 14 10	0 1 7·1
Sundries	12 1 0	0 12 1	0 0 6·6
Totals	116 18 0	5 16 11	0 5 4

Gross returns from the 20 acres = 436 tons (= 21 tons 16 cwt. per acre), at 18s. = £392 8s.
Gross returns per acre = £19 12s. 4d.
Net returns from the 20 acres = £275 10s.—*i.e.*, £13 15s. 6d. per acre.

EXHIBIT 11.—COST OF RAISING SUGAR-BEET IN WYOMING, AND MARKET RATES OF SUGAR-BEETS AT GRAND ISLAND, NEBRASKA, U.S.A.

Cost of Raising Sugar-beet in Wyoming.

The cost of raising an acre of sugar-beets in Wyoming is about twenty days' labour. Estimated at $2 per day it would be as follows:—

	$
Ploughing one acre, team one day	4
Harrowing and clod-crushing, team one-fourth day	1
Drilling and making irrigation furrows, team one-fourth day	1
Thinning and weeding, man five days ..	10
Irrigating, man two days ..	4
Cultivating, team one day	4
Harvesting, man four days ..	8
Storing or hauling to factory, team two days	8
Total	$40

By personal supervision, the farmer can reduce this cost. Rent of irrigated land is not included, being the same for all crops. With proper cultivation the yield will vary from 10 tons of rich beets to 30 tons of larger beets. The average price per ton this season is $3·50 in Nebraska, $4 in California, and $4·50 in Utah. The value varies with the sugar content as follows:—

MARKET RATES OF SUGAR-BEETS AT GRAND ISLAND, NEBRASKA.

Per Cent. of Sugar.	1891 (Ton).	1892 (Ton).	Proceeds per Acre of 15 Tons.
	$ c.	$ c.	$ c.
12	3 00	3 00	45 00
13	3 25	3 50	52 50
14	3 50	4 00	60 00
15	3 75	4 50	67 50
16	3 00	5 00	75 00
17	4 25	5 50	82 50
18	4 50	6 00	90 00
19	4 75	6 50	97 50
20	5 00	7 00	105 00

EXHIBIT 12.—BEET-PULP AS A CATTLE-FOOD AT GRANDE RONDE VALLEY, OREGON

There is one side of the beet-sugar industry which observation and inquiry show is not receiving the attention which it deserves in the Grande Ronde Valley I refer to the feeding of beet-pulp to cattle and sheep. Located as the valley is in the midst of the best stock regions of the Pacific Coast, in a region where such excellent crops of alfalfa can be grown, there seems to be no reasonable excuse for neglecting this side of the industry, both for fattening stock and the manufacture of dairy-products. The fullest fruits of the industry will never be realized till attention is given to this phase of the subject. Nothing has been more conclusively demonstrated than that beet-pulp is a most excellent cattle, sheep, and hog food when properly balanced with nitrogenous material, as alfalfa, clover, or grain. While the leaves and tops are good food, pulp is much better A chemical analysis of the pulp produced at La Grande shows the following composition :—

Water	89·01	Dry matter	10·99
		Fat	0·58
		Fibre	2·40
		Protein	0·88
		Ash	0·70
		Carbohydrates	6·43
		Total	10·99

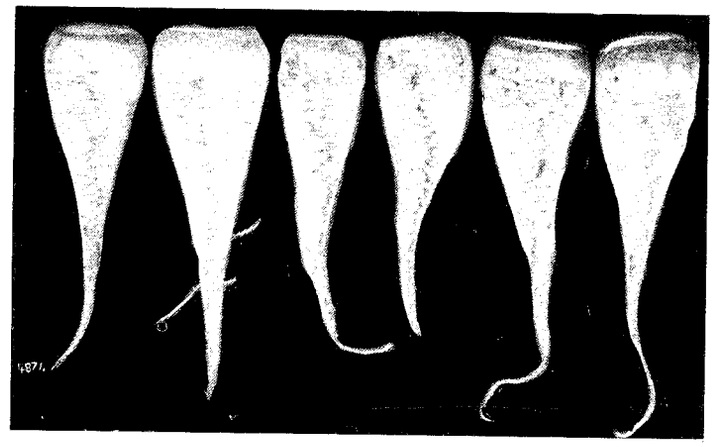
No analysis was made of the siloed pulp, but there is not a very great change in the chemical composition, as will be shown by the following analysis given in the "Revue Universelle des Progres de la Fabrication du Sucre," i, 428

