

1890.
NEW ZEALAND.

FLAX AND OTHER INDUSTRIES COMMITTEE

(REPORT OF THE) ON THE DAIRY INDUSTRY, TOGETHER WITH MINUTES OF
EVIDENCE AND APPENDIX.

Brought up 9th September, 1890, and ordered to be printed.

ORDERS OF REFERENCE.

Extracts from the Journals of the House of Representatives.

WEDNESDAY, THE 23RD DAY OF JULY, 1890.

Ordered, "That a Select Committee be appointed, to consist of ten members, to consider all matters pertaining to the development of the flax and dairy produce and wine-producing industries; with power to call for persons and papers. The Committee to consist of Mr. T. Mackenzie, Mr. Valentine, Mr. Dodson, Mr. Marchant, Hon. Captain Russell, Mr. Walker, Mr. Wilson, Mr. Hamlin, Major Steward, and the mover; three to be a quorum."—(Mr. BEETHAM.)

THURSDAY, THE 31ST DAY OF JULY, 1890.

Ordered, "That it be an instruction to the Select Committee, appointed on the 23rd instant, to inquire into all matters pertaining to the development of flax and dairy produce and wine-producing industries, to add the fruit industry."—(Mr. HOBBS.)

REPORT ON THE DAIRY INDUSTRY.

THE Committee, to whom was referred the question of flax, dairy produce, and other industries, have the honour to report, with respect to dairy produce, as follows:—

1. Your Committee have much pleasure in drawing attention to the large increase in the export of dairy produce that has taken place during the last ten years, as shown in the following return:—

			Butter.	Value.	Cheese.	Value.
			Cwt.	£	cwt.	£
1880	..	...	2,717	8,350	717	1,983
1881	...	...	2,426	8,496	3,056	6,112
1882	...	...	11,264	52,088	3,553	10,130
1883	...	...	8,869	42,020	2,519	6,892
1884	...	...	15,766	66,593	10,342	25,074
1885	...	...	24,923	102,387	15,245	35,742
1886	...	...	23,175	105,537	16,429	45,657
1887	...	...	17,018	54,921	23,913	54,562
1888	...	...	29,995	118,252	36,682	78,918
1889	...	...	37,955	146,840	26,558	67,105
1890	(half-year, to June 30)		24,021	83,799	26,663	57,642

These figures show that the dairy industry is undergoing rapid development, and the expert evidence laid before your Committee proves that much of the butter and cheese now made in New Zealand is quite equal in quality to that produced in any part of the world.

2. Your Committee, however, find that the export butter-trade is in an unsatisfactory state, the causes being (a) that butter is frequently made in a faulty manner, and will not therefore keep long even under favourable conditions; (b) that butter, in every way good when originally made, is spoiled in transit through defective carrying and transshipment arrangements, or the use of unsuitable packages.

3. Your Committee find that want of knowledge of the best methods of manufacture is the principal reason for butter being badly made, and they have therefore the honour to recommend that Government should at once engage at least two experts, thoroughly qualified to impart scientific and practical instruction. They are of opinion that it would be desirable to obtain such experts from Denmark, where the industry is thoroughly understood, a knowledge of the English language on the part of such experts being, however, a necessary qualification for their appointment.

4. The formation of dairymen's associations for mutual instruction and assistance would, in the opinion of your Committee, be of very great service to the dairying industry. Such associations could confer with Government and with professional experts, and should hold periodical conferences for the advancement of the industry in the manner pursued in the United States and Canada, their funds being supplemented by grants-in-aid from the consolidated revenue, as in most

or all advanced dairying countries. Particulars of the constitution and working of such associations are appended to this report. Meanwhile, your Committee cannot too strongly urge the establishment of dairy factories, and the use of separators, or, where the use of separators is not practicable, the early separation of the cream by immersing the milk in cold water on the Cooley or Schwartz methods.

5. Your Committee find that the causes of good butter being spoiled in transit are (a) its being allowed to accumulate in stores after packing, sometimes for weeks; (b) its being exposed to the sun or to a high temperature on wharves and railway-platforms, or in sheds and steamers; (c) the use of faulty packages.

6. The cure for evils (a) and (b) would be to ship the butter as soon as possible after making, taking care to keep it out of the sun and in a low temperature; to reduce railway-freights to lowest level, so as to encourage the forwarding of the butter by rail instead of by steamer; to provide refrigerating cars, or, if that be not practicable, to at least take special care to ventilate the cars and keep them as cool as possible; to run night-trains where found advisable; and to provide cool storage at the port of shipment. (N.B.—The temperature in the Wellington Harbour Board's sheds last summer was far too high, being for October from 47° to 71°, November 51° to 73°, December 57° to 76°, January 54° to 79°, February 55° to 80°, March 51° to 80°.) The regular despatch of vessels, so as to place butter before consumers as fresh as possible, is also an important factor.

7. With regard to packages, the evidence before your Committee goes to show that the 60lb. keg is generally preferred on the English market, and that totara is probably the best of the New Zealand woods for the purpose; at the same time, it is only fair to state that some Australian shippers appear to prefer Pond's boxes (56lb. size), while in New Zealand opinion on this subject is much divided. A series of comparative experiments on this question of packages and woods would be very valuable, and should, your Committee consider, be instituted under the auspices of Government. It is strongly recommended that attention should be given to neatness of appearance, and to having the packages of even tare. The gross and net weights should be marked on each package.

8. With regard to the keeping quality of frozen butter, the evidence before your Committee is of a conflicting nature. Experiments to clear up this point should be instituted, as space in freezing chambers is often available when the cool chambers are full. There is no doubt, however, that the cool chamber, if an equable temperature of forty degrees can be maintained, is the mode of transit that appears most desirable.

9. The question of grading butter has received great attention at the hands of your Committee. It appears to them, however, that grading carried out in New Zealand would often be worse than useless, as butter which had been branded as first class here might, from any of several causes, turn out to be inferior when opened in London. To be effective, grading would have to be carried out in London by a qualified inspector appointed by the Agent-General; but your Committee are unable to recommend that course.

10. Your Committee find that the market in England for good butter is practically unlimited, and that European countries have nearly reached their limit of production. The attention of English buyers is therefore now being specially directed to New Zealand as an available source of supply, our fertile soil and genial climate entitling the colony to take high rank among the dairying countries of the world.

11. Your Committee are of opinion that Government may legitimately assist the industry by the above-mentioned methods; and recommend that steps be promptly taken to give effect to this report.

12. With respect to cheese, your Committee find that, while the quality of that produced by some factories is such as to command prices equal to best American, yet in many cases the quality is inferior, owing to faulty methods of manufacture, with, of course, correspondingly low values, whereas your Committee are of opinion that New Zealand presents all the conditions which should enable the colony to produce cheese equal not only to best American, but to the best English Cheddar. Your Committee therefore recommend that the Government, assisted by such associations as above recommended, should continue to give attention to the fostering and development of this branch of the dairying industry, with a view to further improving the quality of the manufacture.

9th September, 1890.

GEORGE BEETHAM, Chairman.

MINUTES OF EVIDENCE.

DAIRY.

TUESDAY, 12TH AUGUST, 1890.

Mr. THOMAS BRYDONE examined.

1. *The Chairman.*] What position do you occupy?—I am manager of the New Zealand and Australian Land Company. I can give the Committee some information as to our practice and experience in the Edendale Factory, Southland, in the manufacture of butter. The Edendale Factory was started about ten years ago by the New Zealand and Australian Land Company, for the purpose of the manufacture of cheese and butter on the American factory principle, because we were under the impression that dairy-farming was more suited for the Edendale property and for Southland generally than the breeding or fattening of stock, or the growing of grain-crops. With that object in view we started a factory on our own account, which cost about £2,500 at that time. It has cost more now. As we could not get farmers to take to the milking of cows at that time, we bought 350 milch-cows and milked them ourselves so as to get milk for the factory. That milk was made into cheese, which was principally sold in the colony and in the Australian Colonies at a remunerative price. I think we got as high as 8d. a pound for our cheese the first year. By-and-by, as the farmers got confidence in the factory system, they began to lease farms from us on the Edendale Estate, and we sold them cows on terms which enabled them to obtain sufficient capital to make a start. That system kept growing until now we get a sufficient supply from the farmers on the estate, and from adjoining settlers, to keep the factory in full milk: now we milk very few cows ourselves. In the summer time we get as much as from 2,400 to 2,500 gallons of milk a day. The price of cheese came down so much on account of other factories being started in New Zealand and in Australia also that it became necessary for us to export our cheese to the Home-market, and, as the cost of sending it there is something very considerable, and the price at Home has only been moderate of late years, the net result has not been so satisfactory as we could wish. With reference to our system of payments at Edendale, we endeavour to give the supplier of milk as full a price as is possible to be given; and the Edendale Factory has, up till now, always given a little more than factories elsewhere, as it is a matter of very little consequence to our company whether we get interest on the capital that is in the factory or not so long as we can give the farmers a price which will enable them to pay their rents. We prefer, of course, to get our rents paid regularly, and to see the farmers succeeding, to getting a big interest, or even any interest at all, on the capital in the factory. That is but a small matter to us. As the cheese which we had been sending Home sometimes arrived in what was considered bad condition, through getting out of shape, which we believed to be the result of too much butter or fat being in the cheese, we resolved to try what we could do, or, rather, what the result of making graded cheese would be. We take the cream out of 25 per cent. of the milk that comes in daily and make that into butter. The cheese is thus not so rich as what is called full-milk cheese, but we find that it carries very much better, as it is of a firmer texture. Since we have shipped the graded cheese we have had no complaint from London as to its arriving in bad order, nor have we had any losses in the factory through its getting out of shape or losing condition. We find the graded cheese is much easier handled and kept than what has been our experience with the full-milk cheese; and by making this graded cheese we expect to be able to get a bigger return from the milk than we had been getting before. We have the very best appliances for making the butter—cool and cleanly-kept rooms and an abundant supply of cool well-water for the working of the butter; and, although we were not able to secure butter-making experts, still we have men who seem to take every care, and who are as good, I believe, as it is possible to get in the colonies. In the winter season we convert the whole of our milk into butter, as the price of butter in the winter is, of course, always higher than it is in the summer, and that we sell in the local markets—Dunedin and Invercargill—getting a remunerative price for it—say, from 11d. to 1s. 3d. a pound, which, I believe, is about 3d. a pound above the price of the ordinary farmers' butter. The butter has always been very highly spoken of, and it is considered better, both by private people and hotelkeepers, than the ordinary butter they get, otherwise they would not, of course, give us an extra price for it. This shows that in New Zealand we can produce as good butter as it is possible to make. In the summer time we ship this butter to the London market, as, of course, there is not sufficient demand for it in the colonies; but unfortunately it has not turned out nearly so successful as we had anticipated on account of it deteriorating in quality between New Zealand and London, or between the factory and London. I have made every endeavour to ascertain through our Home people and the London agents what the cause of this is, but so far have been unsuccessful in arriving at any definite conclusion. Some time ago I was informed that butter exported from Wellington, which was made on the west coast of the North Island, had arrived in London in good order, and sold at over £5 a hundredweight. Thinking that I might possibly be able to pick up some information which would lead to an explanation of this, I have just paid a visit to some of the factories in the Taranaki District. I have seen their process and have made every inquiry as to their mode of butter-making and packing, but I have not found any sufficient difference in the process of manufacture to lead me to believe that there is anything in the making of their butter, and in the making of the Edendale butter, to account for the difference in

price. I find that the same factory that would get up to as high as £5 10s. a hundredweight for their butter in London would also get, for what they considered as good butter when it left here, as low as £3 or £3 10s., without being able to give any explanation for the difference in price; so that I have very little more light on the subject now than I had before I left home. There is one point that I think we may have been making a mistake in, which is, that we have been using tawa kegs from Wanganui for packing our butter in instead of totara. I find that tawa timber has a bad name for making butter-kegs, and that totara kegs are considered much better. Of course it is generally admitted that the manufacture of butter is a very delicate operation, and that the Danes are most proficient in that line of industry; and, with a view of overcoming the difficulty of putting our butter on the London market in good condition, my company have engaged a Danish expert to make our butter. I believe he has already arrived, and we are hoping that he will make such an alteration as will enable us to make butter exporting a success in the future. If his system turns out successful we will only be too glad to give every opportunity to the Government or to butter-makers to benefit by his practice. With reference to the shipment of butter, we found it very difficult to get the description of freight that we required last year in the steamers, and our butter has had sometimes to be kept for six and seven weeks in the factory before we could obtain the requisite cool space in the steamers. This, I believe, has been detrimental to the butter, and in future, as there is a prospect of abundance of freight being got in the steamers, it is our intention to ship every fortnight at least, or, failing to get it away, we mean to put it into freezing-chambers. Occasionally the butter has had to lie for a day or probably two days between the railway-station and wharves, which must also have had a detrimental effect on it. To obviate this, I think the Railway Department should pay special attention to the conveyance of butter, and give it a preference, as it were, over any other produce which they may be carrying, as it is so susceptible of damage—I mean preference as regards immediate despatch. The Railway Commissioners might also supply insulated or, at least, what is generally known as frozen-meat vans for the conveyance of butter without making any extra charge for them; and from such places as Taranaki, or places situated at a distance, if it were possible to run special night-trains in the summer, I think it would be a very great advantage to the butter-makers. Of course in the South we have a cooler climate, and there is not quite so much risk of butter getting melted during its transshipment as there is in the North Island. I believe that the steam shipping companies are well aware that it would be to their advantage to pay more attention to the carriage of butter and cheese than they have been doing in the past. Unless these products can be landed in the London market in a better condition than they have been, the trade, instead of increasing, will in all probability decrease, and it seems to be one that is capable of being highly developed in New Zealand if the difficulties of conveyance can only be overcome.

2. Do you think that exceptionally high rates have been charged for butter?—I think they have been charging more for butter than they should in proportion to frozen mutton.

3. *Major Steward.*] Do you know whether the butter should be carried in the freezing-chamber or simply in what is called the cool-chamber? Does it require to be frozen all the way Home?—I do not think that freezing will harm it.

4. But it would do at a moderately low temperature?—I would prefer it in a cool-chamber if they would only keep it at the one temperature. I am afraid of variation of temperature. They are not sufficiently watchful on the way Home with what is called the cool-chambers. Of course, whatever is in the freezing-chamber is always frozen, and consequently remains in the same condition all the time at sea. But I fear the cool-chamber is not kept at the same temperature; that it varies; and that may have an effect upon the butter.

5. From your experience, do you think the butter could go Home perfectly safe in the freezing-chamber?—Yes, I think so. It would be desirable not to have the butter in the same chamber with the mutton; it would be better to have a chamber to itself. With regard to the question of grading, I may state that factory-made butter, being considered superior to farmers' butter before shipment, should not be graded otherwise than first class; and yet our experience is that a very large proportion of it is only third class when it arrives in London. Now, from that I should be of opinion that grading here, at the present time anyhow, would be of no service whatever. Farmers' butter, which might be graded as second class, might arrive in a better condition than what was considered first-class factory butter, and might sell for more money in London; so that any grading that can be done here, I think, would be no guide as to the quality or value of the article when it arrived at its destination. With reference to giving instruction in dairying, when the Exhibition was opened in Dunedin the Commissioners there thought it would be very desirable to have a model dairy-factory in connection with the Exhibition, where farmers' sons, or other people who wished to become acquainted with the newest and best modes of making butter and cheese, could receive instruction; and, with that object in view, the Exhibition Commissioners asked the Government to allow Mr. Sawers, their Inspector, to give lessons and practical illustrations. No fewer than three model factories were in operation in the Exhibition for the first month or two, and Mr. Sawers gave demonstrations in dairying; but, so far as I am aware, the people who attended went there more from curiosity than with a view to gaining practical knowledge to be afterwards used in dairying. I did not hear of any people who attended regularly, or wanted to assist, or go through any particular course of learning all the time that these factories were in work; so that I am somewhat doubtful as to whether a school for teaching dairying, or a model factory, would be greatly taken advantage of. Our cheese- and butter-makers are rather conceited in their ideas, and it is very difficult to get them to alter. Of course, it is possible that men younger in the trade might take advantage of the knowledge of an expert and adopt his system. An expert working at a factory such as Edendale, I fancy, will do more good than one travelling through the country. At the same time, it might be useful; I should not like to say it would not. I have no doubt it would be an advantage to have an expert within call, so that any one wishing to have the benefit of his services could get him; but the butter-makers

evidently do not like to have people going round inspecting, as it were, or interfering with them without their request or consent.

6. *The Chairman.*] I think we understand you to say in your general statement that the factory system is certainly one that ought to be carried out in New Zealand as far as dairy-produce is concerned?—Yes.

7. You indicate that the poor price obtained in the English market is not owing so much to the inferiority of the manufacture here as to the difficulties in the transit?—There may be something in the system of making butter by separating the cream that we out here do not yet understand. I am not very clear on that point. There is a weakness in our manufacturing it on this separator principle that we have not discovered.

8. *Major Steward.*] And may not the possible deterioration arise from causes outside the mere temperature?—Yes, of course. We are informed that the New South Wales butter gets Home all right, and that is one thing I cannot explain: why butter made in a climate such as New South Wales, and on the same principle, should arrive and sell higher in London than butter made in New Zealand. I have been in communication with some friends of mine over there who are very deeply interested in butter-making, and I cannot discover that there is any difference in their system of manufacture. They use the same separator and the same butter-workers, and they otherwise treat it the same as we do. Theirs goes Home all right, and ours does not. I believe that one thing they do is that immediately the butter is made they put it either into a cool-chamber or a freezing-chamber. From there it goes direct into the freezing-chambers of the steamers.

9. Do you know anything with regard to the export of butter to tropical countries—to India, for example?—No, I have not had experience.

10. Do you know that butter is sent from Denmark to Calcutta and elsewhere made up in tins?—Yes.

11. And, I believe, commands a price very much higher than butter usually commands in the London market?—Yes.

12. Double the price?—Yes.

13. Then, if that is so, would it not be possible to send New Zealand butter to that market?—I think it is quite possible.

14. Therefore commanding a very much higher price than you now get?—Yes; in fact, we have had it under consideration whether we should not make some experiment in that direction from our Edendale Factory.

15. It also might be possible, if freight could be obtained, to send butter made up in that way to Queensland and some of the colonies which cannot make butter?—Yes, that is so.

16. Then, is it not likely that if Denmark has for some time been exporting butter to tropical countries the services of a Danish expert would be valuable in that direction, as giving us an idea as to how to open up a new market entirely?—That is quite possible. He would require to understand not only the manufacture of butter, but the mode of packing it.

17. *Mr. Mackenzie.*] Have you seen the new boxes of Mr. Begg's?—I have not.

18. He claims by his system of packing to be able to send the butter Home without using much salt?—Yes. I have promised to try some of his boxes as soon as they are made.

19. Have you tried Pond's boxes?—We have made a shipment of butter in Pond's boxes, but I have not yet heard the result. We have also tried Findlay's boxes.

20. You think the freezing-chamber is just as good as the cool-chamber?—Yes, I believe it is preferable.

21. And that is also the opinion of the Home brokers?—Yes. With reference to cheese, we have been shipping some of our graded cheese as ordinary cargo, and we find very little difference in the result at Home. So far as my experience goes now, it is to the effect that we have profited to the extent of about 4s. 6d. a hundredweight on account of the difference in the cost between sending it in the cool-chamber and as ordinary cargo.

22. And that difference would be quite sufficient margin to provide for a factory?—Oh, yes; we do not get quite such a good price, but we save so much in the freight as to make a difference of 4s. 6d. a hundredweight. Graded cheese carries better than full milk-cheese as ordinary cargo.

23. With respect to the conveyance of dairy-produce by the railways, do you not think the Railway Commissioners should consider the advisability of erecting cool-stores at different parts of the lines of railway in which to store the butter, instead of, as in Wellington for instance, putting it in sheds with iron roofs? Do you not think it should be a recommendation to the Commissioners to have such stores erected at the various termini?—I do not think they would entertain the question of putting up stores of that description at roadside stations. They might put up a special one at the ports—at the terminal stations. A brick store, properly ventilated, with a slate roof, or something of that kind, would be necessary, with the ceiling constructed in such a way as to make it as cool as possible.

24. Have you ever met Captain Andrews, who was employed by the Indian Government to consider the question of cooling-carriages?—No.

25. Do you know of any system that might be of use in smaller places than Edendale—a system whereby the farmers might get their milk into smaller factories?—Small factories ought to be encouraged in such places as I saw in Taranaki, and might be made successful. I believe that the factory of Chew Chong is doing very well. I visited that factory, and had an afternoon's chat with that gentleman: he is very well satisfied with the result of his operations so far. It is really the best conducted-factory I saw on a small scale. He has a remarkably good situation as a site for his factory, alongside of a big river. It is well sheltered, and it seems to be well and properly worked. It seems to me that dairying is about the first purpose that bush-land of that description can be put to, as the ground, after the timber is felled and the grass sown, is so rough and covered with logs that sheep cannot be kept, and it is not very suitable for fattening. It does not suit small farmers to fatten cattle. By-and-by, as the timber rots, it will become available

for sheep-farming and for a little grain-growing; and I think that all the encouragement possible should be given to small settlers by the Government to enable them to make a start with dairying.

26. *Mr. Walker.*] What would be the cost of erecting a butter-factory to utilise the milk of some two or three hundred cows, suitable for a bush district?—About £700. Of course the cost would vary according to the locality. In some places the site would cost more money than in others, but that would be a sort of general average.

27. *Mr. Mackenzie.*] How long would the butter keep that is made in your factory?—We have never fully tested it. Probably after three months we should find it good enough.

28. Have you made any experiments as to the quantity of salt that ought to be used?—We have been in the habit of using 3 per cent. of salt, but, as the butter was not giving satisfaction at Home, we lately increased it to 5 per cent., and I do not know what the result of that is. I hear, however, that at the factories I have lately visited about 3 per cent. is the general quantity used.

29. Then as to the quality of salt—do you use it fine?—Yes.

30. Do you grind it?—No; it is fine when we get it. It is what is known as butter-salt.

31. Then what size kegs do you use?—Kegs to hold 60lb. or 70lb. of butter are recommended by the London people; kegs with galvanised hoops; calico is used on top and bottom of the kegs, and a little salt put on the top and bottom of the kegs. I am going to use totara-wood for making the kegs in future.

32. You do not believe in the tawa?—Well, it has been condemned by people who have used it, and we are going to discontinue the use of tawa kegs.

33. *Mr. Hamlin.*] Has the tawa been dried before using?—Yes.

34. How has it been dried?—I believe the tawa kegs are made in Wanganui by a man who, I understand, is a specialist. The kegs were recommended to me by grocers in Dunedin as being the best, but I am afraid I have been misled by them.

35. *Mr. Mackenzie.*] Do you think the mail-steamers should reserve a certain space each voyage for the storage of butter?—Well, of course that is a matter which the manufacturers would require to arrange with their agents.

36. *Mr. Hamlin.*] Do you not think the Government might do it when making arrangements with the mail-boats?—Well, the shipping companies, of course, say they can get no guarantee as to the actual quantity of dairy-produce that they will be required to carry; that in some seasons, when we have a good demand for our butter and cheese in the other colonies, they get little or none to take Home; then when the colonial markets are glutted we come on them unexpectedly with a rush, when they are probably not prepared for it. That is where the difficulty comes in with them; but I believe in the future we will have very little trouble in getting the space we require. There are so many cargo-steamers with freezing accommodation being put on that there will be plenty of space for everybody.

37. *Mr. Marchant.*] Have you sent Home butter both in boxes and kegs?—Yes.

38. Do you find any advantage in sending it Home in boxes?—We have not had the result of our sending it Home in boxes. I fancy the account sales will be in Dunedin. I have been away for a month or five weeks, and I have no definite information on that point.

39. Was the complaint with regard to the tawa kegs that they would not hold the brine—that they allowed the moisture to leak out?—We have sent the bulk of our butter in tawa kegs, and it has not arrived in good condition. During my recent visits to the factories on the coast here I was told that the tawa kegs had been unsuccessful, and that they intended to use totara kegs.

40. Are you aware of the plan adopted in America, of Dairy Conferences going round and holding sessions at different farmers' houses, where information is given in cheese- and butter-making?—I have heard that such is the case. I have been in America, but I have never seen anything of that; I do not know anything of it personally. We have been trying to form a dairying association for Otago, or, rather, for the South Island, and we find that it is a most difficult thing to get the dairying people to act together. This association is to be formed with a view to the dissemination of knowledge, and also with a view to unanimous action in shipping matters, the sale of produce at Home, and other such matters regarding which it would be of benefit for people to act together, but I am afraid that it is going to fall through.

41. Does that not seem to indicate to you the desirableness of a thoroughly competent man being appointed, not as Inspector, but as teacher—an expert who would be at the disposal of communities of dairy farmers who might wish to have his services, whose business it would be to travel round the colony periodically to the dairying districts?—I have said that it might be of service to have a man that people could get advice from if they wished it. I explained that we had model dairies erected at the Dunedin Exhibition for the purpose of affording information to those engaged or interested in dairying pursuits, but they were not taken advantage of.

42. You appear to think that butter would be better sent Home in the freezing-chambers than in the cool-chambers?—I think so.

43. Are you aware that there were a series of exhaustive experiments made in Denmark on the subject?—I do not know. It is entirely different in a freezing-chamber ashore, where attention is given to keeping the temperature at a certain degree, from having the dairy-produce sent by sea, where the outside temperature varies so much, and where there may be want of attention. Freezing at sea is not so reliable. I should not pay much attention to experiments of that sort.

44. Still, if it were found that butter was damaged by being kept in a low temperature, below freezing-point, would not the butter be likely to suffer if kept in a low freezing temperature at sea?—I know that butter has been kept from four to six months in freezing-chambers in New Zealand and taken out in splendid order.

45. Do you think that it would not be desirable that butter should be sent a round journey in some of these ships—butter salted with varying proportions of salt, and sent, some of it in the freezing-chamber and some of it in a cool-chamber, so that when it got back to New Zealand a thorough exhaustive comparison could be made between the butter treated differently?—Oh, that would be very useful.

46. Should we not get some thoroughly practical results by that method?—You would require to send a man along with it.

47. For what reason?—To see that the temperature was kept at the same degree, and that the freezing was not stopped.

48. Would it not be possible to arrange with the pursers in the ships to take charge of it?—I would not trust one of them.

49. *Mr. Walker.*] I regret I was unable to be present when you made a general statement. Have you gone into the question of absolutely rejecting or preventing the shipment of samples that are not up to a fair standard?—No, I did not say anything about that.

50. Do you think it would be advisable to consider that point?—I think it would be very difficult to prevent a man shipping his butter supposing it was considered by the Inspector to be inferior. He would say, "I want to ship it to London; you have nothing to do with it; if you prevent it being shipped in this steamer direct I will send it to Australia or anywhere else and have it shipped." It is just the same as sending inferior sheep Home. There are a large quantity of ewes, second and third rate, sent Home, and they pay as well as first-class sheep in proportion. I think it is very difficult to stop a man from shipping anything he wants to. I do not see how you can do it.

51. But inspection is to secure the Government stamp being placed only on what is a good article?—You could put your Government stamp on.

52. You might refuse to brand what does not come up to the standard?—Yes, even with the Government stamp on it may arrive in London in bad order.

53. But daily experience goes to prove that a certain amount of equality may be secured by inspection?—Yes, I believe so.

WEDNESDAY, 13TH AUGUST, 1890.

Mr. W. FERGUSON, Secretary and Engineer to the Wellington Harbour Board, examined.

54. *The Chairman.*] It is stated that a great deal of the damage that takes place to butter is mainly owing to faulty storage—not here particularly, but in the different ports of New Zealand. Can you give us any information as to butter-storage?—So far as we are concerned, we have only provided ordinary stores. The question cropped up some two years ago as to our providing cold storage. We then asked for statistics to see whether it could be done. No statistics were produced which would warrant the Board in doing it. There was no certainty that it was really required. At that time I started taking the temperature of one of the sheds, and I have taken the temperature ever since. I have not these records with me, but I can produce them for you.

55. Can you give us approximately?—I cannot trust my memory. The last six months I have not been taking the records myself; my assistant has been doing so. [Table giving temperatures appended.]

56. Is the matter of cool storage now under consideration?—The Board are having plans prepared at the present moment for a new office and bond. They have not gone so far as to decide upon having the buildings erected; but I fancy that in two months we shall be calling for tenders for them. They will contain a small amount of cellar storage.

57. What space do you expect to provide?—There may be 1,200 square feet of floor-area. I am just speaking approximately. The cellarage is about 7ft. high. That would be available for cool storage. There is, I may say, private cellar storage in Wellington.

58. But there is not refrigeration?—Except at the Meat Company's works, and their charges are stated to be too high. They find it better to freeze meat instead of butter. The amount of storage they have available for butter is small, and they find difficulties in dealing with it. *Mr. Sladden* would be better able to give you information on that matter.

59. Would it be practicable to include in your proposals some system of refrigeration?—I do not think the amount we would get to store would at all warrant it. I imagine also the price would, for that reason, be prohibitive. I do not think the Board can at all compete with freezing-works because they are without plant. If we had to procure a large and expensive plant I think our price would be prohibitive. We need not for simply a few cases of butter run into the expense of providing freezing-plant and competing with freezing-works. I think that is quite patent. When the matter came before me I did not go into the question of cost at all because it seemed to be so patent.

60. Would you take into consideration the possibility of refrigeration by ammonia machines?—In the plans for the building I have provided a couple of flues, in case we had to go in for any such thing. I did it, however, as much for ventilation as anything else. I do not think it will ever come to anything. The cheapest method of storing would be for the Meat Export Company, or some person owning frontage on the line of rails, to make such provision. The stuff could then come down and go directly into the freezing-chamber. If it were to come down to us it would have to be received by rail at the store, and then carted to the chamber, and from the chamber to the ship; and it appears to me it would entail unnecessary expense.

61. It would be absolutely impossible to provide refrigeration on the wharf?—Well, the question is, where can it be put? We cannot spare the accommodation.

62. The expense of insulation would be altogether too high?—The expense would be altogether too high. Of course, if the trade was a constant trade—if we were certain of a considerable amount continually—it would be desirable to consider the matter; but, as far as I can see, the trade is very irregular.

63. Would it not be worth your while to consider in this way: the trade is irregular because prices are so irregular, owing to the defective accommodation?—That is speculative, and I do not think any public Board should go into speculation. That would be legitimate only for private

enterprise. I do not think the Board should spend capital on works which are based on purely speculative grounds. In the case of cattle, we were called upon some time ago to make provision for shipping them, and great contumely was thrown upon the Board because they did not at once do so. It was simply a flash in the pan. If the Board had given way to the cry and gone on with it we should have been put to considerable expense and had no return. It may have been that if the trade had continued the expenditure would have been justified; but there was the possibility that it would not continue. We made arrangements with the railway authorities to deal with the cattle, and that was sufficient.

64. Have you had any complaints about the storage of butter on the Queen's Wharf?—Not in the Harbour Board sheds. There have been several cases in which the butter was bad before it came from the coastal steamers, as in a notable case ex the "Wanaka."

65. From Taranaki?—Yes.

Maximum and Minimum Readings of Thermometer taken in Shed D, Queen's Wharf, Wellington, daily, at 9 a.m., Sundays and Holidays excepted.

Year.		Jan.	Feb.	Mar.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.
		Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.	Mx. Mn.
1889	..	87	57	78	58	76	51	71	49	69	41	59	40
1890	..	79	54	80	55	80	51	73	49	68	45	65	44
		59	40	59	41	61	42	68	46	71	47	73	51
		76	57	76	57	76	57	76	57	76	57	76	57

Greatest Range in any Twenty-four Hours.

1889	..	23	15	13	16	13	10	14	15	21	14	16	17
1890	..	18	20	18	10	11	12	13	..	..	..	..	..

Greatest Range, with one or more Holidays intervening, during which Shed was closed.

1889	..	15	15	13	16	13	9	12	12	14	12	16	17
1890	..	18	20	18	17	12	12	7	..	..	..	..	..

NOTE.—Readings correct to 1°.

Mr. G. H. SCALES, examined.

66. *The Chairman.*] You are a merchant residing in Wellington?—Yes.

67. You have had considerable experience in the purchase and sale of butter, I think?—Yes; but principally receiving it on consignment for sale in London.

68. Will you kindly give the Committee your opinion as to the best mode of fostering the dairy industry?—That is rather a broad question.

69. Would you rather answer a series of questions?—Just as you like; I do not mind. I started this business some three or four years ago. In 1888 I shipped Home a fairly large quantity of butter and a very large quantity of cheese. The butter then did not turn out satisfactorily. I do not think it brought more than £4 10s. per hundredweight. This year that price has been considered good, but at that time it was not considered so. In that year the market for cheese was most erratic, prices ranging from £1 4s. to £2 16s. per hundredweight. All sorts, shapes, sizes, and conditions were sent to London. The prevailing idea was that cheese should not be shipped Home until three or four months old, the result being that when it arrived it was strong and crumbly, and in every way objectionable. The sizes varied from 25lb. to 40lb., while in London the sizes wanted were from 50lb. to 80lb. At the end of that season I went Home, solely to have a look round the dairy districts, and to see why it was that our butter should not turn out as well as butter made in Normandy or Denmark, or even in England. My London agents have been connected with this business for a very large number of years, and before I came out here I was in their office for three or four years. I thought the trip Home might give me some information. I had only a few weeks, and I spent two of that time in Normandy, going through the principal districts there. I saw exactly how the butter trade was manipulated there. I had not time to go to Denmark and so cannot say anything about the way in which it is done there. Last year the trade took a spurt: it was anticipated that very large shipments would be made to London. The people were, however, keeping it back in order to get large prices here, and were sending a portion of it to Sydney. The large prices were never realised in Sydney, and those who shipped to London did very well indeed.

70. What were the usual receipts?—I do not believe my London agents sold a package under £5 8s. per hundredweight. Prices ranged from £5 8s. to £6. As regards cheese, I had been shipping the year before for the Greytown Factory, in the Wairarapa, the Wanganui Factory, the Manaia and Otakeho Factories, and one or two factories in Gisborne. The Greytown Factory results were so bad that they decided not to ship any more, and they sold to a firm of merchants in Wellington. The Wanganui factory collapsed. The Otakeho and Manaia Factory changed hands, and the purchaser then turned the Manaia Factory into a butter-factory, and has since had great difficulty in obtaining a proper supply of milk, because the people who were formerly supplying the milk had turned their cows out. One of the dairy-factories in Gisborne had to be closed; I bought it myself and started it again. The Ormond Factory (the other Gisborne factory) got into a bad way financially, and another man took it and sold his produce locally. Practically, the output of that year was very small indeed from this port. It has not been very large this year. I think only two or three factories have been shipping at all. I think it was the disastrous effects of the previous year's ship-

ments Home that caused them to refrain from shipping to London again. Referring to this past season's experiences, there are, to my mind, two or three reasons for the cause of the great fall in butter. One was undoubtedly the drought in Sydney last year. People held their butter back, anticipating very high prices. I know people told me when I offered 9d. and 10d. to them, "Oh, we won't sell for that, we will get 2s. for it." They held on and held on, and what was the result? They could not get more than 5d. for it. Wet weather came on the other side, and as soon as rain comes on there, as you know, milk is plentiful. I believe, one man in Masterton had 800 packages, upon which he anticipated making an enormous profit. He went to Sydney and tried to sell them, but could not get any offer at all. He sent them Home, I think, in the "Coptic;" the butter was all old and should never have gone to London at all. I was offered a parcel of 3,000 kegs for 3d., and was told I might get it for 2½d.