	Maercker.		Kuhn.	
	Before Ensilage.	After Ensilage.	Before Ensilage.	After Ensilage.
Water	89·77	88·52	88·9	87·5
Dry matter	10·23	11·48	11 1	12·5
Ash	0·58	1·09	0·9	0·9
Fat	0·05	0·11	0·1	0·1
Crude fibre	2·39	2·80	2·5	3·0
Crude protein	0·89	1·07	0·9	1·2
Nitrogen-free extract	6·32	6·41	6·7	7·3

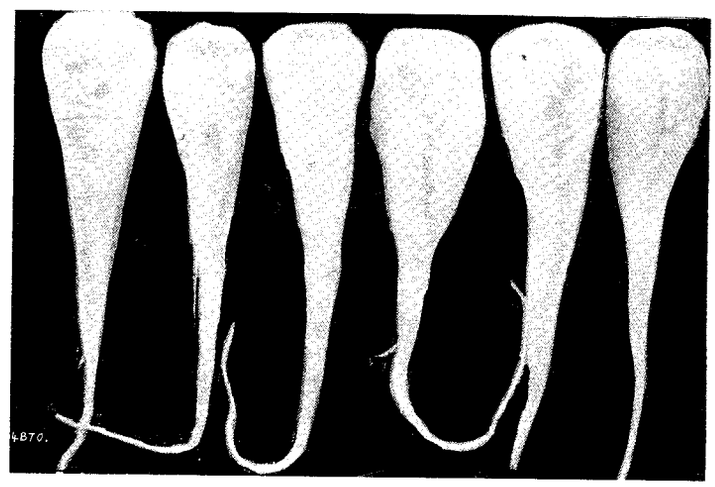
Beet-pulp is not a balanced ration, and the best results cannot be expected from feeding it alone, though it is a healthful and nutritious food. Its chief components are the carbohydrates and proteids. It is essentially a fattening food. Experience has shown that it is relished by dairy cattle, and produces an excellent flow of milk when balanced with nitrogenous foods. The pulp is valuable not only as cattle-food, but also as food for hogs and sheep In Utah it is largely used as hog-food.

It is one of the cheapest foods that farmers can use, for it can be purchased at a very nominal figure. Each team as it delivers its load of beets should take home a load of beet-pulp This pulp should be placed in a silo, where it is much more easily kept than any other silage material. It is very heavy, and sinks down to a very solid, cheesy mass. When properly preserved it does not tend to ferment, and can be kept a very long time. Mr Allen, of the Standard Cattle Company, is authority for the statement that even in very cold weather a large pile can be left out of doors, and, while a crust of eight or ten inches will freeze on the outside, the inside will remain in good condition.

EXHIBIT 13.—PHOTOGRAPHS OF BEETS GROWN IN JACKSON AND UNION COUNTIES, OREGON, U.S.A.