71. It was simply grease?—Of course it was, but it went Home as butter. I am sure there must have been 3,000 or 4,000 packages sent Home from here at the same time, all the previous season's make. A great portion of it was salt butter. We should not send salt butter to London. They can get any quantity from America or anywhere else, but they cannot get fresh butter. There is no use trying to sell salt butter; I have tried over and over again, and have found they will not give payable prices for it. I maintain that was one of the reasons for our prices being so much lower than they were the previous year. It went Home to London in large quantities, larger than before, and it was bad. Well, "give a dog a bad name and you may as well hang it." There is another thing that took place in England which militated against good prices—that was, the particularly mild winter there. My agent wrote me saying that, had certain classes of butter arrived to a market such as they had the previous year, they would have got from £20 to £24 per ton more for it. I have compared their quotations for Normandy and Denmark butter for the corresponding periods of two years, and I find that what they say is correct. There was at least a difference of from £20 to £30 per ton in the prices of those two years. That is a thing which cannot be avoided, no matter how good we make butter here. If the weather is mild at Home the supply of butter is plentiful, and, of course, we cannot expect good prices. Now comes another point, which, of course, can be remedied by ourselves in New Zealand. You were talking to Mr. Ferguson about this storing of butter. Until this year there has been practically no butter-storage required here. Though it may come to merchants in large parcels, these are collected in smaller lots by the factories and storekeepers, and probably from various farmers and producers. The majority of that butter will not be more than two weeks old.

72. It could be more?—No, I do not think so. It ought not to be. The difficulty we have to contend with is getting it away. The reason is this: that last year, instead of shipping to London, it was thought there would be a good market in Sydney, and the butter was allowed to remain in the private vaults. Vessels came to get dairy-produce, and when they came there was no dairy-produce to go. You will understand this: You can put dairy-produce into a chamber that has meat in, but you cannot put meat into a chamber prepared for dairy-produce, because the temperature is so much higher in the latter than the former. Practically, these ships had to go away empty. It is an absolute fact that people have come to me—I remember one case in particular; a good lady came and booked her butter for London, and she came a week or two afterwards and said she was going to send it to Sydney. I went to the shipping company, and they demurred as to cancelling the shipment. I told her, and she went down to see Captain Rose, the agent of the shipping company, and he agreed to let her off. She shipped her butter to Sydney, and did very well out of it. She got 1s. per pound for it. She came into the office on another occasion crying bitterly. She had again sent her butter to Sydney, and only got 2½d. per pound. She said she was going to ship to London this year. Had the people here shipped the butter to London there would have been no question about not having space. Last year the ships provided space and they had no butter to take. This season the shipping companies said to dairy-produce shippers, "We will ship meat, because we have guaranteed freight, and if there is any room we will take butter. If there is no room you will have to go without." That is practically what was done this year. The butter came down here in large quantities from Taranaki and the Wairarapa, mostly Taranaki, and there was no space available for it. What could be got away was got away at an increased charge, which was unfair to the producer, from the producer's point of view. The space was all in the hands of the meat export companies, and we butter-shippers had to buy space from them. I was told that if I could get space a man would give me 7s. 6d. per keg. I paid 2s. myself, and in one instance sold it to other merchants for 3s., and then under conditions that were really most scandalous. They had to send the butter to Christchurch, pay 3s. 8d. per ton for freezing, as well as other charges. It came to something over 1d. per pound, the original freight being 1d., and thus it was doubled. I fully believe that butter was lying here for a considerable time waiting for an opportunity to have it shipped.

73. Three-eighths of a penny would have been paid by the original holder of the space as a charge on the freezing of meat?—The butter had to be frozen. There was such a quantity of butter going last year that ships declined to take it unless frozen. They said "If you put this butter with the meat it will increase the temperature, so it must be frozen." Thus the bulk of it had to be frozen.

74. It does not damage the butter to freeze it?—Experience leads me to say no, though a lot of people will tell you that frozen shipments of butter have gone bad. I have never had any expression of opinion, either one way or the other, as to whether any butter sent by me was damaged owing to its having been frozen; nor have I been able to observe any difference in prices realised on that account. When I was at Home dealers told me freezing did not damage it.

75. *Mr. Walker.*] Do they thaw the butter before they sell it, or does it just come straight out of the stores?—It all depends how long it is out before it is sold. It is allowed, I believe, to thaw naturally.

76. When you were in England, did you see any butter that had been frozen?—No, I did not.

77. *The Chairman.*] It strikes me that, with the expansion that takes place when a frozen keg is thawed, the keg cannot be so tight; and the question of storage in the Old Country, if the butter is not stored in freezing-chambers, might materially affect the quality of the butter?—One objection to freezing is that the hoops fall off. There is not the slightest doubt that freezing does cause the hoops to fall off.

78. Would it not be better to send the butter Home in boxes?—I emphatically say yes. I am a firm believer in boxes, as against kegs, but I do not think the butter does get damaged in any way when it gets Home, as it arrives Home in cold weather. If you shipped butter in April or May, getting Home in June or July, of course that would be a different thing. Butter that lands in London after the end of March is generally sacrificed; but up to that time, the cold weather lasting until the end of March, the question of packing would not affect it. Butter sells at £20 per ton more if put into the market before the cold weather disappears. I have brought up some papers in connection with that particular point. In August, 1889, Normandy butter was quoted at from £4 to £5 12s.; Danish, £4 16s. to £7 9s.; and New Zealand, £3 to £4.

79. And that would be New Zealand butter of good quality?—Yes. Of course, you will find only a very small amount of New Zealand butter in the market then. It has been butter shipped away from here in June.

80. *Mr. Walker.*] Do you know in what shape this Danish butter reaches London?—In kegs. I do not anticipate the same difficulty occurring again in getting butter away. I have got papers here to prove to you conclusively that the amount of damage done to the butter was caused by its awaiting shipment in Wellington. I have not a shadow of a doubt as to this. I have already alluded to the fact that large shipments of old butter were going Home early in the season, and the particularly mild weather experienced at Home had led to a general fall in the price of all butter, this augmented still further the special fall in anything sold as New Zealand butter. There is no doubt the quality of the butter this year, especially in the latter part of the season, was not as good as it might have been. We had a very dry summer, and in Taranaki particularly so. Only a few weeks ago I was around the butter districts, and, in talking the matter over with the dairy-farmers, I gathered that the cows were particularly short of anything in the way of green grass. I have no doubt at all that was one of the reasons that tended to diminish prices at the latter part of the season. In the early part of the season I got satisfactory prices. I did not get as high in any case as I got last year. I did reach as high as £5 10s. for one particular shipment, and a few other parcels were sold at £5 and over. Last year the minimum price I got was £5 8s., except for some sold in June at £3 10s. or £4, and, of course, that was quite out of the season.

81. *Major Steward.*] Could you give us any recommendations? Is there anything that this Committee could recommend to the House or Government which you think would tend to put the trade on a better footing or remedy any difficulties that exist?—I have none, I think.

82. *Mr. Walker.*] Have you seen a letter in the *Otago Daily Times*, written by Mr. Davidson, general manager of the New Zealand and Australian Land Company, from Victoria?—I have it in my pocket; I have not read it.

83. He attributes the low prices a great deal more to the inferior quality of the butter, and he points out that our dairy people are not sufficiently careful in the practice of the art of making butter. He attributes the low price to the want of quality a great deal more than you apparently do?—Well, I would allow a certain portion of the reduction is owing to that, as previously intimated to you, but, as then stated, any inferiority in quality is attributable more to the dry and poor pasture than to bad making.

84. There is another question: it is asserted by him that the Australians have beaten us?—I deny *in toto* that they have beaten us.

Mr. Walker: This is what Mr. Davidson says. [Extract read.]

Witness: What is the date of that letter, sir?

Mr. Walker: 19th June.

Witness: You will recollect I told you several thousand packages of very old butter went Home in the early part of the season. If you were to turn up the papers you would find we had cablegrams out from London stating that New Zealand butter was being sold at £1 8s. and £2, and Australian at £5. I believe at that time I had some thousand or two packages of butter in the London market, and I do not think I could give you any better information than the fact as to what they were sold for. It was about the end of last year, about Christmas time, we saw these cables. I have here in my advices the following prices: 1,448 kegs sold at an average of £4 5s. per hundredweight; 290 boxes sold at an average of £4 13s. 2d. per hundredweight. Now, that lot, I suppose, represents 1,500 or 2,000 packages. Out of that lot there were probably not more than fifty packages sold at under £4.

85. *The Chairman.*] Showing the unreliable character of the cable messages?—Yes.

86. Who is responsible for that?—I do not know. What I want to point out is this: that no doubt it is perfectly correct what Mr. Davidson says. There may have been thousands of packages sold at from £1 8s. to £1 10s., but it was the old butter of last year. It was not butter made for the London market at all. It was butter brought down for Sydney, and never sent there.

87. An instance has been given of two packages being forwarded here, and unfortunately one had to remain on the wharf, and the one that remained on the wharf was sold for so much less than the other?—I may say that I did not ship any butter in Shaw-Savill's boats. All my butter went in the monthly steamers of the New Zealand Shipping Company, so that it was all detained here a great deal longer than it need otherwise have been, but notwithstanding that I believe my prices are better than anybody else's. I will give the reason afterwards. With regard to these two cases, I will tell you about them. The "Tongariro" was to have left here about Christmas, on the 26th December, and I had some twelve or thirteen hundred packages to go by her. The packages came down, but the vessel could not take them. They had to wait for the "Aorangi," which went a month later. The "Aorangi" came in shortly after the "Tongariro" left, and she took in the butter

that had been shut out of the "Tongariro." It was taken on board, and put in the cool-chamber. The "Aorangi" went down South to discharge her English cargo, came back, and sailed from here one month after the "Tongariro." I had another fifteen or sixteen hundred packages to go in her when she came back. (As soon as I know when the steamer will be ready to take my butter I wire to my people in the country to send their butter down, and they forward it by vessel or train as the case may be.) I obtained for the first lot of butter that went on board a bill of lading marked "A," and my people at Home advised me of the following prices: 419 kegs at £2 15s. 6d.; 350 boxes at £1 17s. 9d. Those are some of the prices, the highest prices, advised in the first bill of lading "A," which was the butter that had been left behind and stored. The following are some of the highest prices advised of the second lot of butter, marked bill of lading "B," which was sold at the same time and which was not stored: 391 kegs at £3 17s. 4d. per hundredweight; 391 boxes at £4 3s. 3d. per hundredweight. I may also say that the great bulk of the butter in the two lots came from the same people. I will give you a specific instance. Fifty boxes branded "Star" were sold in bill of lading "B" at £4 12s.; sixty boxes "Star" brand in bill of lading "A" only fetched £3 2s.; twenty-two boxes in bill of lading "A," branded "P.D.F." were sold at £2 16s.; twenty-five boxes, same brand, in bill of lading "B" fetched £4 12s. And there are a lot of similar instances.

88. The butter in bill of lading "A" was really in your hands a fortnight?—Yes.

89. It was in the wharf sheds?—No, I never keep my butter in the wharf sheds.

90. *Mr. Walker.*] Do you know what Danish and Normandy butter was selling for at the same time your butter fetched £4 12s., as a matter of comparison?—This advice is dated 31st March. The prices for Danish and Normandy butter were: Danish, £5 to £6; Normandy, £4 16s. to £6 4s.

91. *The Chairman.*] In dealing with butter, you buy separator butter more readily than ordinary butter?—I do not buy at all.

92. You merely ship?—I merely ship on consignment.

93. You consider separator butter is the best for export?—Yes, I think it is, though singularly enough I have got the highest price for non-separator butter, but, still, the average is better for separator butter.

94. It is uniform?—Yes, it is more uniform.

95. Do you consider a system of grading would be an advantage before shipping from here?—I have not the slightest doubt it would be if it was practicable. I do not think it is practicable.

96. Why do you consider it not practicable?—Because it necessitates the butter being stored here for some considerable time before shipment, and we know it cannot be stored here for that time. We have not the accommodation for storing it of the proper kind.

97. You consider our position is not analogous to that of the Belfast people, the Irish butter dairies?—You see, at Cork, where the butter is graded, it is made at regular times, and Danish butter, of course, is made under Government supervision, and they are in no great hurry. We have not cool-chambers to store the butter in. If we had, and could allow the butter to be stored there for a week, it would be a very good thing.

98. Who grades Cork butter?—The manufacturer, I believe.

99. And Normandy?—The Normandy butter is graded by the manufacturers.

100. You are not referring to Government supervision?—No. In Normandy the producers are all small farmers, who send their butter to the markets.

101. *Mr. Valentine.*] The trade has found it desirable, as wholesale buyers, to adopt the system of grading?—Yes. I think there are four qualities in Normandy butter.

101. *Mr. Mackenzie.*] Do you know anything about tinned butter?—Yes, I do; that coming from Normandy. It is mostly margarine.

102. Inferior butter?—Yes. I have tinned some butter, and sent it Home last year, and I am going to send some more, and I hope to be able to make a trade of it. Of course it is in its infancy.

103. We have got a large quantity of butter which might be tinned, and it could be sold as good stuff at a reasonable price, could it not?—I believe it might be, but it costs so much money to tin it. It is necessary to send it Home in certain classes of tins. I could not get the tins made in the colony anywhere. My people had to send the tins out, and, of course, I was put to the extra expense of paying the freight on them.

104. What tin is it? Of what size is it?—Various sizes. I could get the same kind of tin made, but not in the same size. And if I could get the size I could not get the right shape of tin.

105. Are they flat or long tins?—About as deep as they are broad.

106. It is not capable of being got from the factories?—I tried everywhere. I could not get them made, and they had to send me out some. They said it was very good butter, and was quite as good as that which they had been accustomed to receive, but the price was too high. It is wanted for South America.

107. *Mr. Walker.*] Do you ship from here to South America. No, I ship it to England.

108. If it is wanted for South America, instead of sending it in that way, we ought to do a direct trade?—I suppose we ought to. My people at Home, who do a good trade in this butter with South America, receive their supplies from North America, and they are in hopes of being able to supply South America with New Zealand tinned butter.

109. *Mr. Valentine.*] You have paid a great deal of attention to the difficulty of handling butter, because of its delicate nature and its deterioration in consequence of exposure: do not you think it would be better for the farmers to make cheese rather than butter, cheese being more easy to handle, and there being less chance of damage?—There is very little in cheese, and there is this: You want a very large quantity of milk to make cheese, and, further, there is no use in sending Home cheese unless it is very uniform in quality. There is a greater risk of farmers making cheese of an uneven quality, shape, and size than there is in making butter,

110. Quite so. I am referring particularly to factories?—Well, the difficulty I have found is this: that the people want such a lot of money for the milk. There are not very many butter-factories. There are some private butter-factories, but there are not many public factories. As soon as a butter- or cheese-factory starts the owners of the cows say, "We want 3d. or 3½d. per gallon for our milk;" and you cannot pay that price and make cheese-making pay. We can do it in the colonial market very well indeed, but we cannot do it with large quantities to sell in Sydney and at Home. Some factories, of course, only take a proportion of their milk for their cheese and put the rest of it into butter.

111. What is your opinion as to graded cheese?—My people tell me it is a mistake to send anything but full-cream cheese. When I was at Home I went into this cheese business. I was anxious to go to Canada, and my people were anxious that I should go; but I could not spare the time. I found out, however, and was perfectly satisfied that, as regards cheese, the people we have to compete with are the Canadians. If we want to get good prices we must make full-cream cheeses, the same as they do. When I came back, in conjunction with another man, I took the Cook County Dairy-factory, and I went up there to tell the man exactly what sort of cheese he ought to make. He went on making cheeses till he made one to my satisfaction, and I may say I have not sent any cheese to the London market that has been reported badly on since.

112. *Mr. Mackenzie.*] What have you got for your cheese?—£2 to £2 16s.

113. Net price?—That is the price at Home, we get £2 16s. at Glasgow. Fifty-two shillings is the highest we get in London, and I have never heard of anybody who has got higher or as high this year. We have been getting £2 5s. and £2 6s. for a good deal of it, but this has gone Home as ordinary cargo, and not shipped in the cool-chambers, and this makes a corresponding reduction in the cost to equalise the reduced price got at Home.

114. *The Chairman.*] This price you obtained from your factory has been remunerative to you?—I think so. It is one of those cases in which you cannot see at any moment how it is turning out. We estimate that on our work for the year it ought to pay us.

115. What price were you paying for your milk?—We were paying 2½d. and 3d.

116. *Mr. Valentine.*] You found, I suppose, by conversation, that 3d. would pay the farmer for his milk?—Oh, yes.

117. Pay quite well?—You see, of course, that would depend to some extent on where the place is—the value of the land the farmer is, as it were, producing his milk from. For instance, at Taranaki the average value of the land would be £9 per acre. Well, 2½d. would pay the owners of that land. In Gisborne the average value of the land is £20 per acre; and the farmers there cannot afford to sell at 2½d. I may say, if it was not for the pigs, I do not think the concern would pay at all.

118. Do you keep your pigs far away from the factory?—Not very far; not far enough, to my mind.

119. Could you hazard a statement as to whether, in your opinion, butter- or cheese-making is likely to be the most profitable, so far as these factories are concerned, considering all the circumstances?—That is a hard question to answer. I am of opinion that cheese-factories, if managed properly and worked on the mutual co-operative system, would pay best.

120. It is a very material one?—It is a very hard question to answer. It is purely a matter of opinion, and I must own to have been somewhat vacillating on it. During the last two or three years I have changed my mind on several occasions about it. I should like to consider the matter before I gave an answer. One thing I may mention, and that is in connection with the shipping of butter here. I had a very long interview with Mr. Richardson in connection with this butter business before the House sat—in fact, one or two interviews—and I particularly drew his attention to this fact: that damage was done to the butter coming down in the coastal steamers. Mr. Ferguson drew your attention to it. I think it will become necessary that the butter should come down by rail. At present the rate of freight is very high coming from New Plymouth. I have been to see Mr. Richardson; he has promised to go with me to see the Railway Commissioners about it, and try to get the rate reduced if possible. Another thing I drew attention to was this: Whether the Commissioners could not arrange to run special trains down to meet the different steamers and collect butter on the way.

THURSDAY, 14TH AUGUST, 1890.

Mr. JAMES MCKERROW, Chief Commissioner of Railways, examined.

Witness: With regard to the accommodation, we have got what we call ventilated vans. The construction of them is shortly this: There is a double wall with an interval between the walls. The outside wall is perforated, and the air passes through, especially when the van is in motion. There is thus a constant current of air passing through, keeping the interior as cool as the ventilation of the air permits. Then, while on the journey, the guard takes care at each stopping-place to see that the door is a little ajar, so as to give the additional ventilation obtained by that means. The department is of opinion that these cars are quite safe and quite suitable for the transit of butter, and that it in no way is injured in its passage on the railway. Any injury that takes place in land-transit is at the port, before its gets into the cool-chamber of the ship. From inquiries that I have made this morning of Mr. Gear, who has given considerable attention to this subject on account of his particular business, and also on account of his recent visit to England, he informs me that he thinks the arrangements on board ship are very inadequate—that there is no special cooling-apparatus in connection with the butter-chamber; that it is simply placed alongside the mutton refrigerating-chamber, and that the temperature ranges between considerable extremes. He stated that the steamers trading to Melbourne had a special arrangement for cool air for the butter-chamber, irrespective of its locale in the ship. The steamers trading from

Melbourne to London had a much better arrangement, and had special provision for regulating the temperature of the butter-chamber by an independent supply of cold air. He attributes the superior price given for the Victorian butter to this circumstance alone. He is not sure, but rather thinks that in the new freight-steamers being prepared for New Zealand this arrangement is made.

121. *The Chairman.*] Do you know the system adopted for the carriage of butter and such kind of products by railway in Victoria or in the Australian Colonies?—I observe from the *Sydney Mail* newspaper of the 25th July that they have just introduced a new refrigerating-car into the New South Wales railways for the carriage of fresh meat. The principle of the car is analagous to our own car, with this addition: that they have a partition in the middle of the car. In this partition they place blocks of ice. Similarly at each end of the car they place blocks of ice. This expedient enables them to carry fresh meat in the semi-tropical climate of New South Wales for hundreds of miles without deterioration.

122. Can you tell us what would be the average temperature of the cool-cars you mention as being used in New Zealand?—I made that inquiry of our officers, but they cannot tell me the difference between the temperature inside the ventilated car and the exterior of it.

123. Would the construction of a car such as they have on the New South Wales railways be an expensive matter?—Oh, not at all. It could be applied to our cars with a little adjustment; but of course it would add very much to the expense, because I also ascertained this morning from the Gear Company that the cost of ice is 2d. a pound. Of course, in larger quantities the cost would be less. In the car that I refer to as just introduced on the New South Wales railways there is placed 6cwt. of ice in each partition of the car.

124. It would not require a greater degree of coolness for the carriage of butter than that required for the carriage of fresh meat?—Not quite so much; it would be, I think, very considerably less.

125. So that the chief cost to the department would be the construction of the cars?—Yes; and, of course, the attention required to replace the ice, in addition to its cost.

126. Can you give us an idea what the additional charge would be?—I could not give you any reliable information. I do not think it is necessary in our climate, even on the hottest day, to cool by ice. I believe the ventilating arrangement I have already referred to is quite adequate to keep the butter at a temperature that will not deteriorate it. There might be damage if the van was standing during a summer day, but in running the fresh air goes through it, and, as the train goes round curves at different parts of the line, the sun and wind play upon the car pretty uniformly. If it stood in the station-yard with the sun beating on one particular point for hours, then the car would get intensely heated up.

127. It is stated that great difficulty is experienced by shippers of butter owing to the insufficient accommodation provided by the department at wayside stations?—I am not aware of that. If we get intimation that butter is coming we send a car to suit. We do not send the ventilated cars on the mere chance of picking up butter. If there is an order for butter to be delivered at any particular place we take care that we have the necessary accommodation.

128. On receipt of due notice the department always provides one of these cool-cars for the carriage of butter?—Yes. The minimum quantity we take is 4 tons; we would not provide a ventilated car for half a ton. We could not be supposed to run one of these cars through the distance with so small a lot. The minimum on the reduced rate is 4 tons.

129. Would it be possible for the department to run night-trains during seasons of hot weather?—It would if there was sufficient inducement.

130. What tonnage would warrant the department in running night-trains?—Fifty tons.

131. Then, we understand that if the butter-producers at Taranaki arrange with you they could have night-trains to run through?—Yes.

132. Would it be possible for your department to make an arrangement with the Manawatu Railway Company to bring the butter right through?—I cannot say. I wish to point out to the Committee this: that it takes about fifteen hours to run through from New Plymouth to Wellington, and, necessarily, in the summer time there must be a great many of the hours within which even a night-train would be exposed to the heat of the day. Supposing we started from New Plymouth, say, at 7 o'clock at night we could not deliver the butter before 10 or 11 o'clock next day; and, unless there were very smart despatch, the heat of the day would be up before the butter was in the ship.

133. *Mr. Marchant.*] Are the van-cars you speak of the same as you use for meat?—Yes, the same cars.

134. You were in communication, I think, with some patentees in America last year on the subject of cars cooled by the ammonia process?—Yes.

135. You remember my communicating with you on the subject?—Yes.

136. Did you get any satisfactory information?—No. We asked the Agent-General to communicate with that company, which he says he did. The company sent out a prospectus as to what they were going to do. We went as far as to intimate that we would order their apparatus. They then replied that they were not in a position to supply a special ammonia apparatus, but whenever they were they would inform us. We never heard any more about it. It was merely a prospectus: I do not think the company was carried on.

137. Would it be possible for the department to provide anything in the shape of cool-storage at the ports?—It would be quite possible. Speaking of the Taranaki trade, I think it would be the business of the Harbour Board here to have a small portion of their store converted into a cool-chamber. It could very easily be done, and they could get cool air from the refrigerating company's works here. I think it is an essential point in the safe transit of butter from New Plymouth to ship at Wellington that provision should be made in Wellington to put the butter immediately it arrives by train into a cool-chamber.

138. A question was asked of Mr. Ferguson, Secretary to the Harbour Board, yesterday as

to whether the Harbour Board could see their way to provide accommodation, and I understood his answer to be that they could not see their way to provide any special cool-accommodation to keep the butter at a low temperature. If they could not see their way to do it, could not the Railway Commissioners come to the assistance of the dairy-farmers by undertaking what appears to me a very essential duty?—It would be quite possible for us to do so.

139. And without any very great expense I should imagine?—I could not say about that. I did not contemplate our being required to do that. All the available land close to the refrigerating company's works is occupied by the Harbour Board, and if we wanted cool air from the refrigerator it would have to be conducted a considerable distance, and it might lose its coldness in the passage. I think it is a very essential thing to provide cool-stores, whoever does it.

140. *The Chairman.*] The Commissioners are prepared to give that matter their consideration?—Yes.

141. *Mr. Walker.*] We had it in evidence yesterday from Mr. Scales that what was required were night-trains to bring down produce to meet the large steamers, so as to avoid storage in Wellington at all. That was his experience of the trade, and he stated that the shipments in which he had been most successful for his clients had been shipments where the clients never sent produce down to Wellington until the steamer was ready to sail, and it was put on board immediately. He thinks the department should run special trains to fit the steamers sailing, and that cool-chambers here would then be unnecessary?—If the trade developed into a very large thing that might be done—if all things worked together. At the present time the large steamers lie at the Queen's Wharf, and you must cart the produce from the railway-station round to the Queen's Wharf. I think the important thing is to get it from the railway-wagon into the cool-chamber at once, so as to save the risk that arises from its being transferred from one vehicle to another, and to the ship. The Gear Company's hulk "Jubilee" lies alongside to discharge mutton, and it is possible that butter would sometimes have to wait a day before it could be got in.

142. Do you not think there could be an arrangement by which the butter should only come down when the steamer was ready to take it in?—It would be difficult to arrange these things, especially for each steamer. There are so many people to communicate with in order to arrange matters.

143. *Mr. Marchant.*] Could you not meet the time when the boats leave?—They are somewhat irregular as to times of leaving, and, in the hurry and bustle of loading, contingencies would sometimes arise preventing prompt delivery from the railway train-service. The steamers might say, we will take your stuff on a certain day, and at the last moment not be able to do so.

144. *Mr. Walker.*] The steamers run from here punctually every second Thursday in the month?—Yes, if they leave here for England direct; but on some other uncertain day if the steamer departs from Lyttelton direct.

145. After the lines were cleared some time there would not be much difficulty in getting a special train?—I wish to emphasize the importance of having a cool-store in Wellington, to guard against mishaps. I have already stated that the Harbour Board is in possession of the ground adjacent to the refrigerating company's works.

146. *Mr. Marchant.*] But probably you would be able to arrange with the Harbour Board for a site?—The land is all occupied by the Harbour Board buildings. On the spur of the moment, I should say that a small portion of the large shed might be partitioned off for this purpose. We could run our wagons into it, so that every despatch would be given to the handling of the butter.

147. *Mr. Walker.*] Has the Wellington Harbour Board got limited powers as compared with other Harbour Boards?—The Secretary knows the powers better than I do. I should say that there is nothing to deter them from doing it if they are willing. They have now large stores, and it is part of their business. It quite falls within the scope of their powers, I should say, to provide suitable accommodation for the goods they store and handle.

148. He (Mr. Ferguson) expressed the opinion that the Board had gone beyond their powers already?—I know nothing of that. I know nothing special to stop them from giving facilities.

149. *The Chairman.*] In the event of refrigerating cars with ice being found necessary, what time would you give the manufacturers to take their goods out of the cars here?—Four working-hours from arrival. After that, cars standing for unloading would be liable to demurrage.

150. And, in the event of it being necessary, further time can be given by paying certain demurrage?—Yes; 5s. for the part of the first working-day over four hours, and 10s. each day or part of a day, over the first working-day.

151. You would have sufficient vans to allow them to do that by paying demurrage?—I would not like to say that. I may mention that, as we do not care to use the ventilated cars for general transit purposes, and keep them specially for this business, we do not wish to have a very large stock of these vans—a dead stock.

Witness: With regard to railway charges, the Railway Commissioners succeeded in arranging with the Manawatu Railway Company for a through rate from New Plymouth to Wellington at £2 8s. a ton, as from the 1st of January last. Formerly the rate was much higher. That rate is for a minimum of 4-ton lots. It comes as near as may be to $\frac{1}{4}$ d. a pound on the butter. I may state that, if we include wharfage, and allow for the fact that the steamers charge by measurement and not by weight, the cost by the steamers is about £1 10s. a ton weight. It is within the knowledge of the department that butter-makers much prefer railway-transit, as being much less likely to damage the butter. There have been well-known cases where the butter was very seriously damaged in its transit by steamer from New Plymouth to Wellington.

152. *The Chairman.*] Assuming that you could arrange special trains for the carriage of 50-ton lots, would it be possible for the department to make some concession?—Yes, we might reduce the minimum.

153. I mean as to the charge. You say that £2 8s. is the rate per ton for 4-ton lots. If you

ran special trains with 50 tons, would it not be possible to fix a lower figure?—I fear not, because, in a sense, we would require to run the vans one way empty. There is not sufficient traffic on the railway to fill up the vans, which would require to go back partially empty. And there is a further difficulty of arranging with the Manawatu Railway Company. I may mention that we had some difficulty in getting the company to agree to the through rates now established. It was only arranged after a correspondence extending over some months.

154. *Mr. Walker.*] Is the traffic so heavy that it costs so much to take empty vans back to New Plymouth?—Yes; the line is a difficult one to work on account of its grades and curves.

155. And it costs something to carry an empty van?—Of course it does. As long as you have plenty of engine-power a carriage or two more or less does not matter much on a level straight line; but on the Wanganui line, with its steep grades and sharp curves, one extra carriage more might stick up the train on a steep bank.

156. So we must take into account the carriage of empties?—You must take it very much into account. We are always carrying, even when the vans are well loaded, from 3 to 4 tons of dead weight against 5 or 6 tons of paying weight. The vans empty weigh about 4 tons each.

157. *The Chairman.*] By an arrangement with the Manawatu Railway Company for night-trains, would it not be the case that your night-train starting from New Plymouth in the evening would not mean an additional train on the Manawatu line. You would take the morning train from Palmerston?—But you run into as great a difficulty as regards the transit of butter during the cool hours. The train you refer to leaves Palmerston at ten minutes to 7 in the morning, and it gets in, according to the time-table, at a quarter to 1; but sometimes it is later. You may say it is 1 o'clock when it reaches the Manawatu station here. The handling of the butter between there and the steamers at the Queen's Wharf would require to be done during all the hot hours of the afternoon, so that it would be under very unfavourable circumstances. At the present time, when it comes through by the express on Tuesday or Friday, the butter leaves New Plymouth at 7 in the morning, and is due at the Manawatu station here a little before 10 o'clock at night. All the while—and mark this, as it is very important—the ventilated van, being in motion, is constantly replenished by currents of air, keeping everything cool during the journey. There is no harm in its remaining in the ventilating-van during the night; the thing is to get it away in the morning to the ship's side, in the absence of a cool-chamber on shore.

158. Those remarks apply to the Taranaki portion of the train?—The same van goes right through.

159. In the case of butter sent from the Wairarapa, would there be any difficulty in a night-train coming from the Wairarapa?—There is no difficulty in arranging a night-train anywhere; it is simply a question of cost.

160. *Mr. Walker.*] You state that £2 8s. per ton is charged from New Plymouth right through to Wellington?—Yes.

161. Do you charge proportionately, according to distance, between New Plymouth and Wellington, or is it only from the one point you charge £2 8s.?—The one point, or any other point in the Taranaki District. A man sending butter from Hawera would pay exactly the same as a man sending butter from New Plymouth—all along the line as far as Nukumarū, which is the point at which the rates begin to lessen. In the whole of Taranaki, Patea, on to Nukumarū, they are all on the same footing as regards the rate charged. It lessens after that proportionately, according to distance.

162. What is the distance from New Plymouth to Nukumarū?—Eighty-six miles.

163. Is that not hard on the settlers?—No; it is a cheap rate, and being uniform over a certain distance enables us to simplify the working of the railway.

164. *The Chairman.*] This inquiry is not limited to this particular district; it refers to the whole of New Zealand. Are we to understand that the same facilities for running night-trains with a minimum of 50 tons are available all over New Zealand?—Yes, if there is traffic to warrant it.

165. *Mr. Walker.*] Are your butter rates the same on all your lines now?—No; this rate we have been speaking of is a special rate between Taranaki and Wellington.

166. Have you not been asked for butter rates in other places?—We have cheap butter rates on other lines, in which we discriminate between butter for local use and butter for export. For instance, on the Waikato line we have a cheap rate.

167. *Mr. Mackenzie.*] You charge the gross weight?—Yes, on the gross weight.

168. *Mr. Marchant.*] Does not your experience as Chief Commissioner of Railways impress you with the necessity for the State acquiring the Manawatu line, in order to manage the whole railway system of the North Island economically and afford facilities to settlers?—I think so. It would be specially valuable to settlers, because they would then be able to have the benefit of the through rates. And this will apply to the East Coast as well as soon as the line is through the Gorge.

Mr. NEWTON KING examined.

169. *The Chairman.*] You are President of the Taranaki Chamber of Commerce?—Yes.

170. And a merchant dealing largely in butter?—Yes.

171. You were deputed to represent the Chamber of Commerce?—Yes. The difficulties we have to contend with are chiefly in the carriage of the butter—getting it to the port of shipment. We have either had to send it by the sea or by the railway to Wellington, and the last year's results were, in fact, disastrous altogether to the butter. Very few shipments turned out right. Shipping by the sea we have to send it down by the train to the breakwater in non-ventilated trucks. It sometimes remains there for many hours, and is then put into the steamer and shipped for Wellington. Then, again, its storage in Wellington is unquestionably bad. I came down here specially last year to see about this question. I found one shipment particularly of Taranaki butter in one of the Harbour Board's so-called cool-sheds. They had a skylight in the roof,

and the butter was put exactly underneath, and was melting in the sun. The man apologized, and to remedy this he put a black tarpaulin over the butter. Another case was a shipment of butter by the "Wanaka," which was spoiled. We were going to take the agent to the shipment that came down by the "Takapuna" on another occasion; I went down to the "Takapuna" myself in the morning to see it, and I found it was melting, evidently caused by heat of the steamer's hold. It proved to us that the shipping by the steamer was useless to a very great extent; and that has driven us to the railway. One of our objects is to get the freight reduced. All the settlers up in the Taranaki District think it very hard that flax—a commodity that measures about two and a half times as much as butter—is charged very little more than one-half the rate, the rates being £2 8s. and £1 8s. per ton respectively. It has also been thought necessary by the dairy producers that some person here duly qualified should see that the butter is stowed in the ship in a proper condition. I may say that last year many of the lots that came down here intended for shipment in certain steamers did not go, nor were the consignors aware of that for months afterwards. The butter was put in the Wellington shed, where it remained. It would be quite impossible, I think, for the trains to meet the steamers. For instance, we will say that to-day those connected with the steamers telegraphed to us that a steamer is ready to receive a shipment of butter at a certain time. We get our special night-train to bring it down, and when we get it here we find that there has been a hitch in the interim, and the butter cannot be put on board, and it gets heated. I have been informed by the Shaw-Savill agents that it is impossible at any time to say with certainty when the stuff can be put on board any one particular ship. Special storage is therefore absolutely necessary. I see no other remedy at all. If butter is once heated it is spoiled. It does not matter if it be for only ten minutes. If it reaches a certain temperature all our trouble and care is wasted. The heat always liquifies the butter and destroys it. With regard to the question of the appointment of experts for the classification of butter, I was desired more particularly by the meeting held at Stratford the other day to bring it before the Committee—the question of the Government appointing experts to classify the butter, as is done on the Continent, and in Ireland particularly. It is believed that it would stimulate the makers to produce a better article, and that no bad butter that now goes forward frozen would be put upon the London market with damaging effect to the good article. We have found many shipments of good butter mixed up with inferior, thus depreciating the value of the whole parcel. If these experts could be appointed it would also be of very great advantage in our intercolonial trade with Australia, for then the merchant or producer would have to sell his butter at a certain standard. At the present time, being a large producing district, we sell our butter as "prime" free on board. This particular instance occurred to me last year: We sold a large parcel for Melbourne. We took expert certificates in Taranaki that the butter was prime. We put it on board, according to our contract, and it arrived in Melbourne on a falling market. They got experts there to prove that it was not prime, and our solicitors inform us that we have no remedy against them. This state of things is a loss of tens of thousands of pounds to us every year. The idea would be to brand the good butter as of first-, second-, and third-rate quality.

172. You say that liquification takes place and the butter is ruined?—Yes.

173. Assuming that your butter was graded in Taranaki, and during its progress to the steamer and at the Harbour Board wharf here it was exposed and ruined by the sun, would it not render your grading useless?—Yes; I would not have contemplated grading at Taranaki, but at the final port of shipment.

174. But at the port of shipment, at what period of the day?—It would be, I suppose, in a cool-shed. There would be no danger if put from there into the steamer. I am aware that this is a very important point in many ways, and it has occurred to me whether even grading in New Zealand at all was possible on that account, or whether it should not be graded by an expert when it reached London. It is a matter for the Committee to deal with. There is something to be said on both sides, in this way: that if butter happened to spoil going Home which was certified to here as being of first-, second-, or third-rate quality, it would militate against the New Zealand experts. I may say that the butter-makers are strong on the point of grading.

175. *Mr. Marchant.*] I would ask you whether, to meet that difficulty, it might not only be possible but very desirable that butter should be graded here, and inspected and confirmed at the other end?—Yes, I believe that could be done, and it would probably be a very good plan to adopt, at any rate for twelve months, until confidence was placed in the experts in New Zealand.

176. That would have the effect of preventing any butter which ultimately turned out to be only second or third class going on the English market with the New Zealand first-class brand on it?—Yes.

177. It would therefore be a distinct gain in this way: that our first-class brands would become established as really reliable?—Yes, it would have that effect.

178. *The Chairman.*] I assume that the wish of the people you represent in Taranaki is to insure that no bad butter—butter radically bad in manufacture—should leave the port of shipment branded as of good quality?—Yes, except being branded as of inferior quality. There is no doubt about that.

179. *Mr. Mackenzie.*] Do you not think that one parcel of butter might be branded as first class and another as second class, and, owing to some circumstance occurring during the voyage, the second-class butter might arrive in London in exactly as good a state as that branded first class?—That is really the point—whether grading in London should not be adopted. I would not advocate grading in London, but I think the point should be considered. There is little difficulty with inspection in London.

180. What influence would any grading in London have upon the buyer?—In the London market the buyer, I believe, does not question the grading at all. The Irish butter goes into the market, and is simply sold as first, second, or third class. Possibly the buyers never see the samples of any particular line. It would be bought just as wheat or any other grain is purchased.

181. *The Chairman.*] Is the American system of grading wheat adopted under Governmental control?—I do not know; I think it must be. You go into the Exchange and buy a certain class of wheat. You do not buy any particular line of wheat. You get paper scrip for it. You get a certain graded class. It simplifies trade immensely.

182. You do not know whether it is done by associations or by the Government?—I do not know.

183. *Mr. Mackenzie.*] You are not quite satisfied as to whether grading should take place in this colony or in London?—I should say that it should be tried in this colony.

184. Would the settlers be prepared to pay the cost of grading?—Yes.

185. Is it not possible that butter might keep thoroughly good for a month, and the same butter under the same circumstances might not keep three months after its arrival in London?—That is so.

186. So that grading here would be hardly likely to indicate what the butter would be when it landed in England?—I think it would be right enough when it landed in England. The only question would be how long it would keep after landing.

187. Have you tried any experiments in Taranaki as to keeping the butter?—Yes.

188. How long have you kept it?—I have seen it kept in kegs twelve months. It was fairly good—as good as butter could be. It would not be as good as when fresh made. It gets staler in flavour.

189. If it will keep in Taranaki for twelve months fairly good it is fair to assume that if you had cool-vans from Taranaki to the port of shipment, a cool receptacle at the port here, then taken Home in a cool-chamber with a regular temperature, that the butter would be landed in London in a good marketable state?—Yes.

190. You referred to the classifying of butter here which when sent over to the other colonies was rejected as not being up to the standard of classification?—Yes. It is not classified here at the present time.

191. If classified here as first class, that would bind the buyers in Victoria?—Yes, unquestionably it would.

192. Apart from any circumstances arising during the voyage?—Yes, provided it was sold free on board.

193. *The Chairman.*] Do you not consider that grading by a central dairy-produce association would have the same effect as governmental inspection?—Yes; once it became established I do not see why it should not be as good as governmental inspection. There are no English butter merchants here at present; they are all at Home. The object is to get the name or brand established in London. It is a very simple thing to get it established if there is sufficient quantity.

194. If the small voluntary associations agreed to the grading of butter, would it not have the same effect as governmental inspection?—Yes, practically, I believe it would. With respect to the tuition of farmers, I may say that a great many farmers in New Zealand have not been brought up as farmers—a large percentage of them. There is a great lot of butter made of very inferior quality throughout New Zealand. I know it to my cost in our own district. Others can bear me out in saying that a very large percentage of butter comes in in a condition that it should not. If you take any one man and go to the trouble of explaining what should be done you will see that man gradually working up from very dirty cream-looking stuff until it becomes good butter. That expense or loss falls entirely on the merchant or farmer, and is not quick enough by any means. My own idea would be to have a man who would go round to the farmers, and stay in the Wairarapa, Taranaki, and other places so many months, and make teaching visits to the farmers' houses. The farmers would be glad to see him. He can teach them something; if he cannot there would be no harm done. This plan has been adopted in Denmark and Ireland. Dairy inspectors have been appointed by the New Zealand Government from time to time. In our district they look at the factories, and go into the stores and see certain butter. They never go into the interior or pay visits to the butter-making districts. They visit a few persons in the towns who make good butter, and where inspection is not so necessary. I would like to point out the advantages to be derived from tuition both in the making of cheese and butter. I do not speak so much of cheese, because nearly all the cheese is made by the factories. I consider that inspection of factories, although useful, is almost unnecessary, for the simple reason that at the factory the man must be the man who can do the best work. If he does not he goes to the wall. It is not so with the small farmer. He has no money to expend, and does not know what to do. The question of tuition and inspection does not apply to the large butter-factories as it would do to the small farmers. With regard to packages, we have been using large and small kegs. The large kegs have been utterly discarded now, and will not be used any more. One hundred pound kegs are practically worthless for the London market. The general instruction from our London and provincial buyers is to the effect that 60lb. totara kegs are about the best that can be sent. So far as Pond's boxes and other boxes are concerned, I am of opinion at the present time that our butter is not suitable for them. The merchants in London say that the very finest butters can be put in Pond's boxes with advantage; but for the other kinds—the medium, or what we should call good in the colony, which has to go to the provinces—kegs are preferred.

195. *Mr. Mackenzie.*] Do you think the farmers would be taught?—Yes.

196. And that the farmers' wives would take instruction?—Yes. Hitherto we have been packing off heavily-salted butter, which, although of inferior make, will keep fairly good. A different class of teaching is required in the making of fresh butter for export and sale in the London market.

197. Have you thought of what class of expert we should get?—I would get a man as much as possible like the farmers themselves. I do not want what you would call "a big man," but a man who will go round and explain the best method of butter-making to them. I do not want a

school-teacher but a thorough expert in the business. I do not want a man to say to them, "Your dairy is not fit for making butter," but rather one who will make the best butter with the appliances available.

198. Would you not select dairy experts from Denmark or Normandy where thorough dairy-farming is carried on?—It is a question whether that would not be going one point too far.

199. I understand you want to put butter in the London market to compete with the butter that is going there from other places?—Yes, we do; but if you give too great a wrench farmers are apt to pooh-pooh it. You may do these things gradually, but not force a man to do them at once.

200. Do you think there would be any improvement if you had a first-class man?—Yes; I should call a man a first-class man who can make good butter and teach the making of good butter.

201. Would it not be better to have a first-class Danish expert?—The process of teaching should be gradual.

202. Do you think the settlers would be prepared to pay fees for instruction if a man were sent round to the districts?—I never thought of that. It is a trouble to get money out of them; there is no doubt about that. I think the principle of making the farmers pay would be a wrong one. I do not think they would pay.

203. Have you seen the butter-boxes made by Begg, of Dunedin?—No.

204. Do you not think that the best class of instruction is as necessary to the dairy-factory as to the farmer?—The companies will remedy that in the long run. If they are sending away inferior butter their pockets will soon remedy that. Many of the dairies in New Zealand cannot improve; they are as high as they can go.

205. *The Chairman.*] If night-trains were established by the Railway Department, I suppose the settlers would make use of them?—Yes.

206. There would be no difficulty in arranging parcels of 50 tons?—No, there would be no difficulty. There is not much butter goes direct from the settlers. Nearly the whole of it is bought by the storekeepers in the different districts. Their wish is to have a night-train or a special train.

207. These special facilities being found by the department, shipments by sea would cease?—Yes, entirely, I believe. I would never send another package by sea. Another season like the last would ruin the dairying trade. The losses this time have not, fortunately, perhaps, fallen on the farmer at all; it is the buyer who has lost the money. The farmers have not dropped down to the magnitude of the danger they are in now. The butter for which the farmers were paid £3 and £3 10s. was sold in the London market for £2 and £2 10s., and even lower in some cases.

208. I suppose, from your knowledge of the Taranaki District, you would like the Committee to understand that the dairy industry is capable of indefinite extension there?—Yes.

209. That the land is particularly capable for dairy industry?—Yes.

210. That the climate and character of soil are favourable?—Yes.

211. So that, if facilities are found for storage, for freight, and carriage by the Railway Department, the industry is capable of indefinite extension?—Yes. It has been extending very much lately, and it will go on further and further. The sales this year have been very heavy indeed. In 1887—quoting from the annual report of the Taranaki Chamber of Commerce—522 tons of butter were exported from the breakwater alone. In 1888, 1,306 tons were exported; and in 1889, 1,545 tons.

212. The butter for export from Taranaki to London is manufactured there?—Yes; it is manufactured within the spring and summer months—within about five months. We do not go beyond January for London shipments.

213. *Mr. Marchant.*] Supposing the arrangements for direct shipment of meat from Waitara or New Plymouth to London by the Tyser line are perfected, your remarks with regard to railing butter from New Plymouth to Wellington will require modification?—Yes, except that the Tyser line will be slow steamers, and would not take more than one or two shipments in the year on the present plan.

214. *The Chairman.*] You think it would be more to your interest to send the butter by the Direct line?—Yes. On the whole, I think the bulk of the butter will go for transshipment at Wellington for some years.

FRIDAY, 15TH AUGUST, 1890.

Captain HENRY ROSE, Chairman of Wellington Harbour Board, and Manager in Wellington of the New Zealand Shipping and Steamship Company, examined.

215. *The Chairman.*] The Committee desires information from you with respect to the shipment of butter, the means adopted for providing cool-chambers, and the general charges on butter in transit from here to England?—I have myself shipped butter to England; that is many years ago. There was a Committee appointed by the House some twenty years ago to inquire into this subject. Sir John Hall, I think, was Chairman of that Committee. I was then in Lyttelton. I remember Sir John Hall wrote to me, and asked me if I could give any information. I was then shipping butter to England. It was in small quantities—about twenty, thirty, or fifty firkins at a time. It was bought from the farmers. As a speculation it was a failure. There was no cool-chamber known at that time for the purpose. It was placed in the coolest part of the boat, towards either end. The result of three trials that I made was that the butter was rancid when it got to England. I first took it Home in ordinary kegs—good, well-flavoured butter. I next tried oak firkins brought out from England, and filled with salt; then we tried jars. This also failed. I had it analysed: the butter was perfectly pure, but I learned afterwards that it was buttermilk which was left in the butter that caused all the mischief. Now, however, the butter-export trade is on a totally different footing. The means adopted in the steamers for carrying butter is sometimes the cool-chamber and sometimes freezing. Some shippers prefer that it should be

frozen, and carried frozen the whole way; but the bulk of the shippers prefer the cool-chamber. They do not all seem to agree on this point. When we carry in the cool-chamber the temperature is kept at 45°, or as near to 45° as possible. Each steamer is fitted up with cool-chambers that can carry about 100 tons of butter. It is fitted up so that, in the event of there being no dairy-produce to carry, we can use them for freezing. The insulation is the same. It is simply a question of regulating the cold air. I may state that the store-butter which the steamers bring out with them from England is always brought out frozen. It always keeps well. I do not know whether if shipped in bulk for the purposes of commerce it would be the same. This butter is made specially for the ships: it is made in the west of England: it is pure fresh butter. I do not know that they have tried experiments to see how long it would keep out of the chamber. It is perfectly good for a week. That is as much as we could expect of butter straight from the dairy.

216. You say that the cool-chamber is preferred?—Occasionally we have shippers who prefer it frozen.

217. From your knowledge, would you say the butter is not damaged by being frozen?—Not as far as I know. I do not know whether it will keep any length of time afterwards. I know that the ships' store-butter keeps a week. It is perfectly fresh butter; it is not corned in any way.

218. Can you tell the Committee what arrangements exist in this port, or through New Zealand, for storage of butter?—We have no special arrangements here. I do not know that they have in any of the other ports. The Harbour Board sheds are cool-sheds, but I could not call them cool enough for the storage of butter. The temperature in them is, however, very even. There is one place under the assurance office building which was formerly used by the Government for the telegraph station. That is a cool place. The general store for butter is there. It is estimated to hold about a thousand casks. The Harbour Board of Wellington is about to build shortly: the plans are being drawn for its new offices at the foot of Jervois Quay. There will very likely be a cellar under there available for storage of butter. I do not know that it will be very large.

219. Do you consider that, in the interest of the port, cool-accommodation should be provided for storage of butter?—I think it would be better if they could bring it in straight to the ship. We usually wire to the people at Taranaki and other places telling them when the steamer will be ready to receive it.

220. That saves the cost of storage?—Yes.

221. Is it possible that within a reasonable time you will be able to place vessels on the berth at the Railway Wharf for England, carrying dairy and other produce?—They are dredging now at the right side of the wharf, so that there may soon be enough water for the cargo-boats.

222. For the mail-boats?—No, for the cargo steamers only.

223. Do you also provide accommodation for shipping butter and other produce in the cargo-boats?—Yes, for butter specially. They are also meat-carriers.

224. Do you consider that the sheds on the wharf are not fit places for the storage of butter?—They are not as cool as they should be for such a purpose. They are ordinary cargo-sheds, and not insulated in any way. But there is always a thorough draught there. The temperature in them has been frequently taken, and found to be very even.

225. Do you find that, in the carriage of butter in the refrigerating-chambers, there is any damage done to the casks by the expansion of the frozen moisture in the butter?—No, we have not noticed that.

226. Because we have been told that when the casks come out of the freezing chamber the hoops fall off?—I think that arises from bad cooperage. It is frequently the case before we get the casks on board that the shippers have not taken the necessary precautions to fix the hoops, and, in consequence, some fall off whenever the packages are handled.

227. Then you consider that more care should be exercised by the shipper?—Yes; but there has been a great improvement within the last twelve months. They have taken to using galvanised iron instead of the old iron hoops. This improves the appearance of the shipment and has some other advantages. Some shippers now cover the casks with scrim, so as to keep them clean; this scrim is taken off at the end of the journey.

228. *Mr. Walker.*] You have stated that you buy butter in England for the voyage out?—Yes, we frequently have a quantity left after the voyage.

229. Would it not pay you to buy the butter here for the two passages?—No, it is a question of its keeping. We would have to put it into a freezing-chamber at Home if we took it from here. Then, the ships' passengers, as a rule, prefer the English butter to the New Zealand butter.

230. By the term English, do you mean Danish or Normandy, or strictly English butter?—It is made in the west of England.

231. *The Chairman.*] Do you provide yourself with butter direct from the English dairy?—Yes, a special quantity is made for us, and we have it fresh from the dairy; it is made in 11b. pats, covered with a linen rag or cloth, and put into boxes holding about 30lb.

232. *Mr. Walker.*] Do you say you cannot get butter like that here?—I do not think so; the best I have ever seen in New Zealand does not come up to the butter we have in the steamers. I might state that two years ago a representative from Taranaki came here to see the whole process of the treatment of butter in the steamers, and that there was no fault on the part of the ship. I showed him the butter taken out of the refrigerator. He said we could make nothing equal to that here. I do not know the gentleman's name.

233. Your Board does not propose at present to do anything more than provide cellar accommodation?—Not at the present time.

234. *Mr. McKerrow*, in giving evidence before the Committee, pointed out the ease with which you could make a cool-chamber by partitioning off a portion of one of the sheds?—I do not think that would be found to answer. There should be a passage between the two buildings. The insulation would scarcely be quite perfect. That is an iron shed, and would not be likely to make a cool place unless it was properly insulated. The Harbour Board have not considered it. I may

say that the plans for the offices are not yet finished, but that is to be one of the features of the building.

235. *Mr. Mackenzie.*] You evidently prefer the butter kept in the refrigerator to that kept in a cool-chamber?—We keep it frozen because the result has proved that butter carries perfectly well frozen if it is well made.

236. Do you think it would be safer to send it Home frozen?—I think so, if there is no bad result in the way of it not keeping.

237. Do you think that the temperature of the cool-chamber is kept sufficiently regular?—As far as I know it is. The instructions are that it should be kept regular; the engineer of the ship keeps a log of the temperature, which is checked by the captain and the mate every four or six hours.

238. That shows the temperature is kept fairly regular?—Yes.

239. What is the difference between the highest and lowest?—I should not think it was more than 10°. I have never seen the logs myself, but I am informed that it is very even. Written instructions are given for this purpose. The captain is also instructed to be very particular in this matter. He is instructed to give particular attention to everything connected with the carrying of dairy-produce, and to do everything possible, short of cutting the steam off, to facilitate the successful carriage of the butter, as it is the company's interest—the interest of the colony; in fact, the interest of us all—to promote the prosperity of this trade.

240. You say that the cool-chamber will hold 100 tons: would that be sufficient for the demand likely to be made for such accommodation?—In some ships there are two or three cool-chambers.

241. It has been pointed out that one firm chartered the whole of the cool space, and afterwards charged special rates to settlers who required space?—That certainly is not a practice here; we endeavour to divide the space among shippers as well as we can. I think it happened last year in this way: Owing to the good season in New South Wales last year there was a great deal more butter to ship to London, and some of the meat-shippers sold their space for dairy-produce.

242. Do you think companies would always allow the space to be open to all?—The practice is to send a circular round to all known shippers asking how much space they require. We then allot the space as evenly as we can.

243. *Mr. Walker.*] Is the space inquired for in excess of that actually required?—During the season before last large engagements had been made. The market in Australia went up; many shippers failed to ship, and we had to fill the space with meat instead.

244. As a rule, you can always fill your cool-chamber?—Now that we are getting cargo-steamers there will be plenty of space.

245. *Mr. Mackenzie.*] Do you think that your people would be willing to sort a few pounds of that ships' butter you speak of?—I think they would be quite prepared to do so; they are willing to do what they can. It will be simply asking the steward to put a sample by. If the Committee is still sitting when the "Tongariro" arrives I will send you up a sample.

246. We know the refrigerator-butter will keep a certain time after being taken out of the refrigerator, but we have no data as to how long it will keep?—I will send you a sample.

247. *The Chairman.*] Have you considered the classification of dairy-produce? Do you think that would be of service?—I think it would, but I have not considered it. The old plan used to be buying from the different farmers and mixing all together.

248. *Mr. Walker.*] Are you acquainted with the Irish system?—No. I have seen different qualities of Irish butter, but I do not know anything of the system.

249. *The Chairman.*] Is the air used for the cool-chamber the exhaust air from the freezing-chamber?—No; the cooling-chamber is at the end of the ship, and the air is conducted along a different course. It comes from the same refrigerator, but does not go through the freezing-chamber. The exhaust pump is at the other side.

250. The cool-chamber is in direct communication with the refrigerator?—Yes.

251. Is there any difference in the charge?—No; it is the same. If the butter goes into the freezing-chamber we must have it frozen before it comes into the ship, as the heat thrown off is likely to damage the meat. In the cool-chamber we carry cheese as well as butter. That requires the greatest care: you must not freeze it.

252. The temperature is not below 40°?—I think 40° would be enough.

253. *Mr. Walker.*] But 45° is your average?—Yes, as near as can be. They keep the temperature very even.

Mr. M. MURPHY, F.L.S., Secretary to the Canterbury Agricultural and Pastoral Association, examined.

254. *The Chairman.*] You have taken a considerable interest for some time in the dairy industry?—Yes; I have made a study of it for some years in this country. I am an old dairy-farmer myself. I was engaged in dairy-farming twenty years ago in the Old Country.

255. I should be glad if you would give the Committee the result of your experience?—I have already sent you a report; I thought that would prepare the groundwork of the subject. Embodied in that is almost everything that I have to say, with the exception of one or two matters which I omitted to mention.

256. I have it here; it is a very valuable paper. I shall be glad to hear anything further which you have to say?—I shall of course be glad to answer any questions that the members of the Committee may please to put to me. The whole thing hinges on the proper making of the butter. The difference between our butter and the English butter is mainly the result of imperfect manufacture. But New Zealand ought to produce better butter than is produced in England, for the reason that the cows here are for the most part fed on grass. That is their proper and natural food.

We have grass here nearly all the year round. There cows have to be housed six months out of the year and hand-fed. All the other colonies of Australasia are now obtaining the best information they can procure on this question of dairying. In Victoria they have several travelling dairies and experts. In Queensland they have three travelling dairies and three experts. In South Australia they are advertising for competent persons to take charge of working-dairies. I maintain that, until we have something of the same kind in New Zealand, our butter will remain as it is—of inferior quality—with few exceptions. With regard to the butter industry, I may state that in Canterbury we have, since last autumn, been importing from Wanganui to Christchurch butter for which we pay 1s. 4d. per pound, while we are selling butter manufactured in Canterbury at 4d. and 8d. per pound. I have seen butter made in the vicinity of Christchurch packed in Pond's boxes which had to be sold to the soap-boilers, simply because it was not properly made. Large quantities of butter is sold at 4d. and 6d. per pound. This butter goes to the biscuit-makers and confectioners.

257. You have a factory in Canterbury?—Yes, two; one at Tai Tapu, and one at Sefton. They produce butter for which they get 1s. 4d. per pound, the same as the best Wanganui butter; indeed, they cannot make sufficient, but what they do produce is of the best quality.

258. *Mr. Walker.*] Is the Wanganui butter factory-butter?—Yes.

259. You do not consider the pasturage in Canterbury in any way inferior?—Not in the agricultural districts. I do not think that the finest Canterbury pasturage can be exceeded in any part of the world.

260. Do you consider that it is the want of knowledge or mismanagement which is the cause of this bad butter being produced?—Yes, I do.

261. It results from ignorance, does it?—From the want of knowledge. The same kind of ignorance prevailed in Victoria for a time, but they are now beginning to see the importance of this matter. Victoria is now making a name for herself in the English market, while much of the butter we send there is designated "New Zealand grease."

262. Have you gone into the various systems of working the butter industry? If New Zealand were to bring experts to the colony, from what country would you take them?—I would suggest that you should get a man who is thoroughly trained to the work from Denmark or Sweden, provided he could speak the English language fluently. Sweden is now the best country in the world for dairying. But the dairy system, as it now exists in England, ought to turn out some first-class men. It is quite possible to get a thoroughly-competent man from Denmark or Sweden, who would be satisfied with less pay than you would get a man from England. However, the best men procurable should be had, regardless of any difference of remuneration. In Denmark and Sweden the Government have several dairy-schools. The country is dotted with factories, and a regular grant is made for the encouragement of the dairy industry. Students have to pass an examination and obtain certificates of knowledge and competency in the practice of butter-making.

263. From your own knowledge of Canterbury, do you think the farmers there would receive information kindly upon this subject?—I think so. I do not think there would be any difficulty; I think they would only be too pleased to receive such instruction. In Victoria any district guaranteeing to supply a certain quantity of milk for, say, a week has an expert sent to it. He goes to work at once, explains the whole theory, shows the practice, and gives the benefit of his experience.

264. And he takes a travelling dairy with him?—Yes; I consider that it is a disgrace to be in the condition we are in with regard to this butter industry, more especially when we consider the advantages which we possess here.

265. It is the fact of possessing these advantages probably which makes us indifferent?—The Government of Victoria pay 1d. royalty for every pound of butter produced that is sold for 7d. a pound, 2d. for every pound that is sold for 9d., and 3d. for every pound that is sold at 1s.

266. How is that calculated—on account sales?—Yes, I believe so; but I do not think the industry here would require any such bolstering-up as that.

267. In Australia do the cows milk fairly during the dry season?—No, they do not, except where green fodder is provided for them, in the way of sorghum, lucerne, maize, &c. In New Zealand the grass grows nine months of the year. We can keep our cows with giving them exceedingly little artificial food.

268. *The Chairman.*] What is the case in Sweden?—Cattle are housed there for seven months of the year. They have to grow roots, &c., to feed them. This food is kept in cellars, in order to be protected from the frost.

269. And the butter there is good, although derived from artificial food?—Yes, the butter is the finest butter in the world, because the Government have spared no expense in training the people.

270. Do you think that it would be a good system to encourage creameries for the purpose of concentrating butter-making as much as possible?—Mr. Stead, of Christchurch, and myself went into the whole subject a couple of years ago, and we came to the conclusion that a large central factory could be placed so as to manipulate nearly the whole of the milk produced within a radius of twenty miles of Christchurch. Our idea was to place the central factory at Addington, and to feed it with cream supplied from creameries situated in the dairying districts within a reasonable distance of railway-stations. If we had succeeded in carrying out this idea of a central factory we could have afforded to employ the best experts that could be got. We should have established a training-school. We would have provided a refrigerating-chamber at the factory, so that the whole thing should have been done properly. We could have kept the butter until the ship was ready to sail, and the butter could have been run on board without any additional expense, and, above all, we should have produced butter of one uniform quality, known as Canterbury butter. But the farmers did not seem to fall in with the scheme. Some opposed it. But it is not too late even now. The Tai Tapu and the Sefton Factories are a success. At first they made a few mistakes; but they

now make probably 20 per cent. more butter than any one else on the old system. They are selling their butter at 1s. 4d. per pound while others in the district are getting but 8d., 9d., or 10d. per pound.

271. Is there any recognised process of teaching dairying in the Lincoln Agricultural School?—There is an excellent little model dairy at the School of Agriculture fitted with a separator, a steam-power, and most of the appliances requisite for working a model dairy. As the dairy is not used to the full extent for educational purposes, I would suggest that, if the Government decide upon securing the services of an expert, arrangements might be made with the Board of Governors whereby the expert might give occasional exhibitions of butter-making, inviting the farmers from the surrounding districts to attend. By this means the dairy would be kept in constant work, to the great advantage alike of the students and the owners of cows in the immediate district.

272. Do you think it would be self-supporting?—Decidedly. I believe the Director suggested it to his Board. The nucleus is there. They have all the appliances. They could enter into arrangements with the farmers on the co-operative principle. No dairy-factory will ever succeed unless it is on the co-operative principle. That is a cardinal point. Unless the shareholders themselves are the suppliers there will always be some difficulty about the milk. Each one must have a direct interest in the factory.

273. Can you give us any estimate of the expense of establishing a fairly-appointed butter-factory?—I think the Tai Tapu Factory cost about £2,000.

274. Is that perfect in all respects—I mean as to its equipment?—Yes.

275. Are these arrangements made for cheese-making?—They do not make cheese.

276. How many cows would be requisite for such a factory?—I think, about a thousand cows; but that is only a matter of putting on extra separators. At the Tai Tapu Factory, I believe, they have about six hundred cows.

277. But if the central factory had been established, would it not be necessary to have the separators in central places?—Yes; as I have already indicated.

278. What would be the expense of establishing creameries?—The only expense would be that for a substantial building and separators, with small steam-power for driving the separators and cleaning the vessels—about £400 or £500 each would be sufficient.

279. Would it be difficult to find work for the whole day for the man in charge?—I think his time would be fully occupied. The man in charge should be competent to test the milk occasionally. This would become a matter of routine once he understood it. Then he would have to scald the vessels. I would not leave this work to the farmers. All the vessels should be scalded, for without scrupulous cleanliness good butter cannot be made.

280. That, you say, is a very important point?—Yes.

281. It has been stated as an important point that the cream should be ripe?—That is a matter of opinion; the new theory is that this is not necessary. I was reading lately in some English agricultural papers some experiments conducted by well-known professors, and the conclusion arrived at was that it is not necessary to ripen the cream before churning. There is a difficulty about the ripening theory for the reason that the exact time can be only approximately ascertained. It is like retting flax: if you leave flax too long in the water you weaken or destroy the fibre: it is a matter of detail and experience. Machines are now being made which separate and churn the cream at one act.

282. If cream stands a certain time in the vicinity of any bad odour it would be contaminated?—If sent straight from the separator to the churn that danger is escaped.

283. *Mr. Walker.*] Do you say that separated butter is better than old English butter?—Separated butter must be absolutely pure.

284. But what I want to know is whether it is as palatable, whether it possesses as good flavour, as good old English butter, and whether it will keep as well?—I cannot give a decided opinion as to flavour. I can vouch for its keeping. I once got some from the Edendale Factory, some of it made without salt and some a little salted. It was sent to me in a deal box. It was a week on the road, and after laying in my office for three weeks I found it to be as sweet as the best. This was in the month of August.

285. The milk of cows is very much affected by what is grown on the land—the plants and herbage that are found growing on the pasturage?—Yes; the English pasturage is, as a rule, very much older than that in New Zealand. That is probably a reason why first-rate English butter cannot be excelled.

286. The English pasturage is, in fact, the result of centuries?—Yes; it is often very old, and therefore it is that English butter, when well made, is not surpassed by any other. As regards pastures, I think, if we devoted the same care and attention to pastures here by top-dressing as they do at Home, our pastures would last longer.

287. *The Chairman.*] With regard to Mr. Grigg's farm, which has been mentioned, he never lets his pasture stand more than two or three years. The result is seen in the fact that his butter is selling at from 1s. to 1s. 6d. a pound, when ordinary butter is selling at 6d.?—It is well known that new pastures produce excellent butter, but some of the old pastures in England are famous for the flavour they impart to butter.

288. What assistance do you think we could ask the Government to give to the encouragement of dairy industry?—I think the agricultural interest is the most important of all interests in this colony, but, to my mind, it is one that receives the least attention. It has been left to take care of itself. We are now reaping the fruits of this neglect. I do not know that I should be prepared to ask for more than that the Government should import one or two competent experts to work model dairies. I do not think we would want any more than that.

289. To act as instructors?—Yes.

290. *Mr. Walker.*] You would not urge that Government should give a bonus?—Not for dairy-produce.

291. You think Nature has done enough?—All that we want is to educate the great bulk of the farmers in New Zealand, many of whom have never been trained to farming.

292. *Mr. Mackenzie.*] What are the best grasses for the dairy purposes?—It depends on the soil. In the higher lands the finer fescues and others; in the low-lying lands the strong-growing fescues, ryegrass, timothy, foin, and cocksfoot. Prairie grass should receive more attention; it is an admirable forage grass, but it will not stand too close feeding. This is the reason why prairie grass does not do in some places where it has been tried. It is growing greatly in favour in New South Wales.

293. Reference has been made to the short time pasture is kept: is this the reason that the grasses used are to a great extent annual—ryegrass, for instance?—You may make ryegrass almost annual by continuing to sow seed from the first year's seeds. As I said before, pastures would not run out so soon if we top-dressed them as they do in England.

294. Do you think that having piggeries near a dairy is a desirable thing?—No. Any smell is bad near a dairy-factory. They should be as far away as possible, and should not be placed on the windward side, but away from the prevailing wind.

295. What varieties of cattle are best for dairying?—That depends upon what pasturage will carry them. I do not think anything is better than the shorthorn and its crosses; on heavy pasturage there is nothing superior to them. There is another thing: when they are unfit for the purposes of the dairy you can make beef of them. Ayrshires and other crosses are best for light and hilly lands.

296. *Mr. Walker.*] The knowledge of these things it is which saves the farmer?—There are two classes of shorthorns—the milking shorthorn and the beef shorthorn. Another thing I would point out is the folly of using mongrel bulls. I have suggested to small farmers that they should combine to rent bulls. I know some owners of first-class animals that would be glad to rent them. In this way the breed of cattle in the colony might be greatly improved.

297. Do you think the School of Agriculture has done enough in this direction?—In my opinion, enough has not been done in this direction.

298. *The Chairman.*] If beetroot growing were established, would the pulp, after the extraction of the sugar, be of any use as feed for cattle?—The farmers in the beet-growing districts in Germany depend on it almost altogether for feeding stock in winter; but it requires the addition of oats or linseed meal to reinstate in some degree what has been taken away by the extraction of the sugar. With that addition it is valuable as feed for stock.

299. *Mr. Mackenzie.*] You are favourable to sending travelling dairies round the country?—Yes; that is what we want—information and instruction.

300. You would have the best men selected for that purpose?—Practical men, certainly. There is no use getting men who do not know the science as well as the practice connected with butter-making. We must, of course, have practical men, who will take off their coats, and not only make the butter, but they must explain the theory of it too. Butter-making has become a science now.

301. You are equally acquainted, I suppose, with the manufacture of cheese?—I do not know much about cheese. Butter-making I consider the more important industry. You will find butter in every house. Cheese is not so generally in use. The Americans have been very successful in producing cheese of the best quality. I was speaking to a gentleman some time ago, when travelling, who considered, I do not know for what reason, that we would never be able to compete with the Americans in producing cheese; but in regard to butter he had a different opinion.