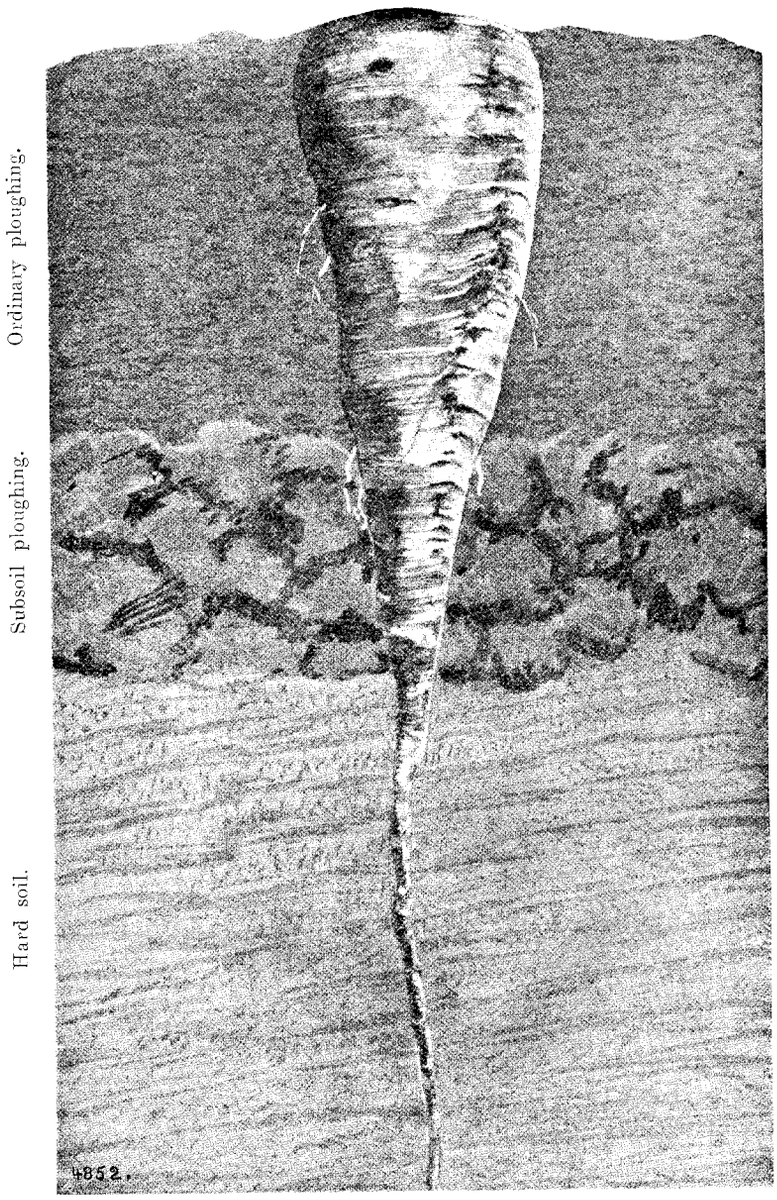


TYPICAL BEETS FROM JACKSON COUNTY, OREGON, U.S.A.



TYPICAL BEETS FROM UNION COUNTY, OREGON, U.S.A.

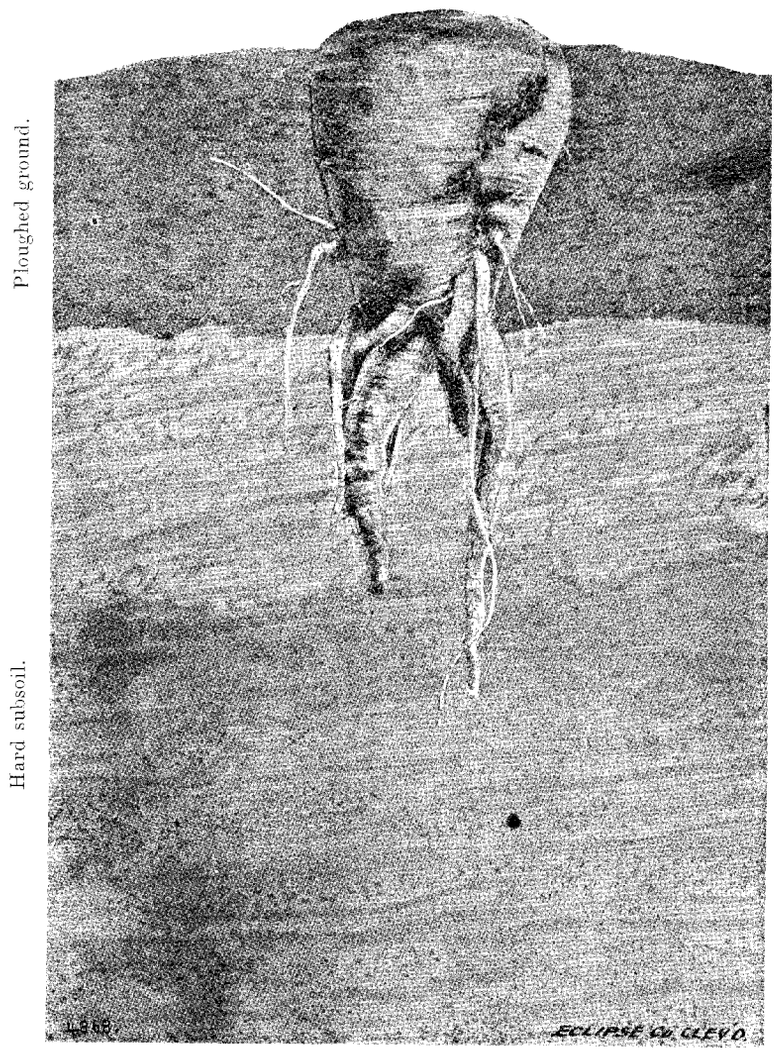
EXHIBIT 14.—TYPICAL BEET-ROOTS GROWN AT THE OHIO (U.S.A.) AGRICULTURAL EXPERIMENT STATION



IDEAL BEET GROWN AT THE OHIO (U.S.A.) AGRICULTURAL EXPERIMENT STATION

Showing the normal development of the sugar-beet in ground properly prepared. Any undercrust, or hardened subsoil formed by previous handling, has been broken up by subsoiling. The tap-roots of the young beets can then have 14 in. of roots on which to build up the beet, instead of 7 in.