302. *The Chairman.*] With respect to some system of classification, have you anything to tell us about that?—There is a difference of opinion on that point. Some merchants say that it ought to be classified here. I am of a different opinion. I think it should be classed when it arrives at its destination. No doubt it would be a good thing to have it classed here if the buyer would accept our classification. But if I were a buyer I would say, "That butter has been two months on the sea; how can I tell what change may have taken place in it." I remember in the Cork market—I am now speaking of twenty years ago—there were sworn officials called butter-tasters. Their duty was to taste the butter, to pronounce as to its quality, and then it was sold according to the brand put upon it by these tasters, who, as I have said, were sworn officers.

303. *Mr. Walker.*] Who appointed them; the Government or the Corporation?

304. *The Chairman.*] Not the Government?—They were appointed by the Cork Butter Trustees, I think. There was no dispute. The butter was branded, according to its quality, as first or second. The whole thing was done in an hour or so. The system which prevails at present with New Zealand butter in the London market is as follows: When the butter reaches the market two or three casks or boxes are opened. If any one of them happens to prove inferior the whole lot is condemned by a board of brokers, and the good and bad has to go alike at a much reduced rate. You have nobody sufficiently authoritative to conserve your interests in the matter. And, suppose you have an agent, his interests are with other people, not with you. I am now speaking of the experiences of persons who have shipped butter, and have told me how they were served. If a dépôt could be established with a cool-chamber for all produce there is no reason why such produce should not be sold according to quality.

305. Do you think, then, that the inspection should be in England?—Yes; for the reason that buyers there would not accept our brands here. If they would do so it would be better to do it here.

306. Do you mean under the authority of an association or the Government?—If done in England it ought to be under the control of the Agent-General. He would be our authority, and would be able to get persons sworn as tasters.

307. It is said that if the inspection took place here bad butter could not be sent Home at all?—In Sweden, I understand, they will not allow bad butter to be sent out of the country at all. There is a law against exporting it under a certain quality.

308. *Mr. Walker.*] Do you know of any book that would give the Committee positive information on this subject?—My information is gleaned from agricultural papers. I do not know any work that I could lay my hands on at this moment treating on dairying in Sweden.

309. We have the Royal Agricultural Society's reports.—Yes; for the last two or three years they contain a great deal of information.

310. And the Highland Society?—Yes.

311. *The Chairman.*] With the object in view of preventing bad butter being exported, would it be advisable for the Government to step in?—Do you think that Government would get an Act passed to that effect? I do not see how it could be done without an Act.

312. To make it compulsory an Act would have to be passed?—They would be bound not to ship butter under a certain grade. But it is so difficult to get co-operation with people scattered in different parts of the country. In Victoria everything centres about Melbourne; every organization there is workable from one point. But it is not so here. Here we have North Island and South Island, and everything lying in different directions.

313. Do you think that buyers would respect that classification?—I know there is a strong organization at Home against everything new which interferes with old-established customs. I do not know whether they would, and even if they did, whether you would not still have to establish dépôts for the sale of it. You know the difficulty that has taken place with regard to frozen mutton. The same thing would happen in regard to everything new that interfered with the brokers.

314. Do you know of any difficulty regarding the shipping of butter?—The directors of the Tai Tapu Factory arrange with the carriers to come at night and take the butter straight to the vessel. I understand that the Lyttelton Harbour Board are making arrangements for a cool-chamber for perishable goods.

315. When you were in Victoria last did you visit Mildura?—No, I did not.

316. *Mr. Mackenzie.*] Do you think that irrigated settlements would increase the output of butter?—I do not know whether they would produce good butter; whether the grasses they would produce would be in every respect the most suitable. They might produce large quantities of milk but not a proportionate quantity of cream. Referring to freezing butter, I had a letter some time back from an agent in London referring to the frozen chamber. He said it ruined the butter to freeze it, and strongly condemned the practice. He said it rendered the very best butter inferior.

MONDAY, 18TH AUGUST, 1890.

Mr. WILLIAM WHITE examined.

317. *The Chairman.*] You are Chairman of the Lyttelton Harbour Board?—Yes.

318. We are anxious to have any information you can give us on the subject of providing cool-storage accommodation for butter at the Lyttelton Harbour?—I do not think we have much information to give on that subject. We are only just now considering the matter.

319. Your intention is to provide such accommodation?—I cannot say that. What has been done up to the present is this: Mr. Wright has given notice of motion for consideration at the next meeting of the Board as to whether it is not advisable to provide a cool-chamber for storage, and I think also to provide for freezing purposes. Certainly a cool-chamber for storing produce generally is required.

320. Can you tell us what has been the custom up to the present time as regards butter? Do the exporters make use of your sheds at all?—Not to any large extent.

321. Then, the butter comes down from the country and is sent on board at once?—Yes, or it is sent to the freezing-works.

322. You mean the Belfast Freezing Works?—The Belfast Freezing Works and the Islington Freezing Works. The latter is a new establishment started within the last year.

323. At the present time there is no cool-storage available at the port itself?—None that I am aware of.

324. Then, considerable expense would be caused by the additional freight—handling the produce in sending it to the Belfast Freezing Works and then to the steamers?—Certainly.

325. Is the proposal to establish the cool-storage contiguous to the steamers' wharf?—Well, that might perhaps depend upon the action of the Commissioners. You are aware they are trying to obtain possession, or, rather, they have possession, and are trying to take what we call No. 5 shed under the Public Works Act; so the storage-accommodation might be provided close to it, or a portion of No. 5 shed taken for the purpose; or it may have to go near what we call the Board's reclamation-ground, round by the docks, or near the present stores.

326. But, at all events, it would be within communication by rail?—Oh, certainly. It would either be handled direct from the store to the ship, or the most that would be charged would be 1s. 6d. per ton for haulage.

327. The charges would not exceed 1s. 6d. per ton?—That is the present rate of haulage from the stores to the ships' side; that includes handling.

328. And what would be the cost of storage?—We have not considered that point. The cost of storage would depend on the cost of the necessary plant and other outlay. We have not considered the cost of storage; in fact, I may say the Board has not gone thoroughly into the matter.

329. We understand that the Board generally recognises that cool-storage accommodation is desirable?—It has never been before the Board. The discussion has taken place between private members of the Board, more particularly between Mr. Wright and myself. Personally, I am in favour of a cool-chamber, and also of a refrigerating-machine, so as to freeze the sheep or cattle as they come to port, and keep them in a proper state until the boat is ready to take them in. It would do away with the difficulty as to trucks, all the cargo being ready for the steamers as they arrived. The whole thing, I think, will hinge upon the support given to the Harbour Board. If we

can see any reasonable chance of our storage being utilised there will be no doubt but that the Harbour Board will get the necessary plant for storing. That is my own opinion only, and not the opinion of the Board.

330. Has there been much butter shipped from Lyttelton?—I could not say. Mr. Williams probably could answer that question better than I. The Harbour Board Treasurer's statements are very full statements, and will afford all the necessary information.

331. Will you provide the Committee with a copy of the Harbour Board returns?—You shall have a copy of them; they will give all the particulars; they are very full returns.

Mr. C. HOOD WILLIAMS examined.

332. *The Chairman.*] You are Secretary to the Lyttelton Harbour Board?—Yes, I am Secretary and Treasurer.

333. You have heard what Mr. White has stated?—Yes.

334. You agree with his statement?—Yes; he has stated exactly the case as it stands. The matter has not come before the Board. I have been instructed, in the resolution referred to, to get certain particulars as to the quantity we should have to store in Lyttelton; but, having been absent from Christchurch during the last fortnight, since the Harbour Board last met, I have been unable to get it. I saw Mr. Waymouth, the Secretary to the Belfast Freezing Company, and he informed me that he considered a building of 80ft. by 60ft. would, in his opinion, meet the requirements as a cool-chamber for cheese, butter, or anything else that might require cool-storage. He also stated that the works of the Belfast Company and the other freezing company at Islington, being at so great a distance from Christchurch, were very inconvenient for the purposes of a cool-chamber for storing cheese and butter.

335. This 80ft. building would, not of course, mean a large storage-building?—No; that would be for a mere cool-chamber for cheese and butter, and possibly fruit and game only.

336. It is simply for cool-storage and not for refrigeration?—Yes. The resolution that Mr. Wright proposes is for a cool-chamber and not for freezing. The larger question, of course, the Board might take up in connection with its cool-chamber.

337. Can you give us any information as to how butter arrives for export?—Well, as a rule, it arrives in trucks, and is stored in the Harbour Board stores and in private stores in Lyttelton. Most of the sheds are built entirely of iron, and are very hot in summer.

338. Then, you think that the butter is very possibly damaged by that?—Not from my own knowledge. I think Mr. Waymouth told me that considerable damage is done both to cheese and butter through its being stored in these heated iron stores. The produce comes down from the country, and very likely the vessel is not ready to take cargo of this class; consequently it is shunted into these iron stores, where it remains sometimes for several days.

339. Are all these stores you speak of as being used for butter-storing in connection with the railway system?—They are all served by railway-lines.

340. There is no additional cartage?—Oh, no; they are all served by the railway. The Board has several suitable sites; it is only a question of the Railway Commissioners giving the necessary access to them. There is a site near the ocean-steamer wharf—a very suitable one, which could be served by the railway, and would be close to the vessel that takes the produce.

341. *Mr. Walker.*] There is no storage-shed in Lyttelton Harbour served otherwise than by railway?—No. The private stores are owned by the New Zealand Loan and Mercantile Company, Shaw-Savill and Co., and the New Zealand Shipping Company. In addition to these, the Board have stores of their own. They have one brick store, which is rather a better store than the others, but it is always occupied with grain.

342. *The Chairman.*] None of these have power to cool the air?—No; there is no provision for that purpose.

343. *Mr. Walker.*] Does the butter lie for any length of time in the port?—Sometimes it lies for several days.

344. We are informed that in Wellington the shippers prefer to get their butter in direct from the country, and have it put on board the vessel with as short a delay as possible. Is a practice like that in existence in Lyttelton?—I think not. I got my information from Mr. Waymouth. I understood from him that they had no conveniences for storing butter before it came forward for shipment.

345. As a rule, it runs the risk of having to lie at the port some time?—Yes. They prefer that the cooling of it should be done in port, and that a cool-chamber should be provided in Lyttelton.

346. We had evidence from the Wellington Harbour Board that it had some doubt as to whether the Harbours Act gave the necessary powers to Harbour Boards to construct such works as you indicate: has your Board any doubts on that subject?—None whatever. The Board took legal advice upon it, and the clauses of the Harbours Act are very clear. I heard that Mr. Ferguson, in giving his evidence before this Committee, had stated the reverse, and I think he did not make himself quite understood on that point. I think he agrees with me.

347. *The Chairman.*] Do the Railway Commissioners provide a proper system of trucks to bring in the butter?—Yes; they have a large number of cool-chamber trucks which they use for meat, and I presume they would put butter and cheese in them. Possibly they may have to increase the number if any large export is made of cheese and butter.

348. Has there been any difficulty in Port Lyttelton in getting accommodation in the steamers to take away the produce?—I have not heard of any.

349. *Mr. Walker.*] Are you sure that the Railway Commissioners place their cool-cars at the disposal of butter-producers?—I am not aware that they do.

350. You have not heard complaints on the subject?—I have heard complaints of the meat-freezing companies not being able to get sufficient meat-trucks.

351. But not for butter?—No, not for butter.

352. Probably they have not come into use for that purpose?—No, I do not think they have used them.

353. *The Chairman.*] Do you look forward to a large increase in the export of dairy-produce?—I am hardly in a position to speak on that point. The annual trade returns for the Port of Lyttelton show last year's increase in value as £22,346; the value of dairy-produce exported for 1888 was £30,127; for 1889, £52,473.

Mr. A. J. Mcgregor, M.H.R., examined.

354. *The Chairman.*] We know that you are from Akaroa, and that it has been the great centre of dairy industry for a long period?—Yes; I have had experience for about twenty years in Akaroa.

355. We are anxious that you should give us any information you possess as to the best means for fostering the industry and for arranging for satisfactory accommodation at the harbours?—My knowledge is principally in regard to cheese-making at Akaroa. We make every year about 800 tons of cheese on what is known as the Cheddar system. It has not been a profitable industry for the last two or three years owing to the lowness of price, and that is to some extent caused by the inferiority of the quality. I think the reason for what I call the inferiority of the quality, or what should more correctly be called the want of uniformity, is that butter is now being turned out by the dairy-factories and by people who give more attention and skill to the manufacture of the article. The most of the makers down in Banks Peninsula make their cheese exactly as their grandfathers and grandmothers did. Another reason, I think, for the poverty of the quality of the article is the depreciation of the breed of cattle. Sufficient attention has not been given to getting the right sort of dairy-cows or the sires of dairy-cows—the right sort of bulls. There is also another matter which I think is rather an important one—the extraordinary variety in the colour and size of cheese. I may say that we depend now entirely on the export market. The local market for cheese is Dunedin or Christchurch. We sell to the merchants of those places for export either to other colonies or London. The great variety of shapes, weights, and colour has been found a great drawback to the sale of cheese on the London market. I think it is very desirable that in the larger bays on the Peninsula dairy-factories should be established. From the hilly nature of the country and the bad roads it is difficult to get milk to any common centre. At the bays known as O'Kain's, Le Bon's, and Pigeon Bay there are quite enough settlers and cows to warrant the establishment of factories, and it is very important that a Government expert should make visits to the different settlers and give them instruction in the most modern and scientific way of manufacturing the article. In some of the dairy-farms the appliances are of a very primitive description, and the buildings are hardly suitable for the production of first-class goods. At present the price is not a paying one, and there is a tendency for dairy-farmers occupying 400 or 500 acres to sell off their cows and go into sheep-farming. I have little doubt that there is no part of the colony better suited for dairy-farming and for growing grasses for cattle-feeding than Banks Peninsula. We can run a larger number of cows per acre than in any other part of the colony.

356. What grasses are generally used in your district?—Almost in every case cocksfoot. Of course the clover comes naturally; we do not sow clover.

357. You mentioned that the cattle generally are inferior at Akaroa?—I do not say inferior, only not so good as they might be for dairy purposes.

358. What cattle do you recommend should be introduced?—Ayrshires. More care should also be taken in the winter feeding of cattle. A large number of them die during the winter.

359. Are we to understand that the feed there is grass alone?—Yes, grass alone. There are hardly any roots at all. I think it very desirable to introduce root-crops.

360. That would provide winter feed?—Yes, it would provide the winter feed that I refer to.

361. What is your opinion about the system of grading cheese?—I think it would be a desirable thing to do.

362. Do you think that an offer by the Government of any bonus for the production of good cheese would assist in developing the industry?—I think that is very doubtful. What would develop the industry most of all is a higher market price, which would make it worth one's while to go in for the industry. I do not think there is much in the system of Government bonus.

363. You say in your evidence that a Government expert should visit the district?—Yes.

364. What class of expert?—One who has a special knowledge of cheese-making.

365. You consider that the farmers of Akaroa would receive any suggestions?—Yes; I am sure they would. They are anxious to do so. An application was made some months ago to the Government with this object in view. They find they are falling behind in the race, and simply as a matter of self-preservation they find that they must do something. They look to expert information as being able to assist them. I made the application for them.

366. How do you send in your produce?—The produce is all packed in wooden cases made of white-pine, and containing about two or three large-sized cheeses. Of the smaller size cheese there would be five in a case.

367. It is sent away by steamer?—Sent by steamer to Lyttelton for shipment to London, or for consumption in Dunedin. There are never more than two cheeses put in one case for shipment to London.

368. What is the range of size?—They range from 10lb. to 60lb.

369. What is your opinion of the best size?—The best size for the London market is about from 50lb. to 56lb.

370. *Mr. Walker.*] Are they shipped by the producers or by the storekeepers?—They are generally shipped by the storekeepers, but recently many of the farmers have taken to shipping

direct to London. They get advances from the New Zealand Loan and Mercantile Company on the shipments.

371. You have no particular requirements at the wharf for storage. Would a cool-chamber or shed be requisite?—No, it would not in our case, because the farmers all know when the steamers sail for any of the ports. They bring the cheese down during the day, and it is shipped the following evening for Dunedin and Lyttelton. I noticed that you asked Mr. Williams if there was any scarcity of freight in cool-chambers. I know for a fact that large shipments have been delayed for months because freights are not available in cool-chambers at Lyttelton. The Harbour Board of Lyttelton acts for the northern side of the Peninsula. The Borough Council acts as the Harbour Board under the Act. All the northern part of the County of Akaroa is bounded by the Harbour of Lyttelton, and Pigeon Bay is also under the control of the Harbour Board.

372. You do not agree with Mr. Ferguson as to wharf-accommodation?—We do not want any storage as a rule in Lyttelton, because it is perfectly well known when the direct steamers are to sail, and we have almost daily steamer communication between Akaroa and Lyttelton. The produce is put into cool-chambers of the ships alongside the wharf at once if there is space. We have to apply a month beforehand to get space. Settlers have to sell their produce at a loss through not being able to ship it in the cool-chambers of the vessels. There is another matter which seems somewhat curious: sometimes those considered the worst cheese-makers get the best returns. It is an extraordinary fact that the men who make a first-class article and take all the care they can will get 10s. a hundredweight less price for their cheese. Proper grading would be a guarantee that the man who made a good article would get a good price. There is evidently a great deal of "fluking" in the matter.

373. *The Chairman.*] Might not that be caused by the long storage in the shed at Lyttelton?—I cannot tell the reason, but it frequently occurs that the returns of the best makers are the lowest.

374. Can you state to the Committee whether the different quality of produce sent by the same steamer is sold at the same market?—I cannot say; but there is not such variation in the London market as would account for the difference in price.

375. *Mr. Walker.*] You stated that the industry is decidedly on the wane?—Yes, it is on the wane.

376. And that the settlers are taking to sheep?—Yes.

377. Is it not because the cocksfoot industry gives them a better return than the dairying industry?—It arises from the present price of mutton and wool. The price of cheese is low, and the rearing of sheep requires less labour. The people do not like the Sunday work making cheese. They see that their neighbours who rear sheep live an easier life—a lazy habit—they go in for the less troublesome article. The cocksfoot industry has fallen off; the price is low. People who keep sheep never harvest the cocksfoot. Those who have cattle keep them in the paddocks half the year and turn them out on the cocksfoot the other half of the year.

378. It is a very important industry is it not?—There are very large tracts of land taken up by sheep-farmers. Men with four hundred- or five hundred-acre farms go in for sheep now who would not have thought of it some time ago.

379. *Mr. Mackenzie.*] You think it would be an advantage to have an expert to go round to the different settlers?—That is very much what is wanted—an expert to go from door to door; to go to each farm for a few days, when he could see the whole operation of cheese-making from beginning to end. It would be of no use going for a few hours.

380. You state that from 50lb. to 56lb. is the best size of cheese for the London market?—Yes, the people think about 56lb. the best size.

381. I was told in London that the best size was from 70lb. to 80lb.?—That would be an inconvenient size. A large amount of the work at Akaroa is done by women, and they would not be able to handle cheeses of that size.

382. Do you know what price is obtained for the best cheese in London?—I know one sample fetched as much as £3 10s. a hundredweight.

383. You mentioned the difference in price obtained for what might seem second-class cheese as against what was considered first class?—That is what has actually happened.

384. Do you not think it may be that what might be considered second-class cheese here, and not looked upon so favourably, would be looked upon more favourably in London?—It may be; there is a great deal in the question of taste, no doubt.

385. Would it not be well to follow up the make of cheese that brings the best price, although not thought so much of here?—The Frenchman to whom I referred as receiving a higher price makes his cheese in a hap-hazard way. He got a high price for one shipment. The next shipment he made and sent Home in the same way he did not get £1 8s. for it. It turned out differently from what I may call the "fluking" shipment.

TUESDAY, 19TH AUGUST, 1890.

Mr. WILLIAM HUME, Produce-dealer, of Wellington, examined.

386. *The Chairman.*] You are a merchant, Mr. Hume, residing in Wellington?—Yes.

387. You have had experience for many years in dealings with dairy-produce?—Yes.

388. Will you make a statement to the Committee as to your views with regard to the production and export of butter?—My opinion as to butter, in the first place, is that it should be properly made, with the water and milk and everything taken out of it; also that the casks should be properly filled at the top, just to give room for the lid to catch in the chine of the cask. Great care is necessary in coopering butter for transit to keep the air from getting into the cask. The cask should also be well jointed, and made out of properly-seasoned wood. A great many casks

are not made out of seasoned wood, and consequently shrink. The casks should have at the bottom about lin. of salt, and the butter should be put in in such a way that there shall be no water or milk in it, as water or milk generally heats; and causes the butter to become rancid. I should advise strong galvanised hoops to be put at the top and bottom of the casks when they are coopered. The last hoop on top or bottom should be stronger than that on any other part. Calico should be put round inside the cask; but the calico should first be properly washed and all the whiting taken out. Whiting is very injurious to butter. As to filling the casks, I would approve of their not being filled at one churning, but at two or three. For instance, a farmer can fill, say, three casks at one churning; it would be much better for him to have six casks, half filling each with the butter and at the next churning to fill the casks up. It would give the bottom a longer time to harden, and the butter would have time to shrink before the cask was finally filled. If you fill a cask with butter at once it is full to all appearance, but in three or four days, or a week, it would be from 3in. to 4in. down. It is a great benefit to the butter when the casks are properly filled, and it also has a better appearance in the market—it takes the eye better.

389. Now, as to the question of demand after the butter is made, and its transit?—For shipping purposes I would approve of butter being inspected before shipping.

390. What is your view as to the advisability of inspection before export?—All butter should be inspected before being sent away, and it should be classed. For instance, if a man had a hundred casks of butter to ship, I think the Government here should have a competent man, who understands the different qualities of butter, to class it, and to reject what he did not think fit for shipment.

391. Do you consider, assuming that the butter was classed here, that we could depend upon buyers at Home taking that classification?—If honestly done, the buyers at Home, after two or three shipments, might have confidence in the inspection. You could not expect the buyers to take for granted as all right butter sent Home for the first time under the inspection; but I believe that after three or four times, if they found the inspection was all right, the butter would be bought without any trouble. The brand of the article must be known. For instance, a brand of Belgium butter, if known, is bought in Glasgow, Edinburgh, London, or Manchester without looking at the butter.

392. By whom is the inspection carried out in Belgium?—I understand by the Government.

393. Do you believe it should be undertaken at the ports of shipment?—I cannot say exactly. I rather think not. I think the inspection should be undertaken at the different centres in the country—at the different places where the butter is brought in.

394. *Mr. Walker.*] The English buyer takes these brands as satisfactory?—Yes, knowing them. If a buyer in Manchester, we will say, has been in the habit of getting certain brands of Belgium butter he would get no other. It is hard to put a new brand on the market.

395. *The Chairman.*] Will you tell the Committee about the system of Irish classification?—In Cork the butter is brought into the market by the farmer. He sends it in to the butter-factor, who has an office in the market, and he places this butter in position in the market. The butter is got in at a certain hour of the day—up to 10 o'clock. There are five entrances to the market, with a little box office at each, where tickets are placed in the box. The Inspector puts his hand into the box and draws a ticket, which indicates what particular pen he has to go to. He does not know anything about whose butter it is he is going to inspect, so that that does away with bribery.

396. Is there no distinctive brand placed on the butter before it is judged?—None. The Inspector knows nothing about it. Porters take the butter in as it arrives, and place it for inspection. If the Inspector considers it first class he places a score on the butter; if second, he places two scores; if third, three scores. If he finds any not fit for third class he puts it on one side and inspects it afterwards. All the butter is then branded on the side of the cask.

397. Are there not four classes?—More; six classes.

398. Do you think that the refrigeration of butter has a deleterious effect upon it?—Yes; when thawed it generally gets soft. It never gets its original hardness, and also gets rancid and a bad colour.

399. You rather believe in shipping butter in cool-chambers with a temperature of not less than 40°?—Not less than 40°.

400. *Mr. Walker.*] That is your practical experience in frozen butter?—Yes; we have got butter from Canada about the month of December very hard. Whenever the weather gets hot the butter gets soft and rancid after being taken out of the cask. My advice to shippers is to be very careful not to ship anything but what is really firm, with no milk or water in it. It should be of good body. What spoils the butter is that the storekeepers fill so many casks with mixed grades of butter; when it gets Home, it is not worth anything.

401. You mean country storekeepers?—Storekeepers generally. The butter lies in the back store a week or so before it is put into casks. The best way is to put it into casks at the time of churning. That butter, properly made, would have a demand in any market.

402. Do you think the separator system far superior to the ordinary Home system of dairying?—No, it is not. I got some butter from a German living at Cross's Creek—some six or seven casks—that paid when it went Home; and I got a letter back to say that it was as good as any Irish butter. It was made from five cows and on the old system.

403. Then, you consider the Home dairy system is not inferior to the separator system?—It is a much better system. The butter is more firmly made. When churned by the horse-power system the butter is light and "foussy"—spongy—which indicates the presence of air-cells.

404. And you think that is caused by too much haste in churning?—It is churned too much. The butter does not get the same solidness as if churned by hand.

405. *The Chairman.*] Then, separator butter generally is all spongy?—It is not so solid as butter churned by hand.

406. *Mr. Mackenzie.*] Separator butter is just as marketable as the other?—It is just as

marketable here. I would give just as much for other farmers' good butter. The best butter in Ireland is made in Carlow, one of the midland counties. This butter is made by farmers who have from five to twenty cows altogether. It is churned by hand in that district.

407. *The Chairman.*] What time do you consider the best for colonial butter to arrive in the British market?—I would not advise colonial butter to arrive before the beginning of December.

408. Up to what time?—Not later than the first or second week in March. Foreign butter arrives in December, January, and February.

409. What time does Canadian butter arrive?—Just the same time. For instance, Scotch butter begins to come into supply in the open market in March; Irish is plentiful in April; Belgium butter is always in request, and the reason is that you can have it in London in twenty-eight hours, and, it does not matter whether it is winter or summer, it takes the market.

410. Can you tell us the comparative price received during any given month for foreign butter as against the Home product?—During these months there is very little Home product in the market; what is in is old butter. Butter made in the summer or harvest time is consumed by the second week in December, when there is none to be got, only repacks bought from the farmers on account of not being worth salting. This is sold to what are called repackers, and it is the only Home butter in the winter time.

411. You have not mentioned Danish butter?—That takes the market at any time.

412. You place that in the same category as Belgium?—Yes.

413. Do you know anything about the storage of butter arriving here before being shipped?—That is one of the great injuries to the butter here. The butter is put down on the wharf in the baking sun before shipping—perhaps a whole day. I have seen hundreds of casks lying there with the oil running through the casks.

414. Does that injure the butter?—Yes; that butter should not be shipped at all.

415. You think it is necessary, if we are to have a butter trade, to have enough storage?—The butter should be put in cool-storage until the time of shipment. It should be actually taken off the drays and put on the boats. We should never think in Ireland—in Cork and Inniskillen—of sending butter out of the stores to the trains before it was cooled.

416. What kind of stores have you?—We have to build them of brick if there is no stone. We have to keep the butter a week in some cases. It is all kept in stone, concrete, or brick buildings.

417. Do the dairies provide cool-chambers for their products?—Yes; in County Fermanagh prizes are given to the farmers, and Lord Erin gives a premium to his tenants, who vie with each other to have the nicest and cleanest dairy. That is one great fault you have here. The dairies are neither clean nor cool, and are not adapted for making good butter.

418. Do you think it would do good if the Government were to appoint a dairy inspector?—That is, if they appoint a competent one; that is required here very much. But the great thing is to get a competent man—one who thoroughly understands the working of a dairy. I would not approve of a theoretical one. He should be a practical man, who knows how to make butter and cheese.

419. Do you think a travelling dairy to teach the farmers would be of service?—My opinion, which I have always promulgated, is that it would pay the Government to bring out practical farmers from Home, and give them some five or six hundred acres of land to teach the people how to make good butter and cheese. You require to do that before talking of sending butter in quantities to any other country. The great success of the Irish was gained by others showing them how to make butter. These farmers would do more good than all the dairy inspectors in the world, if practical men from either the North of Ireland, or Ayrshire, in Scotland. And give a chance to compete to those who have the nicest place, by offering premiums. The Inspectors of Cork are appointed by the Corporation, which gets the benefit of the money received from the weighing and inspection of butter. In Inniskillen the Inspector is paid by Lord Inniskillen, who is owner of the market, and gets the fees. In Sligo, which is a corporate town, the Inspector is paid by the Corporation.

420. *Mr. Mackenzie.*] You think our whole system of private dairying is wrong?—Yes, I think so. I have seen a good deal of it.

421. What do you think of the system of inspection taking this form: employing thorough experts to go from district to district?—You would require that; but my idea is this: By getting a few farmers from Home and placing them in certain districts—say, one in Palmerston, and one or two in Canterbury, and so on—they would teach the people how they made butter. I think that would be the best system, and cheaper for the Government. In a district in Ireland called The Glenties, County Donegal, I recollect when they could not make butter; but, through some Scotch farmers coming there, they were able in a short time to compete with them.

422. Failing that system you speak of, what would you think of a plan of bringing out competent men to go from district to district to give instruction?—I would advise that, failing my theory; but not men to reside in the towns. That kind of instruction depends too much upon theory, which is killing the colony. They should be practical men, knowing how to make butter themselves.

423. What system of salting is best?—Butter should be salted after coming out of the churn.

424. What quality of salt?—The finest is Black Horse salt. There is salt made especially for butter in Ireland, but the salt you have here is not too coarse.

425. What percentage of salt?—Three per cent.

426. Now, as to the kegs?—You have not got the proper wood for kegs. It would pay the Government to import oak and sell it to the farmers.

427. Import the wood and make it up here?—Yes.

428. At what cost?—The present price is too high. The coopers have not got a proper system. If a farmer has to buy a keg he has to give 8s. for it—for oak kegs, which would hold about 100lb.

429. Would you condemn all the timbers in the colony?—Yes.

430. You have seen totara wood; that taints the butter?—Yes, but it is the best of the New Zealand woods.

431. A man in Dunedin has introduced a box, and his system is to drive all the chemicals out of the sap and char the surface?—Yes, all the surface should be charred, but that cannot take the taint out.

432. Your opinion is that no colonial wood is fitted for it?—Yes. One stave of deal in a cask will destroy the butter. I could detect butter afterwards that had been gathered in a dish or tub made of deal. One tub of milk thrown into a hundred will spoil the lot. My advice is to get oak if you want really to send butter Home. The shopkeepers would give more for it when packed in well-made oak kegs.

433. Have you had any butter packed in totara?—Not very much. I never liked it.

434. Do you know Pond's butter-boxes?—Yes; but that is not good for shopkeepers. They like casks. For instance, in Glasgow they make a speciality of having nice windows. They sometimes have as many as eight casks shown with a nice ticket outside. These casks go right along the window, and make a nice show, which takes the eye.

435. Do you not think we could send butter Home equal to Danish?—No.

436. There is a system adopted in Denmark of tinning the butter?—Not for the Home market, but for tropical markets. I would not recommend that system. If you want to send butter to Japan, or other such places, you require to have it tinned; but the Home market has a prejudice for tinned butter. They might buy it when there is no other in the market.

437. *Mr. Walker.*] Does the process of freezing butter spring the staves?—No; but after the cask gets heated it will spring. Like iron it expands, and then contracts when cold.

438. *The Chairman.*] Have you had much experience with cheese?—Yes, a good deal.

439. Can you calculate upon a good market at Home for our cheese?—If you make it a good deal richer than you do; but you cannot compete with American cheese.

440. The whole of the cream should be kept in the cheese for export?—Yes; the milk is poor enough without extracting anything from it.

441. Have you sent butter and cheese to the British market?—I have sent butter, not cheese; I import cheese.

442. Was the result of the butter export good?—Yes. I took good care to select it. If not in actual form I would not send it away. When we bore it, if anything adheres to the back of the pail or auger we condemn it at once; butter that has been too much worked for instance. A good deal will stick to the pail—that is, butter that gets too much working—some time after it has been taken from the churn.

443. Butter can be too much worked?—Yes; that is the great drawback to the butter trade; the butter is actually destroyed.

444. You will be able to compete with American cheese?—No; you cannot send it in quick enough. You can have it from Canada in seven days. Unless you send it by steamer you cannot get it Home in less than three months. And the cheese is made on a different principle in Canada from that made here. Your pasture is not so good; it is poorer. The pasture is not so old. Old pasture is much better for giving cream than new pasture. The older the pasture the better the milk. You have a better breed of cattle; but Ayrshire is poor in milk.

445. All these matters might be got over?—Yes, I admit that; but you want practical knowledge.

446. You think that with practical knowledge you might compete with America?—Yes; but you want system.

447. Our cheese has been brought into competition at times with American cheese?—Yes, at times; but take it as a general rule you would not be able to compete with the Canadians.

448. I suppose the English Cheddar is as good as the American?—Better; I saw as good cheese as any, made at Mr. Skerman's, Palmerston North. It was as good as the best American.

449. What are the best grasses for producing good cheese?—The older the pasture the better. I do not know the best grasses; I am not particular about that. Pasture five or six years old is better than that of two years.

450. What do you think of feeding cattle upon root-crops?—Turnips, for instance, make the milk very thin. Roots do in winter time, when there is no feed; but they make the butter very light. Mangolds are much better than turnips. I should recommend mangolds, as they produce much better milk and butter.

451. What is the effect of feeding cattle on chaff and corn?—I would recommend that cattle get a white drink in the winter time—that is, meal melted and put in with mangolds or whatever else. I would give them sheaf straw; they should not get pollard. Grains are very good in winter time, but they make the milk very thin.

FRIDAY, 22ND AUGUST, 1890.

Mr. J. RANDALL MORGAN examined.

452. *The Chairman.*] You have had considerable experience in the butter trade?—Yes, about fifteen years on the London market.

453. The Committee desires to obtain information from you, and will leave you to give it as you think best. Afterwards the Committee will examine you upon any points you may not have sufficiently touched upon?—I shipped Home a considerable number of kegs of butter last summer, and I went Home in March to see how the butter had got on. I found that the New Zealand butter will not take its place as a first-class article in the Old Country. In the first place, the journey is too long for it, and we find considerable carelessness about the making of the butter. From my experience

up country, I think the storekeepers are too careless in the way they buy it. They do not make distinction enough between good and bad butter from different farms. If they were to pay the farmers according to the quality of the butter you would immediately see a considerable improvement in the make. There is no mystery about the butter trade; it is simply a matter of £ s. d. and, while a farmer gets the same price for his carelessly-made butter, there is no encouragement for him to improve. If the farmers want information on the making of butter the best thing is to have some practical butter-makers from the Old Country. With regard to the packages, the chief butter-salesmen in the London market find the packages of totara good enough. Naturally enough the wood must not be green. If you get a well-seasoned totara cask and keep it full of fresh water for seven days you will find that the wood, being porous, sucks up the water, and makes the cask as near air-tight as you can possibly wish it. After the cask has been full of water for about a week it should be sprinkled well inside with salt all the way round. The butter packed into the cask should all be of one churning, if possible. By having butter of two churnings you are likely to get two colours, which will immediately stop the sale of it in London. The best way that I have seen the butter packed is by pressing it down by the hand with two thick pieces of muslin. By doing that you get most of the moisture out of the butter. You pack it in such a firm state that the air does not affect it (only a little bit on the outside would be affected, not enough to be of any importance). It is desirable to get the packages of even weight, because that will save the exporter a lot of loss on average and tare. The Dutch butter-kegs are all stamped by the Government; and my experience in handling thousands upon thousands of these casks is that you could not find an average of more than one in the thousand as being overweight. They are nearly all alike. A hundredweight cask is 16lb. tare, and it is such an unusual thing that if a cheesemonger writes to his wholesale merchant that he has discovered a cask a pound or a pound and a half over weight the merchant generally sends some one round to see the cask. I just mention this to show the importance of a uniformity of weight of the cask. This is a small item, but you are liable, with all uneven-weight casks, to make a loss of 6d. or 1s. on the keg, and probably the butter trade would not allow such a margin. It is by the saving of these small expenses that you must look to make a profit. I have handled New Zealand butter which has left nothing to be desired for quality—the get-up of the butter and the packing. What I mean by the “get up” is: it has generally the gross tare and net weight marked on the outside. To all my clients I advise this, and where possible I give the preference in buying. When it reaches Home it saves the necessity of turning out a large number of casks to average them tare and tret. With regard to the shipment of the butter, the freezing of the butter kills it. I am one of very few men in the London market who can speak with authority on this, as some six years ago, for three consecutive seasons, the firm I was employed with put down a considerable number of casks in the Central Market cold-air stores of London. I had the salting of that butter in the store, and the selling of it to the butter- and cheese-mongers when it came out. The first lot we froze. I could not tell you the degree of frost, but it was the same as they keep the mutton, which would be pretty considerable. We found it kept the butter all right until it was placed in the shops, where, exposed to the heat and bad air, it went rank in a very short time. If a cask of butter was put on the counter in the morning, and was not cleared out at night-time, it would be all rank. The next season we put down some butter, and we kept it at a temperature of from 35° to 40°. The butter, on exposure, kept good much longer. I found this year at Home just the same thing. The butter I have just spoken about is Dutch butter, which has a considerable sale in the summer months in London. The great loss on the New Zealand butter last season was greatly due to the want of space in the ships, and I have noticed butter lying on the Wellington wharf for some considerable time owing to want of space. I have known considerable quantities of butter in the up-country stores which could not be shipped for want of space. That puts the butter into a very third- or fourth-rate class in the eyes of the London buyer. What is wanted here is a regular service—the storekeeper sending his butter away regularly every fortnight as he gets it, or even in less time if possible. Some of the butter I have seen here has been as fine as any made in any part of the world; but, owing to the long time that it takes on the voyage, it can only reach London as a second-rate butter until there is some other means of conveyance than freezing.

454. Do you think it advisable that butter should be graded here before shipment?—Well, speaking as an experienced man, that is impossible. Owing to the length of time between the grading here and the sale of the butter in London the buyers there could not take any notice of your grading. You would have to get a man to grade the butter who thoroughly understands it, and has seen it at the other side as well as here. I should simply say it is impossible, and it would be of no material benefit if it were possible. The man who pays for his butter in London is not going to have anybody else to judge it for him. A man who is tasting butter every day is not going to have Dick, Tom, and Harry to buy the butter for him. He buys it on his own judgment, and no other.

455. *Mr. Dodson.*] What about the grading of Irish butter?—Some years ago that had great weight with the buyers there, but since that time there has been such a revolution in the butter trade that it is simply put on one side, or, rather, they have not put it on one side but have gone round. They do not take any notice of it to any material extent.

456. They taste and judge for themselves, independent of the grading?—Yes. Another great thing to be observed in New Zealand butter is uniformity of quality. My experience is this: A buyer purchases, we will say, twenty-five kegs of butter of one brand. The first two kegs open very fine; they are worth £5 12s. The next keg does not open quite so well, and is worth £5 6s. That raises a doubt in the buyer's mind that there is worse butter in the parcel, and in a good many cases it stops that sale of the butter. You will see the necessity from a small item like that of keeping out the bad or the inferior quality of butter from the good parcel. If the New Zealand storekeeper wishes to make money through his butter trade he must cultivate a brand, and send a regular quality right through the season of that brand. He must keep up the quality, and the brand will

get known on the Home market, and be inquired for. He will thereby be always sure of getting a good price for his butter. It will not do for him to send two or three lots of a fine quality, and then an inferior parcel that will knock his brand down 20 per cent. at once in the eyes of the buyer. I would advise all storekeepers throughout the country to make this their most important item in the exportation of the butter. Again, they should never keep the butter hanging about their stores for the sake of making up a large parcel. If they have only five or ten kegs of butter it should be immediately shipped. I have had many a parcel of butter which has suited the buyer for quality and price, and he has turned round and said, "Is this to-day's butter?" I said, "No, sir." The Dutch butter-boat arrives in London on Mondays and Fridays. Suppose I am selling butter on the Monday, the buyer has asked me, "Is this to-day's butter?" I said, "No, sir, Friday's." He has immediately refused that butter, although it suited him in quality and price. This may sound very strange to you, gentlemen, but not to any one of experience in the butter trade. The reason is, the buyer takes his butter home. It may be Wednesday or Thursday before he sells it to the retailer. The retailer puts it on his counter on the Friday and Saturday, and, being exposed to the gas and the bad air, that butter does not keep very well. If the retailer has one or two casks left on the Monday, when possible he will try to get that butter changed by the wholesale man for fresh-landed butter. It is just the two or three days that does the damage. Put that in comparison with the way the New Zealand storekeeper hangs on to his butter. He generally reckons that keeping the butter a month or six weeks makes no difference in its quality. You will see the necessity for the shipment of the butter as soon as it is made, where practicable or where possible. In my opinion, there is a large source of revenue or income from the butter trade. There is a large and profitable trade to be done. The whole of the butter-making and butter business is simply a matter of £ s. d.

457. *The Chairman.*] To insure uniformity, do you not think that all the butter made by small farmers should be made on the separator system, under one management and only of one quality?—No doubt the separator makes a uniform quality, but I have handled any quantity of farmers' butter and found it of uniform quality. The bulk of the Dutch butter is farmers' butter, and we get a general uniform quality from that country.

458. *Mr. Mackenzie.*] Do you consider the separator butter better than the ordinary farmers' butter for the market?—I have seen very fine separator butter, but I have also seen very fine farmers' butter.

459. We have been told that the separator butter turns out what is called "foussy" as compared with dairy butter, and that the parcels are larger—that a pound of separator butter is bulkier than a pound of farmers' butter?—I have no doubt it is "spongy," but I see no reason why one should not sell as well as the other. I do not think that is an important item at all.

460. *The Chairman.*] Do you consider that totara timber affects the flavour of the butter?—No, not where you have had clean water in it for some days, and getting the timber to soak up the water.

461. Have you had any experience of butter shipped in Pond's boxes?—I have seen it at Home; I have not bought any. I would not go to any extra expense. I would not give 1s. a hundredweight more for Pond's boxes than for totara casks.

462. Have you had experience of butter shipped in the tawa casks?—Not to my knowledge; I might have had.

463. You know that tawa casks are very generally used?—Yes; but I cannot speak with any authority on them. My idea is that the timber question is not such an important item.

464. What do you consider the most desirable size for casks?—The size they now run, about 80lb. to 83lb. or 84lb.—that is, the gross weight.

465. What is the tare of casks for butter of New Zealand wood?—From 13lb. to 18lb. I am speaking roughly. You should, as near as possible, get the kegs to weigh within an ounce of each other.

466. You have told us that freezing butter destroys its quality?—Yes. It destroys its quality on exposure afterwards to the air.

467. Is that an experience gained from the Holland butter, or from the New Zealand butter?—From both.

468. Does the cool-chamber butter turn out better than the freezing-chamber butter?—Most decidedly the cool-chamber butter turns out better. That was my experience in regard to butter-freezing in the City of London.

469. *Mr. Dodson.*] I understood you to say that the cool-chamber butter was better? Was it Dutch butter that was put into that chamber?—It was fresh-landed Dutch butter.

470. And you found that butter less injured than the freezing butter?—Oh, yes; there was no comparison between the two.

471. *The Chairman.*] What percentage of salt do you think it advisable for farmers to use?—From $2\frac{1}{2}$ to 3 per cent.—that is, 3lb. of salt to 100lb. weight of butter.

472. You say that the butter sold in the retailers' shops deteriorated very rapidly after being frozen: was that butter salted with this proportion of salt, or was it fresh?—It was salted to the extent of from 2 to $2\frac{1}{2}$ per cent.

473. Is that considered fresh butter?—The sale of fresh butter pure and simple in London is small as compared with the sale of butter salted to that extent.

474. Is it the butter that ordinarily goes into consumption?—Yes; you cannot entertain the idea of exporting fresh butter.

475. The deterioration of the butter commences directly after its exposure to the air?—Yes.

476. *Mr. Dodson.*] You told us that some deterioration takes place in the cask, but nothing like what takes place after it leaves the cask?—The time taken on the voyage puts the butter into a second-rate condition.

477. *Mr. Mackenzie.*] If a buyer goes into a London shop and wishes to buy butter, even before it is opened and exposed, the fact that it has been in the store for two or three days, has

that an effect on the buyer—that he does not like the butter so well?—Certainly; he is suspicious of it even before the exposure. He may have to keep that butter himself for three days, and that added on makes it a week stale.

478. *The Chairman.*] Have you had much experience with Danish butter?—I have sold a great quantity.

479. Would you class it under the same head as Dutch butter?—Yes, at different parts of the year. The Danish season is in the winter time; the Dutch season is in the summer time.

480. Do you know anything about the system of governmental assistance to the Danish butter industry?—No, sir; I know there is such a thing.

481. But you have had no experience?—No.

482. Have you had any experience with butter shipped from Canada?—Yes, two or three times.

483. Was that experience satisfactory?—Oh, no. I must tell you that for the London trade they want butter of a mild flavour. In the north of England they like it of a strong flavour, and that is where most of the Canadian and American butter is sold.

484. And New Zealand butter too?—Well, New Zealand butter will sell all over the country, more particularly the provinces. When it reaches London in a good condition it will sell well there.

485. You would consider it of great importance that cool-storage should be provided at the ports of shipment in New Zealand?—Yes, it should be provided at ports like Wellington. If there had been cool-storage last summer a good many hundreds of pounds would have been saved on the returns from the sale of the butter.

486. *Mr. Mackenzie.*] You stated that the long journey would prevent this colony competing successfully with other markets?—Yes, with other countries nearer to England, as a first-class butter.

487. Yet you also said that you had handled butter when in the London market that left nothing to be desired as to get-up and colour?—Yes, as New Zealand butter.

488. You do not mean as compared with the Home butter?—I am speaking of the New Zealand butter. When the market is short of the best butter New Zealand butter takes the place of it very well; but where a buyer has the preference of buying the finest Danish or the finest Dutch butter, then he will not look for New Zealand butter.

489. The butter here has been as fine as you have seen anywhere in the world?—Yes.

490. But the journey Home causes it to go down to second class?—Yes.

491. Do you think if we got regular and carefully-provided means of transit we could save that butter falling off in quality?—Yes.

492. By that, I mean to have a cool night-carriage to convey the dairy-produce from the farm to the wharf, a cool-store to receive it there, space ready in the vessel, and then to keep the temperature regular all the way Home?—Yes.

493. Do you think we could get over the difficulty by those means?—I expect plenty of space for the next season, but not regular space. Sometimes there will be, perhaps, one or two boats leaving the colony in one week. As the butter is made regularly, some of it must be a little stale here, having been kept for some time before shipment.

494. But, all things being favourable, from your experience, which is very extensive, do you think we could get over that if we got over the difficulty of allowing the butter to lie about?—Yes, that is my idea. What you want is a cool-truck to come down in the night-time. It resolves itself into a question of £ s. d. The freight is too expensive by railway.

495. With reference to the temperature on board ship, do you think the ships keep the temperature as they ought to keep it, or do they allow it to vary much?—They keep as near it as possible. I have been Home and out again and have talked with the engineers. I saw that they keep as near it as possible. The difference in the temperature of the sea-water makes a great difference to the freezing-machine. Sometimes there will be as much as 10° of difference in forty-eight hours.

496. They do their best?—Yes.

497. Do you know how much longer the butter that has been placed in cool-chambers will keep after exposure as compared with frozen butter after it is opened?—The circumstances are never the same with regard to the exposure of butter. There is only one thing that you can really tell, and that is, that frozen butter will go rank after twelve hours' exposure on the counter of a shop.

498. How long would a cask of cool-butter placed beside it keep?—It will keep good long enough for commercial purposes, until it is sold in the ordinary course.

499. You were asked about the cultivation of brands by people here?—Yes.

500. But you do not approve of grading: you do not think the London buyer would pay any attention to any grading-mark we would put on butter here?—No, not as Government marks.

501. Do you think he would respect the brand of any man?—Yes, where that man has proved his brand to be uniform. For instance, I know a man who has a factory in the Taranaki District, and he sent Home his butter as one brand last season, and it was always good. If I were in London I could sell that man's brand of butter before arrival. If he once sent a bad lot Home I could not sell the butter except on inspection.

502. Would not that apply to any brand put on by the Government?—It would apply the same, but self-interest comes in. Self-interest is a better judge than what a paid official would be.

503. Do you think a totara cask as good for packing butter in as an oak cask?—They all say the Norwegian oak is the best; but there is not such a difference as would warrant the expense of bringing it. As I have said before, if the totara cask is well soaked with clean water it is sufficient for all commercial purposes.

504. There are two kinds of packages, the keg and the firkin, which is the best?—As far as carrying the butter is concerned, there is nothing in the package. It is just what a man likes here; one may like a tub, and another may like a cask.

505. You think there is nothing in that?—No, nothing in it. When Home last I was asked to ship casks to one firm. Another firm on the same market wished me to get boxes for him. In different districts they have different preferences.

Mr. WILLIAM D. SUTHERLAND examined.

506. *The Chairman.*] You have had considerable experience in the dairy industry?—Yes.

507. The Committee would like you to make a statement regarding any points you think of interest. After you have made your general statement the Committee will ask you some questions upon any points upon which they may think you have not made yourself clear?—The experience I got in the first place was in Canada, and you will quite understand the disadvantages of attempting the manufacture of butter under any circumstances there in the summer time as compared with the advantages this colony possesses. The facility for making butter in this colony was one of the chief reasons that induced me to remain here. In many of the big gullies in New Zealand, where the settlers could not get sufficient inducement to start a factory, they might adopt the system which has been in operation in Canada. There they have Cooley made cans, with a cover, which prevents the water getting into the can. The can is covered with water, the weight of which on the lid forces all the air that may be on the top of the milk out. The result is, the milk is kept perfectly cool; the temperature of the water and the milk becomes the same; the sudden chilling causes all the cream to rise in a very short time. The water flows into the vats in which the cans are immersed. They sink an open vat in the floor of their dairies, and wherever they can find a creek to divert and allow the water to pass through the dairy they do so. Sometimes they would simply set their cans in the water, when they had no means of covering them. The manner of treating milk just mentioned is after the Cooley or Schwartz systems, which are well known, and might be adopted in New Zealand with advantage in places where there are not a sufficient number of settlers to start a factory. Where butter is made of inferior quality by people outside the factories it goes into the market, and, of course, it is all called New Zealand butter. It spoils the market. The factories, so far as they have gone yet, have disappointed me very much. When the frozen-mutton industry was commenced I was asked by Mr. Larnach what amount of support could they possibly get from the dairying industry to induce owners of sailing-vessels to put freezing machinery in their ships. My reply was that the value of the dairy export should exceed that of mutton. The disappointment I feel as to the result of the factories established is chiefly owing to the inexperience of those who have their management. Those in charge of them work by "the rule of thumb." I have been at the different shows held at Dunedin and elsewhere, and have been called upon to act as judge, and the quality of the dairy-produce exhibited was very disappointing. The cause of failure is simply through the inexperience of the manufacturers; they do not recognise the fact that it is pure butter-fat that is required. If the butter is kept in a pure atmosphere, in a cool temperature, and surrounded with pickling it cannot go wrong. The manufacturers have the appliances, but they lack the skill. I have advised them to go to Dr. Black to get lessons in chemistry, for it is really the work of a chemist manipulating milk into butter or into cheese. When the milk comes from the cow the atmosphere has an effect one way or another on it, and this fact the manufacturers do not seem to realise. Attempts have been made to give lectures on dairying, but the population we have to deal with have come with their little experience from other countries, and they will not learn. They are flooding our markets with inferior stuff. To find a market beyond our shores for the article made is the trouble at the present time.

508. Do you consider that there should be some tuition of these people by experts?—Yes; say, colleges, taught by professors at the several centres. If pure butter-fat is put up in proper packages, surrounded with pickle, and the temperature kept even and cool, there is no fear of it not keeping its quality. The shipping companies, when they put freezing machinery in the ships, declined to find a cool space for butter. They did not see the necessity of it; they insisted that the dairy-produce should go with the mutton. Captain Boyd telephoned me to see him, and he stated that he had instructions from the head office at Home to supply the ships with anything I recommended. He sent me down to the port to see what space we wanted, and said it would be supplied.

509. You recommended that cool-space should be provided outside the refrigerating-chambers?—Yes.

510. That recommendation has been carried out?—No, it has not been carried out. They found cool-space, but it is a small chamber.

511. You consider that additional cool-space should be provided?—Yes. The cool-space is not properly regulated as to temperature.

512. What temperature should be kept in the cool-space?—I would simply keep it above the freezing point—from 35° to 40°. The frost makes the butter good for nothing, as the thawing takes all the nutty flavour out of it, and leaves the mass like so much lard in texture.

513. You think that freezing butter destroys it?—Yes, it destroys it completely; it alters its character entirely. The appliances used in the making of butter here have a great tendency to spoil it. Many of the churns used have a tendency to make it greasy.

514. Do you think the separator system is the best to adopt?—Yes, if it is properly worked.

515. You consider that would insure uniformity of production?—Yes.

516. Are there not cool-stores provided in Dunedin to receive butter when it comes in from the country?—I do not think so; it just goes into the ordinary stores with other goods.

517. Have you noticed whether butter, before it is shipped, receives any damage from the want of this cool-storage?—It must do so in warm weather. It is all the better to keep it as near as possible at an even temperature.

518. Do you consider that experts should be appointed to travel throughout the country and enlighten the farmers as to the proper mode of making butter?—Well, no; I should be more inclined to adopt the Canadian system, of having schools and colleges, and educating them. Our present population is hopeless to deal with; but I would provide the rising generation with schools and teach them the industry, styling the teachers “professors.”

519. You would rather prefer a system of colleges in the different centres that would educate the growing population?—Yes. I know the makers so well, having dealt with them for the last twenty-five years. They listen with open mouths to anything said to them, and go home and do as they always did.

520. You do not think the appointment of an expert to travel the country would do any good?—I think the school suggested would be a better plan.

521. Can you tell us whether there is any inspection of butter before it leaves Canada for London?—At the chief seaports there would be an Inspector appointed by the Government; but in the inland towns such bodies as the Corporations or Chambers of Commerce appoint local Inspectors. The Inspector at the seaport overhauls the whole of the shipment. He opens every package and examines it, and if he detected the least flaw he would not brand it. If an Inspector or Inspectors are appointed the question of proper packages or kegs would be decided by him, as I know he would decline to brand it if not good in all respects.

522. He examines the grading and quality of the butter?—Yes.

523. Does the Inspector also examine the quality of the butter?—Oh, decidedly.

524. How many classes does he divide it into?—First, second, and third; all the others would be marked “unbrandable.”

525. Have you any knowledge of the Canadian butter-market in London?—The Canadian butter-market in London is about the same as the Danish.

526. I want to know whether the grading by the Inspector in Canada is accepted by the purchaser of butter in London?—Yes; we never found any trouble in selling it as branded. One of the conditions the Inspector lays down is that, although he has branded it, the pickle should not be allowed to dry on it. In case the winter should come on, and the butter left to be frozen, the date on which he has inspected it is branded on the cask. The buyers know if it has gone past the time, and it would have to be inspected over again.

527. You are sure the Inspector was appointed by the Canadian Government, and not by the Harbour Board or Borough Council?—Yes, he was appointed by the Government.

528. Do you know whether he acts under any special Act passed by the Legislature?—I could not say; it was quite understood that it was a Government appointment he had.

529. You think that the system of establishing colleges is the best?—I think so.

530. As far as Canada is concerned, they have no travelling Inspectors or travelling tutors to instruct the people?—I am not positive on that point.

531. Can you tell us whether the milk in New Zealand is equal in quality to the Canadian milk?—I believe it is superior as far as chemical tests are concerned; indeed, I am positive on that point.

532. And you think with due care our export ought to be superior to that of the Canadians?—Oh, most decidedly, or any other part of creation. Apart from our stock, and the milk being better, the climate for manufacturing the produce is in our favour here. Among the other advantages we possess, there is the advantage of having pure water. The value of our dairy export ought to have been up to the value of the export of mutton long ere this if care and attention had been given to its make and packing.

533. You think the industry is capable of indefinite extension?—Oh, most decidedly.

534. Have you taken into consideration the different class of cattle? What class of cattle do you think the best for dairy-produce?—The Durhams give the richest cream, but you get more gallons from the Ayrshires.

535. You believe that a cross between the two would be the best?—I would always take a crossing for a good dairy-farm.

536. Do you know the preserved milk-factory at Port Chalmers?—Yes, I have been in it.

537. You cannot look upon that as assisting the dairy industry?—No. There is no question of it; a good opening for preserved milk is to be had at all times.

538. From your knowledge of the quality of milk preserved at the Port Chalmers factory, you do not think it would compete with the Swiss milk?—If it were properly made it would most decidedly compete with it. If they had the same skill in making it as in Switzerland I should say they ought to make a better article.

539. Do you consider that the butter produced by the factory system is better than that produced by the farmers?—It should be, but I cannot say that it is, so far.

540. Do you consider that the totara kegs are suitable for sending butter Home?—No.

541. In what kegs do they send butter from Dunedin?—They send it in different kind of kegs.

542. Do you consider Pond's boxes the best?—No. There is nothing to beat the kegs, if properly prepared ere packing butter in them; but the wood of the kegs must be oak, until we can find some wood to answer.

543. *Mr. Dodson.*] Have you had any experience of totara kegs?—The wood acts like a sponge on the butter; it takes the substance out of it.

544. *The Chairman.*] Have you shipped butter Home?—No, I preferred selling it here until it was not only made better but classified ere shipping it.

545. You have no experience of the prices obtained in the Home market?—No.

546. Your dealing has been in Dunedin?—Yes; buying it here and selling it here.

547. Do you know anything of the process of manufacture of butter?—Yes.

548. Have you churned butter yourself?—No, I have not; but, at the same time, I know how it is done.

549. You say the churns used in New Zealand are not the right kind?—I do not say that of all the churns; but unless they were proper churns they were bound to spoil the butter.

550. How do these churns spoil the butter?—If you put paddles into the churn their action beats the butter up into putty. We like granulated butter, that comes out like grains of wheat. The barrel-churn, without beaters, turning end over end, is a good churn. The square churn is a good churn. The American swing-churn is superior to any of the other churns, but, to use it with machinery, I am doubtful as to their being able to keep it in equal swing. The butter should come out of the churn in a granulated form, and be washed thoroughly with cold water ere the grains are pressed, so as to extract as much as possible the butyric acid and caseine ere further pressing or working it.

SATURDAY, 23RD AUGUST, 1890.

Mr. F. W. B. GREVILLE examined.

551. *The Chairman.*] You have a good deal of experience in dairy-farming?—Yes, I have made the dairying industry a study for the last six years.

552. You have heard the evidence given by the two experts who were examined before the Committee yesterday on this matter?—Yes.

553. You would therefore know the nature of the information which the Committee requires. We would be glad if you first made a general statement, giving the result of your experience?—As I have already said, I have made the dairy industry a study for the last six years. I have been engaged as a dairy-farmer myself. I have travelled around this part of the colony—that is, through the Wellington Province—for several years, observing the process of making butter adopted by farmers. I find that there is a total absence of information and knowledge about dairying; indeed, a general ignorance of the true principles of butter-making. The people who are engaged in that occupation have never had an opportunity of learning the proper, improved, and scientific methods of making butter. In the first place, there is an invariable absence of the necessary cleanliness in first taking the milk from the cows. This to a great extent influences the whole question of the manufacture of butter. It is the common practice of both men and women to go into the cow-yards in this district (Wellington) and milk the whole of the cows without washing either their own hands or the cows' teats. The result is that the milk is dirty when it goes into the dairy. It is tainted to such an extent that the quality of the butter is very much injured even before the milk goes into the milk-pans. Then there is the system known as the "shallow-pan" system. Under that system the dairyman has no control over the milk after it has been poured into the dishes. This, to a great extent, is responsible for a good deal of the second-rate butter that is made in this colony.

554. Do you mean that the dairyman has no control over it as regards temperature?—It is this way: Everything is left to chance; but by the system to which I am about to refer the temperature can be controlled. Take, for instance, if it is a warm day in November milk thickens at from twelve to eighteen hours; there is then a large loss of cream; one-third of the cream is often left in the thick milk, the milk thickening before the cream rises. Thus the shallow-pan system actually favours the loss of cream. Then, as if sufficient harm were not already done, when the cream enters the churn, and during the process of churning, 90 per cent. of the butter made in the colony is spoilt. There is not one dairyman in ten who knows how to manipulate the cream when it gets into the churn. It is spoilt by being overchurned. It is in this way that a great mistake is made. Instead of ceasing to churn when the butter breaks, as it is called, the average dairyman continues to churn until the butter goes into one large lump. In consequence of this, butter intended for export is irretrievably ruined. I may say that when the butter is knocked into a lump in that way there is incorporated with the pure butter-fat a large percentage of buttermilk. When butter made in that way is disposed of in the local market the real result is not manifest; it takes a few days before the buttermilk is seen to act injuriously on the butter. When that mistake has been made it is impossible to remedy it by any process except melting the butter, which ruins it completely. Then, even further continuing their error, they take a certain amount of, very often, coarse and poor salt, and, without caring to crush the lumps, they incorporate that with the butter. That is the system generally followed in small dairy-farms in the Wellington Province. In this way they manage to make as bad an article as possible. They have done everything they should not have done, and left undone everything they should have done.

555. You are making these remarks specially with reference to the export trade?—Yes; I agree with the gentleman who said before this Committee that butter can be got to England in first-rate order if that same butter has been properly made in the colony. But I will now proceed to suggest a remedy for the above state of things. The true remedies are the adoption of either the Cooley system or the Schwartz system of making butter or the separators. I may say, there is very little known in this colony of either the Cooley system or the Schwartz system. Not one in a hundred knows anything about them.

556. Would you be good enough to explain to the Committee the process which you call the Cooley system?—Yes, I will do so, briefly. The process is this: Immediately the milk is taken from the cow, while it is yet at a temperature of about 85°, it is poured into deep cans, about 18in. to 20in. in depth, with a patent lid; that allows the full can of milk to be plunged right under water in a tank or vat, say, about the size of this table.

557. *Mr. Hamlin.*] What would be the diameter of the can?—About 10in. The milk is acted on in this way: The temperature of the milk being 85° or 90°, the milk itself, being plunged into cold running water of, say, 45°, receives a sudden shock, an instant chilling, which drives the

cream right to the top, and within a period of from eight to ten hours the whole of the cream has risen. That is the Cooley system. That is the system which received the first prize at the Paris Exhibition—a prize in value equal to £200 in English money.

558. Do I understand you to say there must be a constant flow of water?—Suppose this table to be a tank full of water, or a vat having a pipe at each end, one to admit the water and the other for an outlet, that is all that is required. Other means are used in some places to lower the temperature still further. In Canada they use ice. I know that is not possible in this country; but if our country farmers were to adopt the Cooley system they would find it greatly to their advantage. The point to be observed is the temperature. It is all a question of temperature. If the milk were allowed to stand for half an hour until there should be a fall of temperature to 65°, the thing would not work. It is the instantaneous dropping of the hot milk into the cold water that throws up the cream. From 45° to 50° should be, at least, the temperature of the water.

559. *The Chairman.*] Would the same action take place if the water were, say, 50° and the milk 75°?—No, sir; that is exactly why the whole thing is simply a matter of temperature.

560. Then there must be a difference of at least 35° of temperature between the milk and the water?—Yes, that is what is required.

561. *Mr. Hamlin.*] Suppose the water were drawn out of a well?—That would not do. The water must be running, even through the tank; in fact, this is the system used in Canada. Mr. Hulke, of Taranaki, one of the best dairy-farmers in the colony, has been carrying on this process for some years.

562. Would it not do to have a tank of three or four hundred gallons of water?—No, the water would not be cold enough.

563. *Mr. Dodson.*] In Canada the climate is cold. It is only where the water flows from the mountain-sides that you could get it cold enough in this colony. Do you know what is the source of Mr. Hulke's supply?—The mountain.

564. *The Chairman.*] How long do you say it takes the cream to rise by the Cooley process?—From eight to twelve hours. The important thing to observe is that, when the milk is submerged in this cold water, at this low temperature the milk does not thicken. That is true even in New Zealand in the middle of summer. When in shallow pans it thickens in a few hours, and sometimes almost at once. Once the milk thickens no more cream rises, and a considerable portion of the butter is lost. I would suggest to farmers in out-of-the-way places, where they cannot reach a factory, that they should adopt the Cooley system where they have not a cream-separator.

565. Is there any skimming to be done?—There is no skimming. There is a tap to the can by which the skim-milk is run off, but none of the cream escapes. The Cooley system is a patented one. The can must be imported, or permission be obtained to make it in the colony. When it was exhibited in the Paris Exhibition the man who patented it obtained the first prize, valued in English money at £200. Mr. Hulke can forward to you any information about it that you may require. He is the best authority that I know in the colony on the subject of dairying by this process.

566. *Mr. Hamlin.*] What is the cost of these cans?—That would depend on whether they were imported or made locally. They are not expensive. They could be made by an ordinary tinsmith.

567. Is the mouth of the tap covered with a gauze or strainer of any kind?—Yes, it is perforated; like a beer tap. None of the cream escapes. The cream rises to the top, but the milk goes to the bottom.

568. *The Chairman.*] What is the Schwartz system?—The Schwartz system is a modification of the Cooley system, in which the patent can is done away with.

569. Will you explain that system?—The cans may be about the same shape and form, but without the patent lid. In this system they are submerged to within about an inch of the top; the water is not allowed to rise further than an inch from the top of the can. In that system also the whole thing depends upon the difference of temperature of the milk and the water. It is a modified adaptation of the Cooley system.

570. From what you have said to us, are we to assume that the Cooley system is aided by the creation of a vacuum?—Yes.

571. *Mr. Dodson.*] Have you seen these cans? What is the principle on which they work? Is it a flange?—It is a flange; it allows the hot air from the milk to escape.

572. Do you pump it?—No; there is no vacuum made by pumping; the hot air from the milk prevents the water getting in.

573. *The Chairman.*] But, in your opinion, the Schwartz system is not so perfect as the Cooley system?—No; but the Schwartz system is still better than the shallow-pan system followed in this colony.

574. The same amount of cold water would be required?—Yes.

575. In the same way?—Yes.

576. Can you give the Committee any information as to the factory system of butter-making? Yes; I think the factory system will solve the question of the dairying industry in this colony. A butter-factory necessarily means cream-separators; cream-separators mean from 15 to 20 per cent. additional butter from the milk. I have here a number of testimonials to show the results that have already been obtained. It will be the simplest way to hand them in to the Chairman of the Committee.

577. What is the purport of these testimonials?—They are testimonials as to the effects of the cream-separators. One is from Mr. Reuben Withell, and is dated from "White House, Brookside, Canterbury." That gentleman has made experiments which show a clean gain of 32 per cent. of butter in favour of the separator. The reason why I think the factory system is the true system for the butter-making industry, apart from the increased percentage obtained by the cream-separator, is the fact that most of the home-dairying is done by women, and a sufficient amount of

care and attention is not given to it; whereas in the factory the men in charge devote their whole time and attention to obtaining the best results, so that a greater uniformity of quality is secured.

578. Have you considered the system of bringing the dairy-produce to the chief ports of the colony for shipment?—With reference to bringing the produce to the chief ports of the colony, I wish to bring under the notice of the Committee an important departure from the ordinary method which has been made in Australia with very good success. In Auckland also I think they use this system—that is, the system of separating the milk from the cream up country, the districts forwarding the cream to a centre for each part of the country, and having the churning done in the port of shipment, so that the butter may be carried straight to the cool-chamber of the steamer.

579. That means the establishment of what are called creameries in the districts?—Yes; I think that is the proper system, because the cream can be safely transmitted by night-trains without much injury, whereas butter is always liable to be injured in transit before it reaches the cool-chamber of the steamer. There is one other matter which I should mention, and which has received very little attention—that is, extracting the moisture from the butter.

580. How do you think that should be effected?—By centrifugal force; there is a patented machine for the purpose, invented by one of the best dairymen in the world.

581. How is it applied?—The butter, while still in a granulated state, is placed in a canvas bag in quantities of about 16lb. at a time. The bag is then placed in a cylinder revolving by machinery at the rate of 7,000 revolutions a minute. The whole of the moisture is in this way thrown out through the wires of the drum in which the canvas bag is held. The name of this machine is the *Delaiteuse Butter-worker*. Having brought such information as I possess before the Committee, I wish further to inform them that butter sent Home in a cool-chamber, say, at a temperature of from 35° to 37°, provided it is good when it leaves here, will keep for a week or ten days after it is taken from the cool-chamber at Home.

582. Do you know that the rule is to have a much higher temperature in the cool-chamber of the steamers?—No; I tried to find out yesterday what the rule is, but I was not able to get what it is.

583. We have evidence to show that the temperature of the cool-chamber on board the steamers ranges from 40° to 50°?—I think about 37° is about what is required, or from 37° to 40°.

584. You consider, then, that the temperature should not exceed 40°?—Yes. If it is good when going in at this end butter will keep sufficiently long to be retailed at Home.

585. Have you considered the effect of butter being kept in store?—That is where most of the mischief is done. I know of butter collected by storekeepers being sold in the local market which after being opened became rancid in a few days. As a remedy against the production of a bad or inferior butter, I would recommend to the Government the immediate appointment of dairy instructors. I may mention, if the Committee should not be already aware of the fact, that in England travelling dairy instructors go round the country. The same is very extensively done in Canada, in Australia, and on the Continent of Europe.

586. Is it your opinion that these instructors should also be Inspectors?—No, not Inspectors. Inspectors would be obnoxious; they would make a host of enemies within a week: they must not be Inspectors. But I am now going on to suggest that every keg of butter should be tested before it leaves the colony.