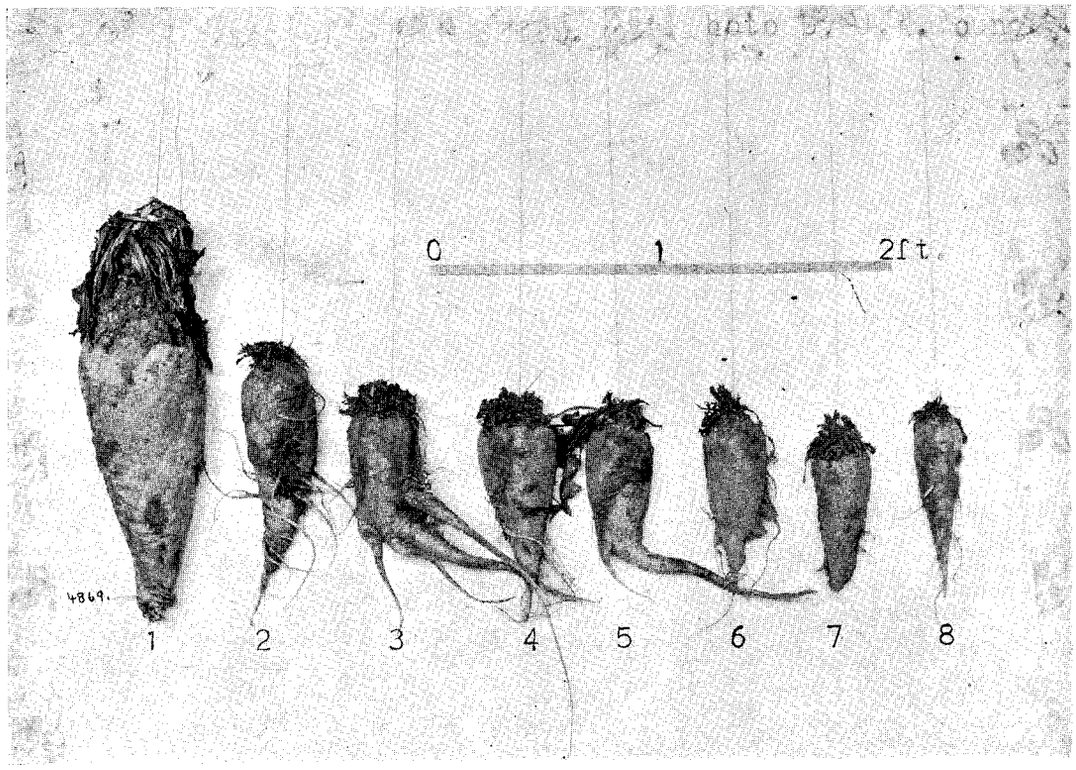
EXHIBIT 14.—TYPICAL BEET-ROOTS GROWN AT THE OHIO (U.S.A.) AGRICULTURAL EXPERIMENT STATION



IMPERFECT BEET GROWN AT THE OHIO (U.S.A. AGRICULTURAL EXPERIMENT STATION

Showing imperfect development of the sugar-beet in ordinary 7 in. ploughing. Here the tap-root has reached the hard-packed, dry soil, which it is unable to penetrate. The root accordingly divides, sends out branches, and in the course of growing the beet is forced out of the ground. The ploughing in this case has left an undercrust, which is found more impervious than the subsoil below it.

EXHIBIT 15.—SAMPLES OF BEETS GROWN AT RAGLAN AND WAIKATO



SUGAR-BEETS.

	lb. oz.		lb. oz.		lb. oz.
No. 1	10 8	No. 4	2 4	No. 7	1 4
„ 2	2 5	„ 5	1 12	„ 8	0 12
„ 3	2 8	„ 6	1 10		

[*Photo by J A. Young, Hamilton. September, 1901.*

All the above roots were field-grown and cultivated. The large root, No. 1, was grown at Raglan; the size is partly due to impure seed, and being grown near sea-coast. It would return probably not more than 3 or 4 per cent. of saccharine matter, therefore it would be unsuitable for sugar-making purposes, but most excellent for cattle-feed.