587. *Mr. Dodson.*] Would not that involve inspection?—Yes, but I meant Inspectors of dairies. The kind of person I meant should be an instructor, and he should be careful not to offend, for every woman is most touchy on the subject of her dairy.

588. *The Chairman.*] Would you recommend that agricultural and pastoral societies should give prizes for butter-making?—Yes; that they should institute a series of butter-making competitions, as is done in England.

589. With regard to inspection and classification of butter, have you anything to say as to that?—Yes; I think the butter should be classified here.

590. And you also think there should be some inspection and classification under the control of the Government?—Yes, I think so.

591. If there had been inspection, with regard to the parcel of butter you have told us about, would it be worth while sending it Home? Ought it be sent Home at all? It would have gone Home unbranded. In that case it would have deceived no one. Buyers would know that New Zealand butter going Home unbranded was not up to the mark.

592. *Mr. Hamlin.*] With reference to creameries, do you wish us to understand that all butter-factories should be at the ports of shipment?—If butter could go straight into the steamer from the place where it is made—for instance, from the reclamation here—so much the better. If the factory is at a distance there is a chance of the butter being injured in transit; nine-tenths of the butter made is spoilt in transit from the factory to the ship.

593. But suppose the creameries to be forty or fifty miles from the port of shipment, and if the factory were also at a distance, would the butter sent from the factory straight to the cool-chamber of the vessel sustain any injury?—Not if the system of night-trains were adopted. If night-trains ran they could pick up butter made by the way while travelling during the night. The butter would not sustain much injury. But there are great complaints of butter being left exposed during the day.

594. Could not the ordinary trains be utilised by providing a cool-van?—No; I have seen butter spoilt while coming down to the port of shipment in cool-vans in the day-time. The sun has a singular effect upon butter. It will turn the best butter cheesy in a few hours. The night-train is the only safe plan. The cool-van, of course, would be an improvement upon existing mode of transit; but the night-train is the proper thing if it can be managed. There is one point which I should like to lay before the Committee. There is £15,000,000 sent out of England every year to buy butter; £4,000,000 of that goes to Denmark. I think £1,000,000 of it ought to come to New Zealand—that is, for butter and cheese alone. There is a point which I wish to urge in respect to

butter-test on all agricultural and pastoral associations. All fresh butter sent in to them should be in the hands of the secretary, and deposited in a suitable place at least ten days before, and salted butter two months before, the date of the shows.

595. *The Chairman.*] Do you know anything of the New Zealand timber of which the kegs for export butter should be made?—Tawa and totara are both good; but they must be seasoned.

596. You do not know of any damage having been done to the butter through the kegs being made of tawa or totara?—I have handled a good lot of butter in tawa and totara kegs, and I have not known of any injury done by them.

597. You have already mentioned the overchurning of butter; will you tell us more precisely what is the result of overchurning?—The result is that the butter and the buttermilk become incorporated in the lump which is caused by overchurning, and the butter and buttermilk are so intermixed together that it is impossible to separate them.

598. Do you know anything about cheese?—The great difficulty and loss in connection with cheese-making arises from the fact that the milk is sent hot to the factory. There is a clear loss of 10 per cent. in cheese-making for that reason. Cheese-making can be better done at home if people are educated up to it. Ten per cent. makes all the difference between a paying and a losing concern.

WEDNESDAY, 27TH AUGUST, 1890. (Mr. HAMLIN, Chairman.)

Mr. J. RANDALL MORGAN re-examined.

599. *The Chairman.*] Will you as briefly as possible state what further information you have to give the Committee?—I take it that the loss last season on the butter was mostly due to the want of space, and it is no surprise to me or any other man of experience that there was such a big loss, as the butter was killed before it left New Zealand through the delay. It is the custom for all the large Dutch, Danish, and French shippers to go to England once a year, for the purpose of keeping in touch with the English market, as there are many changes in the butter trade. I beg respectfully to advise this Committee that they should recommend the appointment of somebody to go Home and inquire into the trade every year, as it would be of great assistance to the storekeepers engaged in the butter-trade to have a man of experience to keep them in touch with the trade at Home.

600. *Mr. Marchant.*] Do you think the same trouble of want of space is likely to occur this season?—Not this season. I think it will take two or three seasons yet to work the shipping trade into the line best suited to the interests of the butter trade.

601. *The Chairman.*] I understood Mr. Marchant to ask you if there would be any difficulty about space?—There will be plenty of space, but it will be on the mail-steamers and cargo-steamers. By two steamers leaving in one week the butter will accumulate, and these cargo-steamers will come along and take away the accumulation. What we want is a regular service instead of supplementary cargo-boats. One week there may be five thousand kegs go away, and the next week there will be ten thousand; and it stands to reason that there must be a lot of stale butter shipped. We must get the butter away as soon after it is made as possible.

602. *Mr. Walker.*] If the butter were kept in a cool-chamber preparatory to shipment, would not that remove the difficulty?—To a very large extent; but it is a matter of very great importance to get the butter shipped as soon as it is made.

Mr. WILLIAM R. YORKE examined.

Witness: I represent the firms of Boyd and Grant, of Liverpool, and T. L. Boyd and Co., of London, which firms have branches in Canada and in the States, and, I believe, are the largest dealers in provisions in the world. I came out here last September on a visit, to see if it were possible to do business in this colony with any chance of success. I visited Christchurch and Wellington, and made inquiries from various people—farmers, and others—as to the position of dairy affairs here. I returned Home in October, and, as the result of my report, I was sent out here in January last to commence business, shipping produce of all kinds Home, but especially butter and cheese. When I got to Auckland I was informed that no space could be had for either butter or cheese on any of the steamers leaving New Zealand for England, as it had been taken up for six months by local people. I saw the representatives here of the New Zealand Shipping Company and of Shaw-Savill and Co., and ascertained that freight-space on their steamers was unobtainable. I arrived at the conclusion that the only course open to me was either to abandon altogether the prospect of doing business in New Zealand or to try to influence the boards of both companies in London to grant us the necessary space. I returned Home on the 3rd April last, and reported the state of affairs to my principals, who instructed me to see the managers of both companies in London, and discuss the probability of space-room with them. I saw the managing director of Shaw-Savill and Co. and the New Zealand Shipping Company in London, and described to them the position of affairs here in regard to the want of space. They both admitted that they knew that this grievance did exist. I was requested by both companies to make them an offer in writing for the space for a certain length of time—to pay for space in cool-chambers, whether we filled up that space or not. Accordingly my firm made an offer to these two companies to take 15 tons of space on each of their steamers leaving the colony for twelve months, with the option of 10 tons of additional space if required. Shaw-Savill and Co. accepted our offer, with slight modifications, but the New Zealand Shipping Company could do nothing for us. On all hands it has been stated to me in the colony, by farmers and others, that one of the greatest bug-bears they have to contend with here is the want of proper means of getting stuff Home in fair condition; but, in my opinion, the difficulty now is practically at an end, because Shaw-Savill and Co. assured me that they would be running more steamers—that from the 1st January next

they would have twenty-three steamers in the year leaving New Zealand; and I understand the New Zealand Shipping Company have bought two or three additional steamers. The want of sufficient space has been, as far as I can ascertain, the cause of serious loss to the colony for some length of time. I have been in the provision trade about seventeen years, and in various responsible positions, and my father was in the Irish butter trade for more than thirty years. I have been a buyer of butter for several years. In 1875 very little was known about Danish butter. I remember distinctly that we used to look upon it as an inferior class of butter—that it ranked much below German or Hamburg butter. But the Government of Denmark took a great interest in this dairying industry, and fostered the trade in every possible way. As a result, the trade has developed to enormous proportions; and I think I am right in telling you that last year somewhere about £14,000,000 sterling was sent from the United Kingdom to Denmark for butter. I can make a reference to check my statement, but I am under the impression it was fourteen million. The whole of the provision trade of Manchester, which supplies a radius of, say, thirty miles, imports on an average from Denmark about four thousand casks of butter per week. The casks will average 100lb. to 110lb. net. One reason why the Danish butter has got such a strong hold on English sentiment is owing to the regularity, the perfect regularity, of the various dairies. I will give you one instance, which will go to prove my statement. I think for three years at least we used to wire an order over to a firm in Denmark every Tuesday to send so many casks of butter, relying on them sending the quantity required, and charging the lowest current price. I believe during that time we only had one complaint to make in regard to being overcharged. The shippers fixed the prices themselves. They used to send us the produce of certain dairies. Each farmer usually brands his casks with his initials. I know of one estate where they had 280 cows. This particular farmer made from six to seven casks of butter a week all the year round. Our firm used to sell this butter rapidly without opening the cask at all, the character of the stuff having become so well known that the brand alone sold the butter; and, indeed, at times there was a scramble as to who would get this particular butter. The Danes seem to pride themselves in keeping the reputation of their brands of butter up to a high standard, and their honesty of character in all business details, as well as their general rectitude, is admitted by all who have any trading with them. This is a strong point, which I wish to impress on the Committee: that the Danes are perhaps the most upright people in business transactions in the world. Their casks weighed from 14lb. to 16lb.; and it is the rarest thing possible to have a claim for error in the tares. They always appeared to have allowed actually more than the cask weighed. They have now got the bulk of the butter trade in England. I do not for a moment think that the Danes can produce any more. They seem to have got to the very extent of their productive powers. I am told that they have two cows for every acre of land they possess. The Government of Sweden have also taken much interest in the dairying industry there; and they have appointed agents in various parts of England to report to the Government as to the progress the sale of Swedish butter is making in England. An agent is instructed to point out any defects in the quality of the butter, and as to salting and other points, to suit the requirements of the various markets at home. There is one agent stationed in Manchester, and he is very assiduous in pushing his countrymen's butter in every direction. As far as my memory serves me, in Denmark there is what is called a Minister of Agriculture, who has deputies, who are constantly visiting the centres of dairying, and giving advice gratis to farmers and others. They have very strict laws in regard to adulterating butter in any way. Every man is proud of his own brand, and does his best to keep it up. One dairy we imported for some three years, and the shipper of that dairy was written to several times by people in Manchester, offering higher prices to obtain the shipment.

603. *Mr. Walker.*] The private brand is the only one used?—Yes; each man generally puts his own initials or the name of his estate. If there is no name to his estate he has his initials branded.

604. Do you know anything of the practice of Sweden?—It is precisely the same. The Swedes are getting very solicitous about the reputation of their brands. It is an absolute necessity for the sale of their butter. They have got into the trade, and they mean to keep in. The Swedes have got to about one-half their total productive power—in other words, they can only make double the quantity of butter they are making at the present time. Germany is shipping very much less now than she used to do, owing to the increased demand experienced from the continental cities. The French trade appears to me to be in considerably less compass than it was ten years ago. What I mean to convey is this: The trade in French butter in England is very much less now than it was ten years ago. The fact that they require a larger quantity at home seems to influence that trade very much; and the taste in the north of England particularly is gone for French butter. The Danes have put them out in the large cities in the North. I remember seeing as many as, probably, ten lorry-loads of French butter outside a particular warehouse in Manchester; and now the same firm, I do not think, sell 5 tons a week altogether, the Danish and Swedish butter being taken in preference.

605. *The Chairman.*] What do you mean by a lorry-load?—There would be about 4 tons on each lorry. There would be 60 tons on the fifteen lorries. You may take it generally that the demand for butter is increasing at a rapid rate in the United Kingdom, and that the European supply will, in the course of a few years, be insufficient.

606. *Mr. Walker.*] Can you say anything about the Irish butter trade?—Yes, I can. Irish butter generally has lost its hold on the English market since Danish and Swedish butter have come so strongly to the front. Various efforts have been made by philanthropic individuals in Ireland to foster the butter trade, by establishing dairy-factories on the Danish principle. Numbers of men have subscribed capital, but I am not aware of a case yet where there has not been a loss attached to the undertaking. I have one particular friend—a neighbour, a well-known man in the trade in England—who was the means of having several factories erected. Danish and Swedish workpeople were brought over, and everything that money and skill could do was done to make

the business successful; but I was informed by my friend shortly before leaving Home that a loss has been the result in, I believe, every case. With reference to grading butter, in Cork, the Corporation appoint certain Inspectors, who examine the butter as it is brought to market and brand it first, second, third, or fourth, as in their opinion it deserves. These brands are generally recognised in England as a good criterion of the value of the stuff. It is bought and sold on these brands. The Corporation is much more strict now than they were formerly in respect of the brands, very much to the advantage of all who deal in the butter. That is the only market in Ireland where they brand butter; at other markets it is simply sold on the shipper's brand. Recently an Imperial Act of Parliament has been passed, giving them more extensive powers in regard to the dealing with butter in the Cork market. I think it is called "The Cork Butter-market Act, 1888." A Committee of the House of Commons sat on the whole question, and recommended Parliament to pass this Act. I do not agree with the statement that the London buyers do not recognise the brands on the Cork butter. It is bought and sold on the brands, generally without being opened. As a matter of fact, very little Cork butter goes to London: the bulk of it goes to Yorkshire, and some to Lancashire and South Wales. The London people do not care for the butter. The Londoners are extra strict about butter, and the Cork butter is a strong, heavy butter. I can well understand a buyer going into a store and trying the Cork butter, to ascertain whether or not it would suit his class of trade.

607. *Mr. Marchant.*] What do you mean by "a strong, heavy butter"?—I mean that the butter is of a tough and dense texture, to some extent like the New Zealand butter.

608. Unnecessarily heavily salted?—No, not necessarily. It used to be the custom in Ireland to put 10 per cent. of salt in what was then called salt butter. That class of butter has gone out of vogue completely, and now 3 or 4 per cent. is the utmost salt that is added to the butter.

609. Do you consider 5 per cent. too much?—No, I do not, for butter made in New Zealand. There is one popular delusion: Generally, dairy people have an idea that salt preserves the butter—keeps it from going rancid. That is an utter delusion. Butter will keep equally well without salt if it is of the right quality to start with. I give that as being absolutely the case. We made experiments at a dairy-factory in Ireland, and we found that the statement was correct. We kept one cask of butter for four or five months without any salt, and it was just as good as any cask of butter that had been salted.

610. What do you think, then, is the principal condition for butter to keep fresh in the way that you have described?—In the first place, butter, to keep, ought to be churned at as low a temperature as possible—say, 52° to 54° Fahr. If the milk is good, and all the ordinary attention paid to the butter in the making, it will keep well for two or three months in a cool temperature.

611. Would you not have allowed the cream to ripen at a higher temperature than that?—I certainly would. I do not think cream would ripen under about 70°. The factory I was connected with in Ireland had in it steam-pipes, which were turned on in cold weather to keep the temperature up to what we considered right.

612. Do you think, then, before churning the cream should be brought down to 52° to 54°, in order to produce a high class of butter that will keep long?—You do not quite follow me. I meant to convey this: that the temperature of the air in the factory in which the churning was done should not be more than 52° to 54°. The milk will get warm in the course of fermentation, and it will ripen at a temperature of, say, 65° to 70°. With respect to the New Zealand butter trade, I may state that I was called upon last December to examine some six hundred packages of New Zealand butter just landed in London. It arrived by the "Ionic" steamer. I valued some of the butter at £6 in London, and the lowest class at £3, but all of the butter averaged, I think, about £5. The character of New Zealand butter is such that it ought to travel fairly well under ordinary conditions. It ought to travel to London without receiving much damage if in a cool-chamber. The butter is of a tough nature, and, being almost exclusively made from grass, has more keeping-qualities in it than continental butter. In order to develop a large trade between New Zealand and England in butter, it will be necessary for dairy-factories to keep up a regular standard, and brand their butter so that the particular brands when they are approved of will become known and appreciated on the Home market. The packing of butter here is done, apparently to me, in a very slovenly way. The casks are too heavy altogether, and they look slovenly in their get-up in comparison with continental casks. I strongly recommend the use of 56lb. boxes, made of wood, about $\frac{3}{4}$ in. thick. They would entail less expenditure in transit, and would be approved of by English buyers. My firm have urged me to do all I can to persuade the dairy people here to adopt these boxes; and they have authorised me to get some made and present them to the dairy people who are disposed to use them. The butter should be put in the 56lb. boxes with "parchment paper," as it is called at Home—a vegetable paper—put inside the boxes. It keeps the dust and dirt out, and keeps the butter free from coming in contact with the wood. This parchment paper will take the place of any cloth or special preparation of the wood, or any enamelling. It costs 6d. or 8d. a cask or box, and saves scraping of the butter. A grocer will give a little more for a cask of butter put up in this way.

613. *Mr. Mackenzie.*] Have you had any experience of New Zealand timber for butter-kegs?—No, nothing more than what I have seen of the casks. I do not know whether it is suitable wood or not.

614. Do you know what sort of wood is used in Denmark?—Yes, beech; in Ireland, oak.

615. Are both these timbers free from flavouring?—Yes; the custom has always been to steep the cask in brine a few hours before it is required to be filled with butter.

616. Do you think that $\frac{3}{4}$ in. timber would be strong enough?—Quite strong enough. It has been suggested to me to import timbers from Home, and I probably will make the experiment. The wood and labour are so much cheaper now. I have arrived at that opinion by being told that the large casks here cost 5s. each. I believe the Danish casks cost 1s. 3d. The oak firkin, in Ireland, holding 70lb., costs about 1s., but I am not quite certain. A firm in Holland offered to

ship over to Ireland, and did really ship over, some of their casks. They do the work much cheaper in Holland, and turn out splendid casks.

617. Do you know if casks could be made up there and sent out here and used for any purpose during the voyage?—No, I think not. They could be brought over in staves and made up here, or the boxes could be brought over in pieces and put together here.

618. From your own knowledge of the trade, do you think it would be well, in order to make our butter fit for the market, to bring out kegs from Home?—Most decidedly.

619. And you recommend that?—I do; I mean, to bring out the timber for the packages.

620. Do you think the shape of the kegs or boxes has much to do with the sale of butter afterwards?—I consider that the package influences the price of butter at least 1d. a pound.

621. And which is the best package?—In my opinion, the 56lb. box is the best, lined with parchment paper. With regard to the making of the butter, I think it can be made best by dairy-factories, where they have every modern appliance, and where there is a skilful man to manipulate and carry out the process. It is possible for a farmer with twenty or thirty cows to make very good butter on the old system, with hand-churns, but at the same time he is at a disadvantage where there is a co-operative dairy.

622. *Mr. Marchant.*] Do you think it would be a wise step of the Government to obtain a thoroughly practical man—say, a Dane—to come out here and give people practical advice as to the management of milk, and the making of first-class butter?—I think it would be a source of considerable benefit to the colony to have such a man here, who was a thorough expert, and whose services were placed at the disposal of the various dairy people, to advise and instruct them as to the process of butter-making.

623. *Mr. Dodson.*] Do I understand you to say that the Danes first commenced the system of inspection and giving instruction, and that the Swedes are now following their example?—Yes.

624. *Mr. Mackenzie.*] Do you believe that the conditions which obtain in New Zealand are favourable to the making of first-class butter?—Most decidedly.

625. *Mr. Marchant.*] I understood from you that, generally speaking, the butter-producing countries of Europe now supplying the English market have nearly reached their limit of production?—Yes.

626. Well, that being the case, there ought to be a very bright future before the butter-producers in New Zealand, if they can only turn out a good article, suitable for the English market?—They ought to do a very large trade with the English market during at least six months of the year, and in the other six months they ought to monopolize a portion of the cheese trade.

627. Can you give any idea, roughly, of what really good butter sent from here might be expected to fetch in the English market during the six months of the year to which you have referred?—I may tell you at once that at the present time we are suffering from temporary over-production of produce in all parts of the world. In America and Canada the make of cheese and butter at present is enormous, and far in excess of any previous year. Our firm imported from Canada in June the finest dairy-factory butter which could be produced, at a cost of something like 6d. a pound delivered in Liverpool. The result of this will be that many dairy-factories will stop operations, as it is impossible for them to make butter at a less cost than about 9d. in Canada. In my opinion this over-production will correct itself, as it has done before, and normal prices will again prevail. I think New Zealand butter ought to average at least £5 in London during the six winter months, and I have very little doubt that in the course of time, when the quality has improved, and the packing improved, such a price will be experienced.

628. Supposing every care to be taken in the transit of the butter from the factories here to the London market, do you think it could arrive to compete with the European butter—the continental butter?—It competes at a lower price. You have got Ireland, which is practically out of the market from October to April. You have then got to compete with the Danes and Swedes. Their butter will always fetch the highest price; but good New Zealand butter ought to come within 10s. of the price of the Danish butter.

629. *Mr. Dodson.*] Can you tell us what food is used in Denmark and Sweden?—The Danes house-feed their cattle almost all the year round, and there are two periods of the twelve months wherein you notice a change of food in the butter—the one is April, when they go off the feeding with oil-cake and such like; and the other is October, when the grass is finished. It is a common thing for buyers to say: "This butter I cannot do with it, it tastes too much of the feed; we can pull out the stuff, and can almost tell what the dairy-farmers feed their cattle on."

630. Do they use roots to any extent?—Yes, they use turnips; and now and then an unwary Dane will spoil his butter with it.

631. Do they use mangels?—Yes.

632. And carrots?—I do not know. If turnips are given to cattle, scalded with bran or "sharps," just after being milked, the opinion among dairy-farmers is that it prevents the following milk from being affected by the flavour of the turnip.

633. What is the Committee to understand by scalding?—Boiling water poured over the turnips; that is believed to remove the flavour.

634. *Mr. Mackenzie.*] Would it be better to send the butter Home frozen or in cool-chambers?—Freezing butter spoils it. Frozen butter is a failure. The reason is this: that the butter while in a frozen state is all right, and if it be taken from the frozen cask and put on the table it will use all right, but if it be exposed to the air for twenty-four hours it goes rancid directly.

635. How long will butter keep after it is taken out of the cool-chamber?—Butter ought always to keep as long after coming out of a cool-chamber as though taken out of the dairy. The effect of keeping butter at 34° Fahrenheit is that it prevents any changes.

636. Do you think that butter made by the separator is as good as the other?—It is generally

supposed to be better than the butter made on the old system. You can get more money at Home for butter made by the separator. You take away the cream from the milk while the milk is perfectly fresh. There are several reasons why the butter ought to be better and why it is better.

637. *Mr. Marchant.*] Do you attach great importance to working all the water possible out of the butter?—Most decidedly.

638. Do you think that leaving any considerable proportion of water in the butter would be an active agent in causing rapid decay?—Yes, that is a recognised fact.

639. In order to make the butter keep well it should be worked as dry as possible?—Yes, most decidedly; one of the secrets of making butter so as to keep is to get all the water and the milk out of it. If you work butter too much you break the globules of fat, and the butter becomes rancid directly.

640. *Mr. Dodson.*] What proportion of salt would you use?—From 3 to 4 per cent. of salt would be ample for the English market. The taste for salt butter at Home is dying out. With regard to cheese, I consider some of the New Zealand make very fine, and some of it quite equal to the production of Cheshire and Somersetshire. I do not think that the farmers in New Zealand have anything to learn in respect to cheese, but I would advise them not to make such large cheeses as they do, nor to make small ones. A cheese of from 50lb. to 60lb. suits the English market better than the small ones of 30lb. to 40lb., or the large ones of 70lb. to 80lb. I fail to understand why so many high-coloured cheeses are made in New Zealand, as the English public do not require them. They always prefer the white cheese, except in the case of Gloucesters. The cheese industry in New Zealand ought to become a very extensive one, as it enters into competition not with American or Canadian cheese, but with the make of English dairy-factories. I think it is a mistake making a poor class of cheese here as it only enters into competition at Home with the lower classes of American and Canadian cheese. We had a shipment of New Zealand cheeses landed in June. They were examined by various experts and pronounced to be very fine. I believe they were sold in North Wales, in competition with the production of Shropshire. They do not want to be taught anything in New Zealand in regard to the making of cheese; they have nothing to learn.

641. *Mr. Marchant.*] Skim-milk cheese would be altogether condemned?—Most decidedly.

642. *Mr. Mackenzie.*] Does the idea as to the size of the cheese vary in different parts of England?—My experience is that all retailers like cheese of from 50lb. to 60lb. They do not like the small ones, because they dry so rapidly, and the large ones are unwieldy for them. The grocer always puts his cheese on the counter. If he has to handle an 80lb. cheese there is a lot of waste and shrinking, and he is at a loss, more or less.

643. Do you not think the dairy-factory people here require to learn a good deal about the manufacture of cheese before they can compete with the American dairy-factories?—I do not think so at all. I do not say that New Zealand cheese can be put on the same level with American or Canadian. It is a distinct commodity altogether, with a distinct flavour. You might quite easily sell a fine New Zealand cheese for a west of England cheese or a Cheshire cheese; but you could never make such a mistake with Canadian. The flavour of American and Canadian cheese is quite distinct.

644. Is the get-up of the American cheese not more regular?—Certainly it is. There are certain cheese-factories in Canada and in the States whose products are sold regularly by the brand of the lot. We sell repeatedly large shipments of cheese from certain factories in the States long before the cheese is made. We sell certain brands.

Witness: I beg further to add, for the information of the Committee, that the Danish Government have also a Commissioner in England, whose duty it is to watch the interest of the Danish dairy-farmer, and to promote the sale of Danish produce. I hand in an English trade journal, which gives an account of a prosecution instituted by this gentleman.

Mr. A. J. Mcgregor, M.H.R., re-examined.

Witness: In addition to the evidence I have already given, I wish to put in a letter received from the Chairman of the Akaroa County Council, who, on his way to England, took special trouble to look into this question of the shipment of cheese. This gentleman, I may mention, has been on Banks Peninsula for the last thirty years. He is a large owner of stock, and has for many years been a maker of cheese. He knows the subject thoroughly, and takes a large interest in the matter. From his position and experience, no man knows more on the subject than the writer of this letter:—

[Extract from *Akaroa Mail* of 22nd August, 1890.]

“SIR,—

“Kirk, Argyllshire, Scotland, 7th July, 1890.

“I arrived in London on the 24th June, after a fair average passage. On board the fine ship ‘Tongariro’ we had a good quantity of New Zealand cheese shipped as cargo, Mr. Hislop, of Christchurch, being the largest shipper. He asked me, if at any time the hatches were off, if I would kindly give the cheese a look. I was glad of the opportunity, and, with the kind permission of the captain and officers, I had free access to examine the cheese at every opportunity, which I did; and, as the few remarks I have to make may be of some use to many of our farmers on the Peninsula, I shall endeavour to give a detailed account of the condition in which the cheese landed. My first examination took place the second week out. The cheese were under the main hatch in the forward part of the ship, and in the coolest place on board. The cheese was in first-class order, with the exception of one lot, which had evidently come from the Peninsula. The ends of the cases were made of $\frac{3}{4}$ in. totara boards; the sides were palings split out of green ribbon-wood; no supports in the centre of the cases. The cases were not made to fit the cheese, and they were all mouldy from the green timber. The cases were so slim that the rolling of the ship had caused the cheese to burst many of them. Lots of the cheeses were cut with the edge of the palings. These cases

were really not good enough to carry cheese from Akaroa to Lyttelton. The cheese packed by Mr. Hislop was in good cases, well packed, and in good order. I examined the cheeses again at the Cape, and they were still in the same order. The next examination was a few days out of Rio, in the middle of the hot weather. By this time the appearance and condition of the cheese had very much changed for the worse. In some of the cases two or three of the cheeses had swollen with the heat until they had sprung the nails of the cases, and were running, while others in the same case had shrunk at the ends and sides till they were slack in the cases. This I suppose to have been caused by the heat acting on the two different qualities of the cheese. The next examination was in the hot weather, and the cheese was then getting much worse, the butter running off some of the cases, staining everything round them. The next examination was in the Channel, and the appearance had not improved. They were really still going back. No blame could be attributed to the ship, for all the ventilators were put up in the cool weather, and the hatches were very often off for getting out ship's stores. It is a great mistake to ship cheese or butter to London as general cargo in a steamer. The heat is so great it causes a steam from wool, potatoes, and grain, which must be very bad for cheese. The next examination of these cheeses was in London. On entering the sale-rooms, the first thing that strikes a person is the beautiful cheese and butter you see from America and Europe, in splendid condition, while of the New Zealand produce the butter is more like cart-grease, and the cheese like Welsh rabbit, mostly out of shape. Comparing New Zealand cheese sent as general cargo and cheese sent in a cool-chamber is like comparing a new axe to an old rusty axe that has been lying in salt water for months. The cool-chamber, in my opinion, is the only safe way to carry cheese and butter. The New Zealand butter has a very bad name indeed in London. Unless the farmers and shippers pay more attention to packing, quality, and mode of transit the trade will soon be ruined completely. If our produce is landed in good order it will always command a fair price, but at present it is very much neglected. If the same care had only been taken with the cheese and butter in selecting quality and mode of transit as the Belfast Meat Company has done in the selection of quality shipped, our cheese and butter might have been holding a first place in the market. Unless our farmers take more care in cheese- and butter-making, with a better mode of transit than shipping as general cargo, the produce would be better kept in New Zealand.

"A few lines on our frozen meat. There are a great many complaints against our last few shipments of New Zealand lambs—small, poor, and not good quality. This is owing to our dry summer and want of more careful selection, and unless more care is taken next season our lamb trade will suffer. There is another very serious complaint which is causing a good deal of dissatisfaction, and, if not checked, will affect our Canterbury meat. There are a great many ewes that have had lambs being shipped as maidens. Many of these ewes are too fat, and butchers and agents both complain of the last six months' shipments. I think it will be a very dangerous thing for either of our companies to ship old ewes, even if they are marked as such. A great many people in New Zealand are in favour of shipping old ewes. I feel sure it will be a great mistake, and tend to damage our trade. They will be bought cheap, and retailed as the best New Zealand mutton by the retail butcher.

"I brought Home with me, as an experiment and to show some of my friends, a few of our apples. I had two small cases and one large one. In one case the apples were rolled in paper and packed; in another the apples were just put into the case without any packing. The large case was packed with cocksfoot chaff. The case was carried among the passengers' luggage. The apples were all late winter sorts, and pulled from the trees in the first week of May. They were exactly two months in the cases, and when opened here there was not a single apple rotten or bad. They really looked splendid. The large case, which was packed in the grass-seed chaff, was in the best condition. The apples looked as if they would keep for another two months. Apples arriving in London in the months of May, June, July, and August command a high price before the new ones are ready. These months would just suit our New Zealand fruit; and, with care in selecting and packing, a good market could be found here for all our surplus apples.

"Yours, &c.,

"The Editor."

"JAMES HAY, of Pigeon Bay."

STATEMENT of Mr. JAMES BAXTER CONNETT, of Bell Block, New Plymouth, Dairy-farmer.

I THINK the cause of failure in shipments of butter to the Home markets has been the damage and delay during transit from manufacturer to port of shipment. As a proof of this, I may mention that shippers from Taranaki lately recovered some £400 from the Union Steamship Company as damages for deterioration from New Plymouth to Wellington.

The question of classification is a most important one. I certainly think classification necessary, and that it should be effected at the port of shipment. Experts, by use of a "tryer," can judge almost to a certainty if butter will keep.

As to packages, from my experience, I find that 60lb. kegs made of totara are as good as can be wished; they are decidedly better than boxes, as they can be made air-tight. I have heard Pond's boxes very highly spoken of, but the opinion in England seems to favour the kegs. Packers should fill kegs and bore a small hole in the head, then hoop up tightly, and as soon as the butter exudes through this hole a spile should be driven firmly in. By this means all the air is expelled and the butter has a better chance of keeping. Boxes cannot be treated in this way. Another cause of failure on the London market has been the small proportion of salt used. I think there should be at least 5 per cent. Last year's shipment of butter from Taranaki was undoubtedly of a better class than that of the year before, but the price realised was not so good, simply owing to the fact of less salt having been used. I use good clean totara kegs with galvanised hoops, and I burn my brand well in. I also take care that the packages all look clean and smart. I put cloth on top and bottom, with a little salt.

I prefer the separator system myself, but I do not think we have sufficient information from Home to warrant us in saying separator butter commands a better price there; in the colony it averages about 2d. a pound higher than that made on the ordinary pan system. One of the great points in butter-making is to allow your cream to ripen properly, and to be careful not to overchurn. Dairymen here, as a rule, leave too much water after working up; they should pack drier. Feeding your cattle is another point that requires great attention, especially in winter; during that time nothing makes better butter than green oats, mixed, of course, occasionally with hay or straw as a corrective. This mode of feeding causes the butter to have a fine rich colour, doing away with chemicals, so often used for this end. Turnips spoil the butter, but the use of saltpetre counteracts the effect to a certain extent. I should never feed on turnips unless forced to do so. Mangels will increase the flow of milk, but make the yield of butter poor.

I certainly think dairying in New Zealand under good management is a most profitable employment. I am at present getting some £50 or £60 a month from one customer. It will not do for those without experience to go in for it. I think that it would be better to educate small farmers into taking their milk to the factories than to teach them butter-making. Butter-making will be a very large industry in Taranaki if properly fostered. Owners of small herds can never compete with large owners, as it is necessary to have cows fresh, and always coming into milk; and because, also, the excessive railway charges on small quantities prevent them sending butter to market so as to make a profit. Small farmers, as a rule, churn in too small quantities to fill a keg, and between the churnings the butter deteriorates to such an extent as to ruin it for export.

I do not exactly know how long salt butter will keep. I have kept some over six months, and it has been good. I use ordinary fine salt, and work it well in. More depends on this than having the salt of finest quality.

I do not think there is danger of factories finding their supply of milk run short when butter is fetching a high price in market, as they make annual agreements which meet the difficulty. Factories pay from 2½d. to 3½d. per gallon for milk, according to season of year.

I think that a specially-constructed cool receiving-chamber in Wellington will be a very good thing. Night-trains should run with vans specially built to bring in the butter. This would prevent damage during transit.

To show what difference "training" or quick transit makes, I may mention what Mr. Cock, a butter-buyer of our district, told me of a shipment he sent Home. There should have been a hundred kegs sent down together, but for some reason only fifty came by Union Company's steamer, the others being delayed and afterwards sent on by train. Both quantities were shipped by the same Home-steamer, and were of exactly the same make and quality when bought; but in London that which came by train fetched £2 a hundredweight more than the other lot. The best time for shipping butter to London is from September to Christmas.

With regard to cheese-making, much depends on the relative prices as to whether it or butter-making is the most profitable. It takes about a gallon of milk to make a pound of cheese as against 2½ gallons to the pound of butter; but, taking into consideration the value of the skim-milk, and also the extra labour and care entailed in cheese-making, I am inclined towards butter as being the best-paying industry.

APPENDIX.

DAIRY INDUSTRY IN AMERICA.

THE system of aid to the dairying industries in Canada and the United States is, briefly, as follows:—

Associations of not less than, say, a hundred members are formed in the various agricultural centres, which, having complied with the provisions of the Act under which they are constituted, receive monetary assistance from the Government of their States. Attached is a copy of the constitution and rules of one of these associations, from which it will be seen that the object aimed at is the furtherance of all matters appertaining to the industry. General meetings are held annually to receive reports and other matters of business, and during the session, which lasts some days, the various members and experts read papers or give lectures. After these are delivered discussions take place on the various points raised, members being invited and encouraged to ask any questions and give their views on any matters likely to interest the association generally. Verbatim reports of the meetings are taken, and as soon as possible after the session, full notes are printed and widely distributed in pamphlet form, gratis. Judging from these reports, many of the members take full advantage of the privileges offered, to make themselves perfect in their business, going to the meetings with long lists of questions arising out of the experiences of the past year, all of which are answered or fully discussed, no matter how trifling they may appear. The associations appoint instructors, who visit various dairies, helping and advising the dairymen. Their mode of imparting instruction is to choose a suitable dairy, situated within easy distance of a number of others, and, after obtaining permission from the owner, to invite all the neighbourhood to attend, and then go through the process of butter- or cheese-making, explaining the reason of every action, and answering questions on all points. At the end of each year, full reports of these visits are made to the board of directors, who have them printed with their annual pamphlet. The instructors also attend the annual conventions, and answer any questions arising out of their reports.

In the United States a State agricultural society, board, or commission is the generally accepted form of administering State aid. Each State has an agricultural college endowed by the

National Government, but also receiving more or less support from the State ; also an agricultural experiment station, which receives \$15,000 annually from the National Treasury, and, in some cases, additional aid from the State. The appropriations made by the National Congress for the year ending the 30th June, 1889, amounted to over \$2,200,000.

Constitution of the Dairymen's Association.

1. The association takes as its designation, The Dairymen's Association of _____.
2. The object of the association is to encourage the improvement of the manufacture of butter and cheese, and all things connected with the above manufactures.
3. To become a member of the association a subscription of \$1 per year is all that is requisite.
4. The affairs of the association shall be under the direction of a president, vice-president, a secretary-treasurer, and certain directors named in accordance with the act of incorporation, all of whom shall form the board of directors of the association, and shall make a report of the operation of the association to the annual general meeting of the association.
5. The election of the officers and directors shall take place at the annual general meeting, the date of which shall be fixed by the board. To insure the right of voting at the above election the previous payment of all subscriptions will be requisite.
6. When more than one candidate is proposed for the same office the secretary shall count the votes, and the president shall declare the candidate elected who shall have the majority of votes.
7. The officers elected shall remain in office until the following election, and shall be re-eligible.
8. The president shall take the chair at the general meetings and at the meetings of the board of directors.
9. The president shall be *ex officio* a member of all the committees of the board of directors.
10. To the secretary-treasurer shall be intrusted all the moneys and other valuables belonging to the association ; he shall keep, in a special register, minutes of all meetings of the association as well as of the board of directors, and these minutes shall be signed by the president, or, in his absence, by the vice-president and by the secretary-treasurer ; he shall, besides, keep books in which shall be entered, regularly and without delay, all the monetary operations of the association. At the end of the fiscal year of the association the secretary shall present before the board a statement of accounts for the directors' approbation.
11. The vacancies which occur among the officers or directors shall be temporarily filled up by the board ; and the board shall also nominate the directors for those judicial districts which are not as yet represented.
12. The board, to insure greater efficacy, shall be at liberty to claim the services of specialists as advisers.

Rules and Regulations.

1. The annual or general meetings of the association, as well as those of the board of directors, shall be called by notice in writing from the secretary-treasurer to each of the members of the association and of the board. Notice of the meetings of the association shall be given at least a month beforehand.
2. At the request of three directors or officers of the association, the president may call a general meeting of the board of directors ; the call shall be in the form mentioned above.
3. At a meeting of the board of directors three shall form a quorum, exclusive of the president and vice-president.
4. The board of directors may name from among its members a committee to audit the accounts, and other committees for any purpose it may think necessary.
5. The order of business at general and official meetings shall be determined by the board of directors.
6. No question shall be submitted for discussion except it be in writing and placed before the secretary-treasurer.
7. The secretary-treasurer shall be obliged to furnish security to the amount of \$400, which security shall be subject to the approval of the board.

DANISH MODE OF DAIRY ESTABLISHMENT, by C. E. LANDSPERG, Dairy Consulnt, Denmark.

I am a Dane ; have been trained to farming and dairy-work in all its branches. Since my period of service was completed I have been manager of large and important farms, and subsequently gave my sole attention to dairy-work. I owned, in conjunction with others, an extensive dairy-farm, where there was a daily delivery of the milk produced from eight to nine hundred cows, yielding about 12,000 quarts of milk daily. About this time there began a marked improvement and progress in the condition of dairy-farming in Denmark, inasmuch as the landowners combined together, and established on their joint account large dairies throughout the country ; so that now nearly in every village one of the dairies is in successful working-order. I then became manager of one of the largest of these dairies in Saxkjoberg, which I managed for two years and a half, and was the only expert who received the highest medal for producing the best and finest butter at the Great Northern Industrial Agriculture and Art Exhibition, held at Copenhagen in the year 1888. The award was given for the production of the finest butter from the mixed milk of a great variety of cows. Since then I have been instructor in the formation of other dairies in this country for the production of both fine and faultless butter and cheese, as also with the formation and management of new dairies, so that they are practically equal to the production not only of the first quality of butter and cheese, but also that they are conducted on the modern system by means of the least labour-saving apparatus ; and, further, with regard to the proper feeding and best caretaking of the cattle, the latter of which has necessarily a great influence on the excellence of the products. I

gave instruction also as to the means by which a proper judgment can be formed as to the quality of the milk presented—all milk not being equally good for the manufacture of sound butter and cheese, in my experience as a dairy consul. I shall send you the best testimonials from the most extensive dairy-farmers and butter exporters, and these testimonials will be indorsed by the seal and signature of the British Consul in Denmark.

Denmark is acknowledged to be the only first-class dairy country in the world, for, although great endeavours have from time to time been made, no other nation has yet arrived at the same state of perfection in the markets of the world so far as butter export is concerned. It is well known that the Danish butter is preferred everywhere, on account not only of its superiority, but also for its keeping-quality. The industry is now the most productive and gives the largest income from any trade in the country, there being 3,000 dairies in daily work competing with each other in the manufacture of the finest butter that skill and care can produce. The industry is steadily progressing, as the production continues to be good.

Other countries—New Zealand, for example, with its good grass-land and fine climate—could produce equally good butter and cheese if the necessary expert instruction were provided to enable farmers to follow carefully the rules and practice of the Danish system. Indeed, this should be accomplished with much more ease and success in New Zealand, where the climate and grazing-lands are so much more advantageous than those of Denmark, and should yield the best of products to any market. It is my strong belief that with such advantages New Zealand would produce most superior and best-keeping butter packed in smaller or larger canisters for export to warm countries, where a high price is obtainable. Denmark packs much butter in this way, exporting quantities to various places under the Line at very high prices—from 5s. to 6s. per pound. Such export is only made during the summer months, when the cows are on grass feed only, as otherwise the butter will not keep to send to warm countries. The mode of packing requires great attention, and several special matters should be observed, which are kept secret in the process of packing, but with which I am fully acquainted. The Government here in Denmark have appointed four dairy consuls, who receive permanent salaries from the State, and whose duties are to instruct dairy-farmers and correct their omissions or errors in the process of production, to teach them the necessary treatment and care of their cattle, and the proper formation and laying-out of their dairies. These Government consuls are required to travel to any district where their assistance and opinions are required by any dairy-farmer or establishment desiring their advice. All the necessary travelling-expenses from and to head-quarters, while their services are required, to be paid by the party requiring their services. These consuls are also judges in the exhibitions of dairy-products which have lately been established by the Government. These exhibitions occur once a month all the year round, and are attended by the leading butter producers and exporters from different parts of the country, and the experience thus gained by the exhibitors enables them steadily to improve the quality of the product. In addition to the above-mentioned four State consuls, there are eight private experts consuls, who have also a right to be present at these exhibitions, and who have also ample employment with numerous dairies as instructors and advisers.

I have now, as briefly as possible, stated the manner of the administration of the Danish milk industry and the mode of the State assistance to maintain its now well-earned reputation in the world's markets.

C. E. LANDSPERG,

Dairy Consul, care of Danish Consulate, Wellington, N.Z.

MR. MURPHY, F.L.S., since giving his evidence, forwards the following papers on the subject of milk:—

NEW METHOD OF MILK-PRESERVATION.—(From the *Scotsman*.)

The value of milk as an article of diet is too well known to require to be dwelt upon, but it has one defect: it will not keep long; it very soon turns and gets sour. Its use, therefore, is somewhat restricted to regions where dairies are plentiful. Many attempts have been made to get over this difficulty. There are two common methods of preserving milk by processes of condensation. In the one the milk is simply evaporated down to about a fourth part of its bulk and then sealed up in tins. In this state, however, it cannot be preserved for longer than a few weeks at most. In the other method a more elaborate process is adopted. The milk is first strongly heated and then a considerable quantity of sugar is added, after which it is evaporated down to the same extent as in the first method. By this process the milk may be preserved in a sound condition in tins securely soldered to exclude the air, and when these are opened the milk only requires to be diluted to be fit for use. But the composition of the milk is greatly altered by the addition of so much sugar, and, although useful in many cases where fresh milk cannot easily be obtained, its value as a nourishing diet is doubtful, especially when it is used as a food for infants. As, however, notwithstanding these drawbacks, a large trade is done in these condensed milks, it is evident that a good method for preserving this valuable article of diet for a long time, without altering its composition and without adding any foreign ingredient, would be valuable and supply a great want. Recently a process of this kind has been brought under our notice which merits some attention, as it seems to attain the end in view. This process is the invention of a Norwegian, and has been in operation now for a sufficient length of time to test its value. The milk is preserved for apparently any length of time in a perfectly fresh and sweet condition, while its composition is quite unaltered, nothing being added to or taken away from the original milk. The tins have only to be opened, and the milk poured out and used as if fresh from the dairy. A company has been formed in London, under the title of "Dahl's Pure Milk Company," to work the process, which is patented. An establishment has been erected in Norway to prepare the milk, whence it is exported to this and other countries. It thus promises to be a new industry which will utilise, for the benefit of the inhabitants of the United Kingdom, the dairy-produce of the pastoral regions of Norway.

Samples of this preserved milk have been submitted to various medical and other authorities, who report very favourably regarding it. Klein, the well-known authority on microbes and such small organisms, says he has been unable to detect the presence of any of these organisms, whether harmless or disease-producing. Professor Wauklyn also certifies that the milk is of excellent quality and excellently well preserved, and several physicians commend it as highly beneficial in wasting diseases of adults and children, and as a remedy for diarrhoea, &c. The principle on which the success of this process depends is simply that of completely sterilising the milk—that is, depriving it entirely of any of those small organisms usually known as bacteria, which are the active agents in bringing about fermentive and putrefactive changes. When these organisms and their germs are completely destroyed the milk will keep in good condition if protected from the air, which is done by hermetically sealing it up in tins. The knowledge which has been acquired of late years as to the nature and habits of bacteria renders such a process possible. Experiments have shown that, if the temperature of a liquid be raised to a considerable extent, any of these minute organisms which it may contain are completely destroyed; but the germs or spores are not so easily got rid of, as they can endure much higher temperatures than the organisms from which they are derived, and may, therefore, give rise to new swarms when the liquid cools again. Further, these germs require a certain moderate amount of heat in order to insure their development into fully-formed organisms, just as an egg requires some heat to develop the chick. It is evident, therefore, that we never can be sure that any liquid is completely sterilised by merely heating it once to a high temperature; some germs may remain, and, indeed, new germs may be formed by the organisms before they perish, and hence the labour may be lost. If, however, we first raise the temperature to such a degree that we know must destroy all the fully-developed organisms which may be present, and then allow it to remain for some time at a temperature most suitable for the development of those germs which are most advanced, we shall have a second crop of organisms, which we may then destroy as before by again raising the temperature. Even after this, however, we may still have some germs remaining, and to get entirely rid of those we must repeat the foregoing process several times perhaps, but we shall at last get rid of the trace of germs, so that no further development can possibly take place. When this stage is reached the liquid is now perfectly sterilised, and will keep sound and fresh if protected from contact with the air, which might introduce a fresh crop. This is essentially the process which is adopted in preparing this new preserved milk. The milk is taken direct from the cow, and, in the first place, is cooled down to ordinary temperature—about 50° or 60° Fahr.—and then hermetically sealed up in tins. In this state it is exposed to a temperature of about 160°, and kept at this for one hour and three-quarters or thereabout, after which it is allowed to cool down to 100°, at which it remains for some time. It is then quickly heated up again to the former temperature of 160°. This alternate heating and cooling is repeated in the same manner several times, and then finally the temperature is raised to the boiling-point of water, or about 212°, after which it is cooled again to ordinary temperature, when it is found to be completely sterilised, not a trace of any organism or germs being left, and is therefore in a state in which it can be kept for an indefinite length of time without undergoing any change. We have had a considerable number of sample tins of this milk which had been preserved from various lengths of time, ranging from six up to as much as fifteen months, and certainly, judging from these samples, the process is completely successful. It may be added also that on the tins being opened the milk does not rapidly turn sour, but may be kept for several days and still be fit for use, so thoroughly do the germs seem to have been destroyed. On the whole, the manufacture seems to be a distinct success, and well worthy of the attention of all consumers of this valuable article of diet.

VEGETABLE GROWTHS IN MILK.

In the course of a lecture on the "Chemistry of Milk," delivered by Mr. F. J. Lloyd, consulting chemist to the British Dairy Farmers' Association, at the Dairy Institute, Aylesbury, in treating of the constituents of milk, he said: "Although we have separated the fat from milk by the most perfect means which we have at our disposal, still it will remain cloudy; so that we know there must be something in it which is not like sugar in solution, but which is kept in suspension, as chemists call it, in the milk. This matter in suspension, when examined very carefully, is seen to be partly caseine, not altogether precipitated as it is by rennet, nor yet not altogether soluble. With this caseine are numerous products or substances which, so far as we know, do not always come from the cow, but which get into the milk after the milk is drawn from the cow. Some of these are vegetable growths; they are of the minutest kinds, and are called bacteria. This word is used to name all those minute substances which grow, and are most fond of growing, in milk. One of these is characteristic of milk. He would read the words of one of the greatest authorities who had studied this subject of bacteria. He said, 'The germs of the organisms called *Bacillus lacticus* are disseminated to such an extent that they never fail to be developed in milk under conditions.' Now, he wanted to explain what these ordinary minute organisms were. They were minute vegetable cells, which we hear spoken of a great deal, but which are exceedingly difficult to discover, even by means of the most powerful microscope, so infinitely small are they. After a great deal of trouble he had succeeded in making a drawing of some in cream, for he had found that these organisms were carried up in the big globules of fat forming the cream. Hence, cream is richer in these minute organisms than the skimmed milk underneath. And when we see the change they make we shall understand how important they are in connection with butter-making. When exceedingly magnified about a thousand times they can only just be seen—that is, appearing about one-sixteenth of an inch in length. But they have the power of dividing themselves, and each half will divide again, and so on infinitely at an enormous rate, and as they grow they produce certain changes in the milk. They feed upon the albumen, and they change the sugar which is in the milk into an acid, which is called lactic acid, and which causes milk to go sour, and cream too. It also gives the

flavour in butter and cheese to a great extent. Thus it might be seen how important the work is which these minute organisms perform. They have also the power of growing within themselves a little spot which grows until it nearly fills the whole cell, and then the outer portion of the cell seems to be destroyed, and this interior cell will remain quiescent. That is to say, it does not grow, and does not affect the sugar or the albumen, and is, what is spoken of in dairy matters, a germ. The germs of this bacillus lay in a resting condition, and are most difficult to kill. The milk may be boiled and they will not be killed, and it is in this condition that they pervade every dairy. They are similar to many other vegetable organisms, some of which are destructive to milk and produce bad flavours, and some of which are beneficial and produce good flavours. But if the germs of any organism destructive to milk get into a dairy it is almost impossible to get rid of them, and the dairies have to be given up. It is impossible to wash out these organisms he had referred to in the butter; but by the exercise of great care that portion of the milk can be washed out that they feed upon—namely, the nitrogenous matter. By carefully washing butter this nitrogenous matter and caseine can be washed out, and then these organisms having no food cannot grow, and the butter keeps. The washing-out of the caseine depends upon the skill exercised, and varies in its effects to an enormous extent."

EXTRACT from LETTER from THOS. BRYDONE, Colonial Manager, New Zealand and Australian Land Company.

MR. W. S. DAVIDSON, general manager, New Zealand and Australian Land Company, Edinburgh (writing to Mr. T. Brydone, the colonial manager, dated 23rd June, 1890), is of opinion that the New Zealand Government should put £1,000 or £2,000 on the estimates for the encouragement of cheese- and butter-making; and says, further, that "There should certainly be a first-rate cheese and as good a butter-expert in the colony, who knows the details of cheese- and butter-making sufficiently well to correct all faults and failings in our factories. The feeding and treatment of the cows, and the treatment of the milk immediately it is taken from the cows, is of great consequence. All these matters have much more to do with the success of our dairying business than one is apt at first to give credit for. I do hope you will stir up the question, as I do feel quite keen about our dairy-farming opportunities after having seen what can be made of the business under much more difficult circumstances than exist in New Zealand. The fact is, New Zealand should be equal to any place in the world for butter and cheese. There are several firms in London who make ammonia cooling-rooms, and I fancy it would pay to send you an apparatus to fit up a chamber at Edendale."

NOTE.—Mr. Davidson was fifteen or sixteen years in Canterbury, and during the last ten years has taken a great interest in dairying. The letter above referred to was written after visiting Denmark to engage a butter expert for the company at Edendale.—THOS. BRYDONE.

MESSRS. CUMMINS, SHARP, and Co., of Wanganui, write, through the Chairman of the Chamber of Commerce, under date 26th July, 1890, that as large shippers of butter they are of opinion that qualified experts should be appointed at the principal shipping centres to examine all butter for export, and put an official mark on it according to the grade. Also, that dairy-schools and travelling dairies should be established on similar lines to those in Australia.

EXTRACT from LETTER from Mr. JOHN RENNIE, of Doyleston, dated 27th July, 1890, addressed to Sir John Hall.

Assistance can be given to the dairying industry by following the example of Victoria. When I was over during the Exhibition year they had, besides the dairy-plant in the Exhibition buildings, a competent teacher, with a small dairy-plant, travelling from district to district, giving instructions to the farmers' wives and daughters, which was highly appreciated; and I am sure it has done much to improve the butter. We have a few good makers, but on the average the quality of the butter sent from New Zealand is very low, and I am satisfied that if such a plan was adopted here it would improve the value of our dairy-exports at least one-third. I have lately seen some returns for butter shipped to London that barely paid for the kegs, which, if it had been properly made, would have fetched from £1 to £5 per hundredweight. This is a great loss to the country as well as to the sender, and I am pleased you are taking the matter in hand. We have the finest climate in the world for dairying, and if the produce is properly handled, and shipped at the right season, we have the best market; but, so long as the bulk of our shipments are sold as grease, there will be a loss to all concerned. It is the same with fruit: we can grow all kinds to perfection, but for the want of proper instruction in planting, cultivating, and the destroying of insect-pests, hundreds of trees are allowed to go to waste every year. It is very easy to keep fruit-trees clean if the people are only shown the way, which I think the Government could do at a trifling expense. Much information may be got from California, where they have a Horticultural Department, with regulations and restrictions something like we have in the Sheep Department. Government should also see that nothing but clean trees are planted, and that all the latest information—scientific and practical—is made available to all. . . . —JOHN RENNIE.

EXTRACT from LETTER of Mr. JAMES SCLANDERS, Chairman, Chamber of Commerce, Nelson, dated 29th July, 1890.

The last year's experience of shipping to England both butter and cheese, but more particularly the former, has been most puzzling. The year before last any good butter that was sent Home fetched quite a remunerative price, and I happened to be in England myself at the time that butter was arriving, and many good samples fetched over £5 per hundredweight, a price that will pay any New Zealand dairy-farmers for any amount they choose to make. This last

year, butter, which I have reason to know has left the dairies in this district in equally good condition, has realised very much lower prices. It is a very great puzzle indeed to know the reason for this. So far as I have been able to ascertain, the market-price of good butter at Home is not very much different from what it was the year before last, and the complaints from our agents in England is that the butter has arrived in bad condition. I can see two probable reasons for this being the case, one being that this last season there was a great difficulty in getting the butter away promptly owing to the want of what is called cool-chamber accommodation in the direct steamers. Much of the butter that was sent from here, from Taranaki, Wanganui, and other outside districts, lay kicking about in Wellington and in other ports awaiting shipment, having been shut out of the steamers for which they were intended; but even those parcels which were got away without any trouble at all, as was the case the year before, also seem to have suffered in price. I am inclined to think, therefore, that the low price to a very large extent has been the want of care on the part of steamers in keeping the cool-chambers at the temperature at which they ought to be kept in order to deliver the butter in London in the condition in which it is put on board in New Zealand. I see no reason why there should not be some engagement on the part of the steamers in keeping the cool-chambers set apart for dairy-produce at the temperature which it is understood to be kept at, but as to which there has been hitherto no guarantee. I am of opinion that some alteration should be made, so that when shippers of dairy-produce pay the high freight that they have paid all through, and which I dare say they are willing to pay still, they should have some protection as to the proper maintaining of the required temperature of the cool-chamber just as the meat shippers have in connection with their shipments of mutton.

LETTER from Mr. G. M. ROBBINS.

DEAR SIR,—

Gore, New Zealand, 31st July, 1890.

There is yet much to do of improvement in the dairy industry of New Zealand. In cheese I do not think there is so much improvement to be effected in its manufacture as in marketing. Most of the factories of the South Island are making a first-class article now, and I believe many of those in the North Island. The cheese we send to England I regard as fully equal to that from Canada or New York State. The prices quoted from London by the leading cheese merchants confirm this: for example, at the beginning of our season finest Canada and New York State cheese is quoted about 3s. over New Zealand; as the season advances it is quoted at even figures generally; now, at the end of our season, New Zealand is quoted 3s. over Canada or New York State cheese. The system of marketing cheese is, I think, very unsatisfactory. It should be consigned to dealers direct in the trade, who sell it to retailers and consumers.

The care of dairy-produce by the steamship companies seems very lax, or we should not hear of cheese shipped in cool-space arriving in London in a heated condition. Is there no way of insuring against this, or getting the steamship company to guarantee? Dealers to whom it was consigned could tell as soon as it was in port by sending a man on board and opening a single case, and, if heated, the merchant knows at once how much it reduces its value, which loss should be paid by the steamship company. The freight on cheese is out of proportion to mutton— $\frac{1}{4}$ d. per pound net weight should pay as well as 1d. per pound for mutton, as 2cwt. of cheese would only occupy about the same space as one carcase of mutton, and the expense of refrigerating should be much less. I do not think fault would be found about heated cheese if good sound cheese was handled as follows: Load them in cool-space, but leave temperature natural till tropics are reached. When temperature rises to 55° Fahr. introduce just enough cold air to keep the temperature between 45° and 50° Fahr. right through to end of voyage. If when rounding Cape Horn the temperature falls below 45° Fahr. some means should be used to keep it up to about that point.

Butter I consider bad. Not even the butter made at the Exhibition, of which so much was said, would win many points with good butter and competent judges. I do not say I could better it. I enjoyed a first-class reputation as a butter-maker in the United States, but have not done anything in that line in New Zealand. There may be something against its being properly done here yet. I believe it can be done, and with good success. I have seen a fine sample of long-keeping butter made at the Otama Bridge Dairy-factory in June, 1888. I set and put in operation one of our separators at the above factory, and in trying the machine we put through 250 gallons of milk. The manager, after allowing the cream to ripen, churned and worked it up. Being late in the season, it had a turnip flavour, but developed no rank flavour, so common to butter in general here, although it lay openly exposed and uncovered in the factory for fully six weeks. I know the want of ice or very cold spring-water would be a great obstacle in summer time; but refrigerating-machines can now be had fairly cheap, and I should say that the use of them was the only way to assure success in butter-making in New Zealand.

Our factories are good. Still, there are some details that should receive more attention when building, as our climate is different to most any other where cheese is made.

I think many will be disappointed in what they will derive in the way of benefits from the dairy association. I think very little of it, as I understand it; but really know little of it. The idea of classing cheese here in New Zealand I think wrong. With so long a voyage as it has to make to market, it is sure to change some, and different factories' make will make different changes. In our case, the merchant to whom the cheese is consigned must and will do the classing. In my mind, we want a Government brand to use with our factory brand, to show the consignee the cheese is full milk, or one-quarter, half, three-quarter, or full skims; and the instructor could see that each factory was putting on a brand that corresponded to the quality they manufactured. I wrote for particulars of the working of the New York State Dairy Association, and intended to have it published in the leading journals, but have not received it yet. It is a very satisfactory organization, and perhaps would suit in New Zealand.

I consider we could almost do without an instructor so far as cheese is concerned. Still, a good man, who would demonstrate by practice, and take into consideration the variations in different localities, would always be of value to makers of less experience, as beginners, who we shall always have with us more or less. What is wanted is an instructor who will make an informal visit, look over the cheese in stock, observe the system of making, if anything is wrong stop and work a few days, and see if the difficulty can be traced and a remedy applied; not make a formal call, and try to cram them with a set of hard-and-fast rules that might apply to one factory but would require perhaps a different set for each of the next ten he visited. In conclusion, I would say that an instructor should know where and when he is wanted better than any one can tell him, unless some maker is in trouble and he is requested to call.

I am not in a mood for thinking or writing, and in looking this over I doubt if it interests you much. What there is you are welcome to.

I am, &c.,

G. M. ROBBINS.

The Chairman, Flax and other Industries Committee, House of Representatives.

MR. WESLEY SPRAGGE, secretary to the New Zealand Dairy Association, Auckland, writes, through the secretary of the Auckland Chamber of Commerce, under date 1st August, that the association suffered severe losses last year through lack of space in cool-chambers of steamers to England, and suggests that Government should take steps to secure ample space for butter shippers in all the direct mail-steamers leaving New Zealand from September to end of February, reasonable freight at per ton weight or measurement to be arranged, and temperature of 45° to be guaranteed throughout the voyage Home. They do not recommend any bonus system such as was adopted in Victoria, and have no remarks to make regarding the appointment of Inspectors, being of opinion that all that is required is a sure means of getting produce to the market in proper time and in the same condition as it leaves the producer.

LETTER from Mr. J. A. POND, Colonial Analyst, Auckland.

SIR,—

2nd August, 1890.

In reference your letter of the 26th ultimo, requesting me to forward samples of butter-boxes, and also inviting me to offer any information upon these subjects, I now have the honour to reply stating that the boxes desired have been forwarded, and that any information which I can give upon these subjects I shall have much pleasure in recording.

In dealing with these subjects, I will first take up that of "dairy-produce."

The chief item of value in this department is, to my mind, butter, especially with a view to export. The reasons for this decision are—first, that practically an unlimited amount of this article is capable of absorption in the various markets of the world, the chief of which is that of England, while South America, India, and the Cape would also deserve notice; secondly, the manufacture and export of butter entails no loss to the soil if carried out in a skilful manner, which is a matter of no small moment to the farmers and the colony. Now, the value of butter imported into England exceeds twelve millions sterling annually, while the amount which the colony of New Zealand contributes is so small as to make this point alone worthy of attention.

It is with much diffidence that I enter upon a criticism of the mode of manufacturing butter, and the article so produced, which obtains, unfortunately, in so many parts of our colony. The great evils to which I shall call attention are chiefly the segregation of the producers, want of cleanliness, knowledge, and capital, resulting in an output of a very inferior article, entailing an unnecessary loss to the individual producing, and bringing discredit also upon those who have manufactured a superior article, which has possibly been shipped at the same time and under the same conditions as the former.

Now, in the segregation of our farmers, there are too many who have no alternative to making their butter in the most primitive manner, after which it is kegged and often remains for a long time before an opportunity permits of its being forwarded to market, while the changes of temperature which it undergoes are factors in its decomposition. Again, the want of knowledge, too, often is the cause of carelessness in regard to the keeping of cow-sheds and milking-pans, where the filth is left for long periods of time without removal, and pigs are frequently permitted to enter these sheds. If wet weather supervenes, then the malodours, and even splashing of the cattle in the slushy ground during milking, too often affects the quality of the milk; while in dry weather the same material lifted by the wind has a like baneful effect. I have no desire to make sweeping charges, or to assume that this is the state of affairs in most cases; but that it obtains in too many is the result of my observations in many dairies, both in the country and in regard to those supplying milk to this city.

The production of the butter in a proper condition for export is still further endangered in many instances from the want of proper accommodation for setting where separators are not used. Even under the most favourable circumstances, the butter, during summer, when it is produced in the largest quantities, is churned at too high a temperature, resulting in a condition in which it is impossible to remove the caseine, the subsequent decomposition of which adds another and most frequent cause of rancidity. I may add that in the finest butter I have yet received for analysis curd was present to the extent of .674 per cent., while I have frequently found it to exceed 3.5 per cent. There is yet another factor to be considered in which much injury is done to butter during its production, and that is in the use of impure water for washing. This is a matter which frequently comes before me, and is more often the cause of carelessness or neglect than the actual impossibility of obtaining suitable water.

To all this let me add the irregularity of salting, the variety of the output of the butter when made in a small way, the difficulties of transport, and high temperature to the port of departure,

with frequently great delay in the matter of shipment, and often absence of cool-storage both on shore or on ship; and I think it is not a matter of why we do not export large quantities of good butter, but why we export any entitled to this character.

Some of the difficulties I have mentioned beset every producer of butter throughout this colony, even the most successful and well-managed factories. At the same time, they are all possible of amelioration, if not removal; and under such conditions only can our export of butter take rank in the English market with the continental butters.

The object to be attained to this end is, in my opinion, extreme cleanliness, low temperature, and thorough washing. It is also necessary that the product should be equable and packing uniform.

To obtain this result, the butter-factories should be large, and situated as near as possible the exporting facilities; in fact, in the present condition of carriage, there being no refrigerating-carriages on the railways, I would urge their erection at the chief centres, and carry the cream to them, rather than the butter. I would urge co-operation amongst small centres of the farming population, and the erection of separators only where the skim-milk can be at once returned to the farms and the cream forwarded to the factories. In churning and the subsequent washing the temperature of the milk and the surrounding air should not exceed 60° Fahr., the water used being of the same temperature, and in every way suitable for the purpose; the butter when completed and packed, being stored at a temperature above freezing, but below 55° Fahr., that of 40° Fahr. being the most favourable for this purpose. In shipping, the cool-chamber requires to be of this degree of cold also, as it has been found injurious to butter to reduce it below the freezing-point.

In packing for market, which is a matter I have given a great deal of attention to, I have invented and patented a mode of so enamelling or coating wood as to render it impervious to water, fat, or brine, and thus able to carry the finest-flavoured butter without in any way contaminating it from the influence of the wood. I have no desire to dwell upon my own action in this matter, but would bring before your Committee the fact that the largest exporters of butter in Australia were last year a syndicate in Sydney managed by the Fresh Food and Ice Company. This firm obtained from the company with which I am connected 14,000 boxes, in which the whole of their butter was exported to England, realising throughout the highest price of any forwarded from these colonies. So successfully have this syndicate carried on its operations that our firm has undertaken to supply 20,000 boxes during the ensuing season, 2,000 of which have already been shipped. I may add that the Fresh Food and Ice Company have exported their butter in these boxes during the last three years.

Now, this butter which has attained such commendation, and so high a price in London, is manufactured in the manner I have suggested, being churned, washed, and packed in the cool-chamber, the water being also brought to the required temperature. By this means there is a minimum risk of the importation of the germs of ferments, with an almost certain arrest of the development of those which may be present.

Now, to attain this requirement of low temperature at the smallest cost is a matter which I respectfully suggest should be taken up by your Committee, and would urge that inquiry be made in reference to a patent taken out by Mr. L. Perkins, in England, termed the "Arktos," referred to in "The Journal of the Society of Chemical Industry," of the 31st May, 1889. This invention is for the production of cold air by a very ingenious adaptation of the ammonia process, and carries out its entire operation without the use of any machinery. This process appears to be eminently successful, if not in obtaining great degrees of frost, at all events of attaining easily the temperatures of which I have spoken; and I can see no reason why it should not also be applied to railway-carriages as well as in the factories. However the temperature is brought to the required degree, it is, to my mind, of the utmost importance that, from the time subsequent to churning to that of delivery at its destination, London or elsewhere, the temperature should never exceed 45° Fahr.

Assuming that the conditions required in these notes are obtainable, then I am satisfied that we have the intelligence in this colony to produce the finest butter in large quantities. It will be a matter of consideration the cultivation of the most valuable foods for this purpose, and I would bring before your Committee's notice several papers I have written in reference to the growth of sugar-beet, not alone for the production of saccharine matter, but also for the improvement of our dairy-produce from the waste of the sugar-factories.* Unfortunately, less has been done in this direction than was hoped; but I have no hesitation in saying that it is but a matter of time before this is carried into effect.

The manufacture of condensed milk is a matter which I will not enter upon other than to request that inquiries should be made into the latest mechanical developments, especially with regard to vacuum machinery. The remarks in reference to improvement of foods for dairy-stock apply with still greater force to this branch of dairy-produce, the want of consideration on this point having proved fatal to the success of factories erected for the manufacture of condensed milk.

In conclusion, I beg to forward some papers by post which give more fully than I desire in this report the details of our manufacture of boxes, and opinions in connection therewith; but I would also remark that we are indebted to the New Zealand Government Inspectors of Dairies and others for urging that none but the finest butter should be packed in our boxes. I would, however, say, in reply, that from this colony, with a fairly equable and moderate temperature, with abundance of water, and in many parts the finest imported grasses, none but the finest flavoured butter should be exported or even made.

I have, &c.,

Flax and other Industries Committee.

J. A. POND, Colonial Analyst.

* "Transactions of the New Zealand Institute," and communications to the Hon. the Colonial Secretary.

LETTER from Mr. R. G. BAUCHOPE, Secretary, Taranaki Chamber of Commerce.

SIR,—

New Plymouth, 7th August, 1890.

I have the honour to acknowledge receipt of your letter of the 25th ultimo and telegram of the 5th instant, and am instructed by the Chamber to reply as follows:—

Dairying.—This important industry has of late years made great progress in our district, and is every month assuming larger proportions. Butter suffers very materially in transit from our being at a long distance from any port of shipment to foreign parts, and this Chamber is most anxious to minimise this risk as much as possible, and are of opinion that this can be done in the following manner: The Railway Commissioners to put on a special freight-train when required, during the five summer months (October to February inclusive). It would probably be necessary to run it once a week, taking up butter at all central stations. The Chamber believes the quantity between New Plymouth and Hawera alone would warrant the Commissioners doing so. In order to make this work successfully the railage would have to be reduced to, at any rate, £2 per ton weight, not measurement; and specially-ventilated trucks, similar to those in use for meat-carrying, should be used instead of the ordinary wagons.

The question of experts being appointed by the Government to classify and mark as "firsts," "seconds," and "thirds," as done in Ireland, opens up a very important question, both for protection of exportation to Australia and to give our butter, &c., a better standing in the London market. There is this to be said in favour of this plan: that it could be made self-supporting by charging exporters a fixed rate per keg.