Roots 2 to 8 were all grown in Waikato, and within twenty miles of Hamilton They are the right size for sugar purposes small roots give the highest percentages of saccharine matter

Note the shape and form of roots 3 and 5 They are good illustrations of the effect of shallow ploughing and cultivation In stiff soil roots of this character would be costly to harvest. Deep cultivation (18 in if possible) is one of the great essentials to successful sugar-beet-root growing

The size and length of roots can be compared with the two-foot rule shown in the photograph.

EXHIBIT 16. STATEMENT BY EDWARD W KNOX, GENERAL MANAGER OF THE COLONIAL SUGAR REFINING COMPANY (LIMITED), SYDNEY, ALSO STATUTORY DECLARATION

A.

In reply to the request made to this company's manager in Auckland for a statement of the views of our directors in regard to the manufacture of beet-sugar in the Dominion of New Zealand, I have to say that such sugar cannot, in our opinion, ever be produced at a price that would allow of its being sold on equal terms against sugar made from cane grown within the tropics.

Even in Germany, with cheap labour, capital, and material, and under a system of chemical control of both cultivation and manufacture that has reached a remarkable pitch of perfection, there is no indication of a belief that the industry could stand without a protective duty, and in New Zealand, where the conditions just named would be—at any rate, for many years—completely reversed, the need for such duty or for an equivalent bonus would be much greater

What would be the amount of the protection needed to thus insure a working margin of profit for both grower and manufacturer it is impossible to say, because the information obtainable as to the probable weight of the crop and the percentage of sugar in it is wholly inadequate for framing a just estimate on the subject. In the United States the effective protection is about nine pounds (£9) per ton of sugar, besides the cost of inland freight, and the coming crop is expected to give 425,000 tons of sugar from 410,000 acres under beet, but this yield of sugar per acre is far below that obtained in Germany, and one could hardly guess whether the causes that may have operated in America to reduce the return—poor cultivation, unsuitable climate, and insufficient labour—would similarly affect that in New Zealand in an equal or greater degree.

Perhaps all would tell a high degree of cultivation is a necessity; the distribution of the rainfall and adequate sunshine during the growing months largely determine the percentage of sugar, and there must be a sufficient labour-force when the young plants are to be thinned and weeded: moreover, experience only can decide whether the harvesting would clash with other agricultural operations.

At least two years would be required for obtaining records and making experiments before a fair opinion could be formed as to the chances of success of such a venture, and even then the risk of failure would be so great, and so much would depend on the willingness of a number of farmers to grow the crop, that no firm with experience in such matters could be expected to enter on a speculation of this sort if the factories erected were subject to resumption as proposed.

Whether the Dominion should attempt to divert capital and labour from agricultural industries now prospering and independent to one which can only live at the cost of the taxpayer is a question for the majority of the voters to answer We can say, however, as to the existing position, that the absence of a duty on sugar secures to the people a supply of a necessary of life on the most favourable terms, and wholly prohibits the establishment of any monopoly in connection with its distribution. Our company has secured the market by underselling all other suppliers, and can only hold it by maintaining the same principle, when every distributor can procure his supplies from any country in the world. In support of this statement it can be said that Tate's Granulated—equal to our 1 A—is now selling in London at £20 10s. per ton, the duty being £1 16s. 8d., in Auckland the price is £17 10s., duty-free, off which price there is an allowance of 10s. per ton. The advantage to the New Zealand distributor is obvious, and he receives in addition a larger discount, while our sugar is delivered in more costly packages.

EDW W KNOX,
General Manager,
Colonial Sugar Refining Company (Limited).

Sydney, 16th September, 1910.

STATUTORY DECLARATION

I EDWARD WILLIAM KNOX, of O'Connell Street, Sydney, in the State of New South Wales, do hereby solemnly and sincerely declare as follows 1 I am the general manager of the Colonial Sugar Refining Company (Limited). 2 The statement, dated the sixteenth day of September, one thousand nine hundred and ten, signed by me as general manager of the said company, and which is attached hereto and marked "A," is true in substance and in fact. And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the Oaths Act, 1900.

[L.S.]

Subscribed and declared at Sydney this seventeenth day of September, one thousand nine hundred and ten, before me— } EDW W KNOX.

ALFRED W NATHAN,
Notary Public,
Sydney, N S.W

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