The question of a better system of tuition among the farmers generally should also be looked into, as the Inspectors appointed by Government have hitherto given their attention only to factories, where, no doubt, it is wanted; but they should also, to some extent, give a house-to-house visit in dairying districts. The Chamber feels that any expenditure by the Government in this way would be money well spent.

There are so many questions of vital importance to this industry that the Chamber are strongly of opinion that it would be advisable to have a conference of representatives from the several dairying districts meet in Wellington, and, after discussion, submit their views to your Committee.

* * * * *

I have, &c.,

ROBT. G. BAUCHOPE, Secretary.

The Chairman, Flax and other Industries Committee.

MR. J. FOSTER, of Dunedin, writes, under date 21st August, calling attention to his glass-lined butter-boxes.

MR. R. RITCHIE, secretary of the Roseville Dairy-factory Company, Sawyer's Bay, Port Chalmers, writes, under dates 8th August and 28th June, 1890, calling attention to their condensed milk, and asking that assistance to the industry be recommended, in the shape of a bonus and rebate of duty on accessories for the manufacture.

MR. W. D. SUTHERLAND writes, under date 29th August, suggesting that Government should ascertain from the British Consul at Rio de Janeiro full particulars of the butter-market at that place; and that Government should issue, at small charge, printed pamphlets from time to time, giving all the latest information on butter- and cheese-making; and enclosing a note from Mr. William Kirkland, of Elm Grove, East Taieri, offering to give the use of his dairy and find all milk required for the purpose of lectures or lessons to be given by any dairy expert appointed by Government. Also handing in the following recipe for salting butter: "Say, to 22lb. butter add 1lb. salt, one teaspoonful of nitre, two tablespoonfuls of the best powdered sugar—all to be well mixed. If well surrounded with pickle, and kept cool, will turn out finest gilt-edged butter, after three months' packing."

LETTER from Sir F. D. BELL, Agent-General.

SIR,—

Westminster Chambers, 13, Victoria Street, London, S.W., 30th July, 1890.

In continuation of my memorandum of the 25th instant, No. 1081, I beg to state that Mr. Davidson has very kindly sent me some notes made by him during a recent visit to butter-factories in Denmark. I enclose a copy, which you will read with interest, if you have not already heard from Mr. Brydone on the subject.

The information contained in my memorandum of the 25th will have shown that the services of a competent Danish expert could most likely be obtained for a salary of about £350 a year. But I do not think it would be of any use to communicate further with people in Denmark until the Government have decided whether such an expert shall be engaged. I gather from your letter to Mr. Brydone of the 23rd May that, while you were disposed to assist the New Zealand and Australian Land Company in the way they asked, a final decision was reserved until the reports came in which you had called for from the Sheep Inspectors. But the work in which such an expert would be engaged is one that must be the same whatever might be the character of those reports; and I venture to suggest that the question of his engagement might be decided without waiting for them. If there could ever have been a doubt as to the absolute necessity of technical instruction for our dairy-farmers it could hardly survive the perusal of Mr. Davidson's notes. Here is a company which for years past had been sparing no pains or expense in the endeavour to turn out butter for export in the right way, yet it only required a brief visit to a great Danish factory to show how much they had still to learn on elementary points in the business; and it may very confidently be said that, if the Edendale dairy does not yet know the right way no other dairy in New Zealand does. If New Zealand is ever to rival, or even approach, Denmark in making butter the

same scientific precision, extreme precautions, and minute attention to details as Mr. Davidson saw during his visit will have to be the rule in our own factories; but obviously the Government can do very little to bring this about, unless they will first do what the Danish Government did, and permeate the country with dairy-schools, and bring the best technical teaching to the farmer's door. I hope I am not going outside my province in saying that it does not signify now what the Sheep Inspectors or the Agent-General may find out. They can find out nothing so certain as that our people do not yet know how to turn out butter for export any more than the Danes did only a few years ago, and will never know how unless they will pay to be taught as the Danes had to pay. The pre-eminence of Denmark as the "model State in dairy-farming" was earned by the excellence of the technical teaching freely given to the country-folk; and if the industry is to reach the same success in New Zealand it can only be by making the same sacrifices, and devoting money year after year to the same methodical and sustained instruction in both school and cottage. Now, this is just what the New Zealand colonists have not yet come to think it is worth their while to do, although the natural advantages of their country for dairying are so much greater than any that Denmark possessed, and although the fruits of proper dairy-teaching would be even sooner seen in the same prosperity as has come to the Danes. It would only be a very modest step in advance to help Mr. Davidson's company in bringing out an expert; but the work of such a man might one day persuade the colonists to go much further; and if you decide to engage one I would strenuously advise his being sent for a year or two at least to Edendale, in order to give the best chance of Danish methods being successfully established there, and of other dairies being encouraged to do the same.

I have, &c.,

The Hon. the Minister of Lands, Wellington.

F. D. BELL.

REPORT ON DANISH BUTTER-MAKING BY MR. W. S. DAVIDSON, GENERAL MANAGER, NEW ZEALAND AND AUSTRALIAN LAND COMPANY, EDINBURGH.

ON the evening of the 8th May I left London, and reached Copenhagen early on Saturday morning, 10th instant.

On making inquiries through friends regarding the possibility of engaging a working butter-maker, I was amused to hear that Professor Fjord, who is a scientific authority on all Danish dairying, was strongly opposed to allowing the art of butter-making to be abstracted from Denmark through the employment of their experts. Indeed, articles have already been written in the Danish newspapers warning people that New Zealand is the most dangerous competitor Denmark is to have in the future, and advocating the withholding of all assistance to that colony by retaining the knowledge of butter-making as much as possible within their own country. To those who supported these views my answer was that, as New Zealand was admittedly unsurpassed in the world as a dairying country, their best plan was for a number of their dairy-farmers and butter-makers to emigrate to that colony, and so take advantage of all the good things we can offer them. I should much like to see a colony of Danish farmers in the vicinity of our Edendale Factory.

My first introduction to the method of handling milk in Denmark was through the kindness of Mr. George Busk, who accompanied me in a visit to the works and dairy of the Copenhagen Milk Supply Company, which he personally instituted, and worked at a loss for some nine years, after which the enormous advantages it offered were appreciated by the public, and the company is now a most successful one. It is unique in being by far the most perfect dairy system in the world for supplying a large town with pure, unadulterated, and healthy milk.

It would take too long to give a detailed account of the system, but it is, shortly, as follows: All the dairies supplying milk are required to come under the control of the Supply Company, and inspectors and veterinary surgeons are employed to constantly visit the farms and insist on cleanliness, and to examine into the health of the cattle, and to watch that the animals are properly fed with the fodder stipulated for. When the milk reaches the large collecting dairy in Copenhagen the temperature of each can is taken, and any exceeding a certain degree are refused. Samples are taken of each lot of milk, and these are tested daily by experts for strength, and a certain number of them are chemically analysed. There are between three thousand and four thousand cows attached to the company, and the daily examination of their milk fully employs two experts. All the milk is filtered through sponges or fine gravel, and some 300lb. of black filth is taken daily from the supply. In 1889 there were 12,500,000lb. of milk purchased and distributed by the company, and out of this nearly 50 tons of dirt must have been filtered. If this amount of filth can be abstracted from milk sent from probably the cleanest dairy-farms in the world we may imagine the state of matters where no supervision exists. The Milk Supply Company distribute the milk in forty carts, and use specially-constructed cans, which are locked in the conveyances, and are thus secured against any adulteration on the part of the drivers. Special milk from selected cows is sold in sealed bottles for the use of infants. All these precautions are taken to prevent the milk from becoming the medium of communicating infectious diseases, such as diphtheria, typhoid fever, and scarlet fever. If any of the farmers or their employes are suffering from any infectious disease they are compelled to declare it, and the milk supplied by them, although paid for, is not delivered to the company's customers. During illness the employes receive full wages and medical attendance; so there is no inducement to conceal disease. In the distributing dairy in Copenhagen some 180 hands are employed, and the cleanliness is the most perfect possible, even to the supplying of clean blouses daily to work in.

I have given this short account of this really wonderful undertaking with a view to showing to what perfection the handling of milk has been brought in Denmark, and in order to impress upon you once for all that no product requires more care and scientific control.

The Copenhagen Supply Company have a good dairy attached to their works, in which they make butter for a town supply, principally from surplus milk, and I spent a morning in watching the process.

Another day I visited the country districts, and, under the guidance of Baron Weddell, saw a model farm, where dairying and agriculture is taught. This dairy was, however, under the old system, and had not the most modern appliances.

I then visited a new co-operative dairy-factory, with all the latest improvements, and, without pretending to be an expert, acquired the following information: The milk is cooled by the farmers immediately after milking, and to do this most of them use ice; they nearly all have ice-houses. The milk is weighed when delivered to the dairy-factory, and samples are daily taken of each farmer's supply. The milk is then emptied into a large round vat, and is passed from here into a small vat close to the separators, where it is heated slightly by steam-pipe, and then it is run into the separators. The cream, after leaving the separators, is cooled to as low a point as possible, and at least to 48° Fahr., by using ice. The skim-milk is elevated in a pipe from the separators, and is run through a heater, which raises the temperature to 160° or 170°, and thus destroys germs which might carry disease to calves, and at the same time arrests fermentation and consequent sourness. The farmers take back their skim-milk.

The best butter for export is made from soured cream; and this is one of the most important features in a Danish dairy. The sourness is arrived at by keeping on hand some sour cream called the "starter," and by mixing this to the extent of 2 per cent. with the sweet cream the necessary alteration takes place. The sourness is in reality caused by a germ (named by Pasteur No. 18 Bacillus), and much attention is required in the souring process.

A "starter" can be created by keeping cream for thirty-six hours in an equal temperature of 18° to 20° Reamur, which sours it, and renders it ready for use in twenty-four hours. About 4 per cent. more butter is obtained by the sour-cream system as compared with the sweet cream. Next comes the churning, and this also requires much attention. The churns used are stationary, and only the "plunger" inside moves. Our American churns, which themselves revolve, are utterly condemned as bad butter-makers, so I have ordered a double one to be sent from Copenhagen for Edendale. It is similar to those represented in the various sketches and plans sent you. The churn is filled to the extent of about two-thirds its capacity, and the butter should come in about thirty-five minutes. During churning the temperature is carefully watched and regulated by the revolutions of the "plunger." A thermometer is introduced through a hole in the churn, and closely watched. About 55° Fahr. is, I understand, about the proper temperature (9° to 12° Reamur).

The colouring fluid varies according to the season, and is introduced in the cream just previous to churning; about 1 drachm to 22 gallons of milk is about the allowance. The butter is removed from the churn in a hair sieve, and is well rinsed in pure cool water before being put on the butter-table. In the Copenhagen dairy it was then worked moderately by the hand; and there is much art in the manner in which this handling is done, and dairymaids with naturally cool hands are selected for the duty. The butter is next spread out in a trough, and salted with 2 per cent. of the finest dairy salt; and it is then placed in a refrigerating-trough for two hours, in a temperature of 7° Reamur. Then it is passed ten times under the butter-worker, during which process 2 per cent. more salt is added. Then it is once more put in the refrigerating-trough for about an hour, and until sufficiently cooled down to stand the final working of eight to twelve times under the butter-worker, which process should thoroughly express the buttermilk and leave the butter ready for packing. Most of the factories only use the butter-workers, but some people think that the best butter is produced by first working it slightly with the hand.

The foregoing is, shortly, the system of Danish butter-making; but, unless it is seen, one can scarcely credit how careful and exact the experts are in conducting the process, and they calculate things to one degree of temperature, or one revolution more or less of the churn per minute. Now, we have everything to carry on this system, or can easily supply what is wanting, excepting the means of refrigerating the cream and butter, and this, I believe, we must procure to place us on an equal footing with the Danes. In their cold country they have an ample supply of ice, and every farm of any size has its ice-house.

The refrigerating-trough alluded to by me is merely a wooden trough with ice laid in the bottom, which is again covered with a false bottom, on which the butter rests, and the whole trough is then covered with a metal lid, on which ice is laid. The butter is then between two layers of ice, but without coming into contact with it. The necessity for cooling the butter is a *sine quâ non* in Denmark, as, unless so treated, it cannot be worked sufficiently to get out the buttermilk without rendering the butter oily and tallowy. Now, I believe this is certainly the reason our butter is so greasy and tallowy; and in Denmark, where ice is used, even the style of pressure is studied, and direct pressure is insisted on, such as is given in the butter-worker. In packing, care must also be taken not to "spread" the butter into the kegs, but merely to put it in and press it down.

The question now comes, how are we going to find the necessary cold? Are we to purchase a small refrigerating-engine to make ice, or shall we try the ammonia system and use a refrigerated room, or shall we use the ammonia pipes to surround and cool refrigerating-troughs or vats? These seem to me the alternative possibilities, unless we can make a contract with the Bluff refrigerating-works to supply ice, which might be delivered daily. I fancy it will end in our supplying ourselves with the means of maintaining a refrigerated-room, and also of making ice. Some new ammonia systems are now being tested in London, and I am communicating with the promoters. We are also testing the Arctos machine at Nelson Brothers' stores. I will write again fully on this subject, but we can take it as a certainty that the best butter cannot be made without the power of chilling it sufficiently to stand the working of the butter-worker; and, unless the buttermilk is thoroughly expressed from the butter, it will not keep, and cannot be packed for export. Then, after it is made, the butter should be kept in a cool-room until shipped. As to packing butter in tins, it seems a simple enough business, and I visited a large packing works. In this case the butter was purchased from a number of dairies and brought to the Copenhagen works for tinning, after which it is sent to all parts of the world. On receiving the butter it is passed through a butter-worker, in case any moisture has been left in by the farmers, after which it is put into 1lb. to 28lb. tins, and branded in

accordance with the percentage of salt. All the tins were made in the factory, and the greatest care is taken to secure the best quality of tin, and any that is scratched is rejected. The tin is bought in small sheets, and is packed with paper between the layers to avoid scratching. The usual tin-cutting machinery is used, and soldering is all done by hand, and not mechanically, as I have seen it done in Switzerland. All the solder is made on the premises, in order to avoid the risk of too much lead being intermixed with it. After completion, the tins are washed with hot water and soda, and then rinsed in cold water. They are not dried, but merely inverted and allowed to dry themselves by draining. This plan is adopted so as to avoid touching the inside of the cans with the hand. After they are filled with butter and closed the cans are painted over with quick-drying enamel paint, and labelled.

Previous to visiting Denmark I advertised in the Copenhagen newspapers for a practical butter-worker, and received ten applications. From these I selected C. N. Andersen, aged twenty-four, with good testimonials, of which I send you an interpretation. He is now managing a factory, and, I believe, is thoroughly intimate with his business. I received through private sources confirmation of his testimonials. He is engaged for one year at a salary of £100 per annum, and found in food and lodgings. We also pay his passage out, and allow half-wages during the voyage; copy of agreement sent herewith. He will sail from London in the "Doric" on the 10th July. Unfortunately he cannot speak English; but the Danes are excellent linguists, and by the time he reaches you he will know a little. He promises to act under the orders of the dairy manager, and to assist in making cheese when he is not required in the butter-room. He is, in fact, to be viewed in the light of a butter-foreman, and is not engaged as a manager. In order to avail yourself of his services from the first, it would be well for you to get a Danish workman who can speak English and can act as interpreter for a time, until you get the butter department into order. How you are to get him to work without the means of refrigeration remains to be seen, and he will be, I fear, rather lost, as his system necessitates it. However, I am getting him over to Leith before sending him on to you, so will hear what he says, and perhaps be able to send you a refrigerating-trough at least, worked by ammonia. As stated, I am sending you a Danish churn, and will also send some thermometers graded in the way he has been accustomed to, so as to give him every chance in a field where he will require to accommodate himself to new surroundings.

My next hope is to get Government to send out a qualified expert like Landsperg, who speaks and writes English; and, indeed, I am negotiating with that man now, and will recommend our board to offer him some inducement to go, on the chance of being made public dairy expert, to visit all factories and correct existing faults in butter manufacture. We could make good use of him at Edendale for six months, to get Andersen properly started in his department, and to help us to solve this rather difficult question of refrigeration. I am more than ever convinced that we cannot attempt butter-making without the best knowledge and appliances; more especially if we are some day to tin butter for general export. A few hundred pounds will be money well spent to secure success for the future, more especially as our dairy-farmers are even now complaining about their returns. Andersen's future will, of course, depend on his qualifications, and I leave Mr. Brydone to raise his salary as he proves himself worthy.

Now I come to the payment for milk at factories. In Denmark the chief factories only pay by results—that is, each farmer receives a price for his milk in proportion as it is found to contain butter-making cream. For long a satisfactory tester was wanting, but now an excellent one is discovered, which is simple enough to be used generally. A sample is taken from the milk sent by each farmer, and this is poured into a glass tube, which is placed in a frame capable of holding some 150 such sample tubes. This frame, with all the samples in the glass tubes, is then put into the centrifugal separator, which has been previously partly filled with water; the centrifugal is then set in motion, and the cream in each sample of milk is driven to the top of the tube. After removal from the centrifugal the quantity of cream is measured in each sample tube, and the farmer is credited if he can show more cream than the standard quantity required, and debited if his milk yields less than this standard. Unfortunately this tester is only constructed for use in the Danish centrifugal machines made by Burmeister and Wain, of Copenhagen. I am asking Laval's agents if they cannot apply the same system to their centrifugals; Burmeister and Wain say it is impossible, but this is an interested opinion.

I send you a great many drawings and pamphlets from which dairy information may be gathered. If we ever set up a special butter-factory the plans should be adopted. I retain duplicates, so if you want anything you can refer to the page and pamphlet. In the pamphlet I have also numbered a few of the articles, and you could cable the number if necessary, and we will understand.

The feeding of cows is very strictly attended to in Denmark, and where butter is made no turnips are allowed, but beetroot is used. The cows were all at grass when I visited the country; and the fields are despatched by tethering the cows in a line, and feeding the grass regularly before them. One man can watch, water, and shift the tethers of a great many cows, and by feeding them in this way they always get a "clean bite," and the whole of the pasture is thoroughly well fed. All the cows had blankets on them, as they had only lately left their warm winter stables, and were liable to catch cold. I was surprised to see the excellent farming prevailing; and the land seems very clean, and every inch available is worked. Excepting cocksfoot, the same grasses and clovers are used as we have, and about the same quantities per acre, so far as I could make out. The cows are fine big animals compared to Ayrshires, and look as if they would make good beef. They are, of course, selected for their milking qualities. I should like to send you a bull if the quarantine regulations permitted. The herd I saw had about three hundred cows in it, and they were wonderfully alike, their colour being a rich brown, running into black at the points.

Since writing the foregoing, Mr. Melvin has looked in, and, to meet the ice difficulties in our dairies, suggests that water-power be taken, if possible, from the Mataura River, at the falls,

and that an ice-making factory, driven by water-power, be started to supply all the neighbouring dairies with ice. It seems a good idea to have such a factory, and you might consider it and report. My fear is that the other dairies would not sufficiently support the venture.

Edinburgh, 30th May, 1890.

W. S. DAVIDSON.

REPORT BY MR. JOHN SAWERS, DAIRY INSTRUCTOR, ON THE EXPORTATION OF NEW ZEALAND BUTTER TO GREAT BRITAIN.

SIR,—

In accordance with your request, I have the honour to report on the exportation of New Zealand butter to Great Britain. In relation to the failure and causes thereof, it is an easy matter to indorse the views held by all those dairy-produce brokers handling New Zealand produce in London as to the inferiority of the butter-product during the past season, and who advocate the desirability of the product reaching the market at the right season as soon as possible after manufacture. Last year being an exceptionally favourable season for the disposal of dairy-produce in the Australian markets, on account of the high prices ruling, a great many of the producers held back their butter, in anticipation of a still further rise in price. On the fall of the market, in the months of October and November, 1889, large stocks of butter were held not only by producers, but also by many of the large exporting and commercial-agency companies. On the complete glut of the Australian markets, and the consequent heavy fall in price, the only alternative left was to send the butter to the Home market.

Many instances have come under my notice in which producers were offered as high as 1s. per pound for the whole of the butter produced during the summer season, but which they refused to accept, in anticipation of a still further rise. In one case a Christchurch firm, whose output amounted to about 20 tons, was offered 1s. per pound, but they would not entertain the offer; and on the fall in value in the Australian market this firm was compelled, as a last resource, to ship their butter to London. This butter by the time it reached its destination would probably be from six to nine months old. In the month of May last I saw the account-sales of some of this shipment—some 120 boxes—the greater portion of which only realised £1 8s. per hundredweight; some was sold for 14s. per hundredweight; while some 2cwt. or 3cwt. which had been shipped immediately after manufacture realised the remunerative figure of £5 10s. per hundredweight. This was consigned to Messrs. Doddridge and Co., London.

Very few samples of New Zealand butter I have inspected of any age have shown that firmness of body and texture so essential to butter of good quality, and upon which its keeping-qualities so much depend. The causes of this defect, and the remedy, I will specify further on in this report. Were the New Zealand producers in a position to place their butter on the market in from eight to ten days after it is manufactured they could, no doubt, compete successfully against the products of any other country. It is true that New Zealand has natural facilities for the production of milk, such as are possessed by scarcely any other country; and our manufacture of the products of that article are capable of almost indefinite expansion. Ample tests have now been made to demonstrate that the colony can produce a first-class article, as shipments of both butter and cheese placed in the Home market have commanded top prices. That the capabilities of this colony for the production of dairy-produce is fully recognised is borne out by the articles which have frequently appeared in the Danish newspapers during the last two years, warning their people that New Zealand is the most dangerous competitor Denmark is likely to have in the future, and advocating the withholding of all assistance to New Zealand, by retaining the knowledge of butter-making as much as possible within their own country.

Although we have so many natural facilities for carrying the dairying industry to a successful issue, there are many almost insuperable difficulties to contend with. The causes of bad butter are many, and to the uninitiated some of them might seem of little importance; but these are seeming trifles which cannot be overlooked without endangering the quality of the product. I shall first take up a few of the principal difficulties which beset the maker and which materially affect the quality of the butter, and then speak of them in detail: First, the particular breed of the cows kept for dairying purposes has a marked effect upon the butter produced. Second, food has a great influence on the quality of the butter produced. Third, some of the cows may be in bad health, and some may have been eating bad-scented weeds or other food prejudicial to the quality of the milk, or the milk may have been used too soon after calving. Fourth, the cow may have been harassed or overdriven, or they may have been without shelter from the hot broiling sun of summer, causing the milk to spoil in their udders. Fifth, the milk may have been kept standing too deep in close cans over night or exposed to an impure atmosphere. Sixth, filth breeds a tremendous progeny of bad consequences, all tending to do serious damage to the quality of the product. The most scrupulous cleanliness is therefore essential during milking, as also in all the subsequent operations in the process of butter-making. Seventh, the milk may have been driven a long distance to the factory in closely-covered cans. Eighth, the want of sufficient means for maintaining a low temperature in all the operations throughout the process, and the absence of the desired cool-storage for the butter after it is packed and during transit, are the most serious obstacles in the way of the success of our export butter trade. Ninth, the proper maturity of the cream before churning is a matter requiring much strict attention. Tenth, the preparation of the packages for packing the butter is another item of no small importance. These are the chief difficulties in the way of making butter of good keeping-quality, and attention to which will in the future insure the success of the New Zealand butter-export trade.

Any of the defects referred to as affecting the quality of the milk has far more injurious effect on the quality of the butter manufactured therefrom than upon cheese. For example, should it be found that a surplus of moisture predominates in the milk of a given dairy, the cheese-maker, if he be a thoroughly competent man, will regulate his process accordingly. So also with taint in milk which may have been caused by the cows eating some bad-scented weed or drinking impure water. This can

all, or nearly all, be expelled by proper manipulation of the milk, and cured. Again cheese is not such a perishable article, decomposition being much slower than in butter. Cheese can also be subjected to a higher and more fluctuating temperature without sustaining the same amount of damage.

I cannot impress too strongly upon manufacturers of butter for export the necessity for using the greatest amount of care in the treatment of the milk before separation; and where milk is supplied to creameries, or butter-making establishments, there must be equal care on the part of the milk-suppliers, for their interests are identical, and much of the success of the industry depends upon their efforts. They should see that the cows kept possess good butter-making qualities, such as the Jersey cow (which certainly takes the lead in this respect) possesses. For general purposes, however, the Jersey cow, on account of the amount of attention she requires (not being of a hardy nature) is not the best for general introduction at the present stage of the industry. There can be no doubt, however, but that any district or country aiming to secure first place in the market would do well to secure a blending of the Jersey qualities in their breeds of cattle, by keeping a certain percentage of the Jersey breed, or by carefully crossing them, and thus giving the desired quality and character to the milk-product. To any country aiming at the production of butter, this fact cannot be too plainly pointed out, and is one which should be impressed upon the farmers in a course of lectures directly dealing with the subject. Farmers should immediately see to the weeding-out of poor stock, and should keep and breed from only their best animals. During my circuit I have been astonished to see the breeding of dairy-cows, on the whole, carried on in such a slipshod fashion.

Food, as already pointed out, has a great influence on the quality of the product, besides having a marked effect on the keeping-qualities of the butter. New Zealand being naturally adapted to the growth of grasses (although in some districts only a few varieties are grown, owing to the nature of the soil), these form the chief or only food of the cows. This grass, during the flush of the season, being rank and green, and containing a very high percentage of moisture, causes an excess of moisture in the milk, which leads to a softness in the butter. Butter made from such milk, when the cows are fed on rank green grass, without that food being supplemented with some artificial food, such as crushed oats or bran, is likely soon to lose its firmness of texture. In supplementing green grass food with any other kind of concentrated food, only such should be chosen as will not taint the milk. For this form of food, crushed oats or bran make a good substitute. Milk is, of itself, a very complex fluid, containing as it does all the elements of the animal body. Naturally, therefore, the food should be rich in all of these elements. The greater the variety of food consumed by the cow the better the quality of the milk, conditional upon the food not containing anything that will taint the milk, as already pointed out.

Any one engaged in the manufacture of butter will be struck by the difference in the firmness of body and texture of the product when the grass begins to run to seed, as compared with that produced from cows fed upon young green grass. The difference in this respect, and in the keeping quality, flavour, firmness of body and texture of the butter, is very clearly illustrated when cows have access to an old meadow which has been laid down for some considerable time with good variety of grasses. On the cows being taken off such pasture it will be found that not only is there a decrease in the yield of milk, but also in the quality of the butter.

The milk from cows which are in any way unhealthy should not upon any account be used for the manufacture of butter, or any other product for human consumption. Great care should also be exercised to exclude from the factory all milk taken from cows soon after calving. Milk supplied to the factory in this condition does incalculable harm, besides proving very troublesome in all the operations of the manufacture. Some people either use or send to the factory the milk of the third milking. The colostrum or cells of the animal have not at such an early period ceased shading off with the milk. I have seen milk of the fifth or seventh milking in a fit state for use. This very much depends upon the amount of inflammation in the udder at the time of calving, resulting chiefly from the treatment, condition, health, and food of the cow at the time of calving. It usually takes six or seven or even more days before the milk is fit for use. A reliable and convenient test of fitness for use is applied by boiling the milk, which if fit for use will not curdle. This reminds me of a case which came under my notice only a few weeks ago. While standing conversing with a few suppliers of milk to a large Southland dairy-factory, the question of colostrum arose. When I asked one of the suppliers in question how long a time he considered should elapse after a cow calved before her milk would be fit to send to the factory I was surprised to hear in reply that he usually held back the first two or three milkings. I remarked that it was surprising that such milk was not detected by its reddish colour in the can on arrival at the factory. The reply was that he always distributed such milk equally in all the cans, so that it would be more difficult of detection. Thus we see how often the efforts put forth by the other milk suppliers in trying to deliver their milk into the hands of the manufacturer in the soundest state possible are nullified by the dishonesty of a few. For this abuse there is, to my mind, only one remedy, and that is organization among milk-suppliers and factory-men, which is just as essential as the scheme brought forward for the federation of the dairy-factories and dairy-produce manufacturers. To bring about this desideratum my services have in the past to a great extent been directed; but in this direction much yet remains to be done before the industry can attain that importance which it merits in the colony.

The proper treatment of cows has a marked effect on the character of the milk and in its keeping-qualities. When cows are overdriven or receive brutal treatment the milk changes in its composition, and decays very rapidly. Such milk contains but little fat, and shows a considerable decrease in sugar and caseine; the place of these two essential elements (fat and caseine) in milk being taken by albumen. Therefore, it is easily seen that the milk is soundest and possesses better keeping-qualities when the cows are well fed, healthy, and quiet. Shelter from the broiling sun during excessive summer heat, by means of trees, hedges, or shelter-sheds, is very necessary if

the cow is expected to yield the maximum of milk in a thoroughly sound state, as comfort, rumination, and rest cannot be obtained in hot sunshine.

From a knowledge of the extreme sensitiveness of milk and its products, it goes without saying that scrupulous cleanliness is an absolute necessity not only in the dairy, but in all the initial stages. How often do we find the cow-sheds only cow-sheds in name? And how often do we find the sheds and yards clean? Too often in close vicinity to these are the piggeries, &c. Thus it is that when the milk is warm, and consequently in the most sensitive condition for affection from bad odours, it is exposed to all the taints of an impure atmosphere. Again, when the milk is destined for the factory I have often found it left standing to cool over-night in deep cans in the cow-shed, until it has absorbed a whole brood of pestilential odours. When taken to the factory such milk soon pollutes the sound milk with which it comes in contact.

In order to illustrate the necessity for scrupulous cleanliness being observed during milking I will briefly cite the results secured by the Copenhagen Milk Supply Company, which was established some twelve to fifteen years ago, and which is unique as being the most perfect dairy system in the world. All dairies supplying milk to the company are required to come under the strict control of the Supply Company, who have a staff of inspectors and veterinary surgeons employed to periodically visit the farms and insist upon cleanliness, to examine the cows, and to see that they are fed on the stipulated food. On receipt of the milk in the large collecting dairy in Copenhagen the temperature is taken, and any milk found exceeding a certain degree is refused. Samples of each patron's milk are taken daily, and these are carefully tested, and at intervals each patron's milk is chemically analysed. The company receives the milk of between three and four thousand cows. All the milk, after arriving at the factory, is filtered through sponges and fine gravel, with the result that some 300lb. of black sediment is taken from the milk daily. Last year (1889) 12,500,000 gallons of milk were received, and out of this quantity almost 50 tons of dirt were abstracted—a quantity scarcely credible, yet, nevertheless, true.

As already stated, I have given this brief account of the working of the system with the view of showing the absolute necessity for cleanliness in handling of milk. When so much filth was abstracted from milk taken from farms known to be the most perfect and clean in the world, what must be the condition of the milk where no care is exercised, and where cleanliness is only a secondary consideration? Let every one recognise that a first-class butter-product, with good keeping-qualities, cannot be made if the milk is in any way dirty or unsound, no matter how competent the maker may be, or what system is pursued. This brings me again to the point previously referred to in my last report—viz., the necessity for having the milk delivered at the factory as soon as possible after the cows are milked, so that the operations of aerating and cooling the milk are not left in the hands of the suppliers themselves, to the detriment of the product and the risk of the maker.

Another matter requiring great attention at the hands of the milk-suppliers is the transit of the milk to the factory. Strict attention to this is necessary. Covered cans being used for the transportation of the milk to the factories, these are, for various reasons, imperfectly ventilated. Therefore the animal odour of new milk is retained, which has a very deleterious effect upon the butter-product unless the odour is removed before separation of the cream. If the odour arising from milk fresh from the cow is allowed to pass on into the cream, and then worked into the butter, such butter is certain to have a modified flavour, and will be defective in its keeping-qualities. Similar defects appear in butter made from milk taken from unhealthy cows, or milk which has been carried a long distance in close-covered tins not quite full, thus giving space for the milk to roll about. The butter from such milk will not keep long, and is liable to take on an unnaturally strong and unpleasant taste. It will also soon lose its firmness of texture, and become of a greasy nature. As a remedy for this evil I recommend that milk-tins with coned tops, having a capacity of from 10 gallons to 12 gallons, be used for the transport of milk from the farms to the factories, and that the tins be kept completely full, so that when the lid is on there will be no space left for the milk to roll about.

The proper maturity of the cream before churning is one of the most important points in the manufacture of butter for export, as on that depends the extent of the yield, and, in a measure, the keeping-qualities. Experience goes to show that ripened cream produces from 4 to 5 per cent. more butter, and its flavour and keeping-qualities are improved in a marked degree. The exact stage of ripeness is not yet ascertainable by any easy test, and so must be left to the good judgment of the operator. The ripeness should just be sufficient to coagulate the caseine of the cream.

The want of proper means for maintaining the desired low temperature throughout the various operations in butter-making for storage purposes and during transit are the greatest hindrances to the success of our butter-export trade, and these means must be procured before thorough success can be attained.

The industry has not yet reached a stage in its development where the food of the cow, cleanliness, and care of the milk on the part of the milk producers will be strictly attended to, and the quality of the product will be looked upon more as the result of careful manufacture. It is for these reasons that the use of ice becomes an absolute necessity, for whatever comes or goes we must have firm butter, so that all the operations of the process can be conducted successfully, and to counter-balance the defects of the milk in its initial stages. For example, the cream, immediately after separation, should be reduced to a very low temperature (45° to 48°). This is not only a corrective for cream that is inclined to froth during churning, but at the same time produces firmness of texture, and greatly enhances the keeping-quality of the butter. And again, after the butter is taken from the churn, and has received sufficient working to cause solidification, it should be placed for a short time, or at least until it is quite firm, in a cold atmosphere. This is secured in Denmark in the following manner: (1.) A large trough fitted with a false bottom is used. (2.) The space beneath the false bottom is filled with ice. (3.) The butter is placed on the false bottom, resting upon the ice. (4.) The trough is covered with a metal lid on which ice rests. Thus the butter is between

two layers of ice without coming into contact with the ice. The butter is afterwards taken out, worked a little on the butter-worker, and again placed in the ice-trough before the final working. All this is done to preserve the grain of the butter, which is destroyed when it is washed in a soft state, and to thoroughly expel the buttermilk. Finally the butter is packed away in cold-storage rooms, awaiting transit.

In the free use of ice lies the great secret of the success of the Danes in butter-making; and that is also the secret of the success of the Colony of Victoria, which has during the past two years used ice-cooled chambers freely. How to secure the ice or the necessary cool-chambers is the problem to be solved. To secure either involves the use of refrigerating machinery. This can probably only be effected by the factory system, where alone sufficient quantities of butter can be made to warrant the erection of the necessary refrigerating-plant.

I have advocated the devising of means to procure ice during my circuit, and assisted also in devising means for cool-storage. Perhaps arrangements could be made with the various refrigerating companies for a supply of ice. Probably the creameries will see the necessity for making ice for their own use.

In Denmark and on the Continent, during the long and cold winter, an abundant supply of ice is stored for use in summer. Every farmhouse of any size, and all factories, have ice-houses, in which a supply of ice is stored during winter for summer use. But in this colony, on account of our temperate climate, ice cannot be so secured. The necessary cool-chambers for shipping the butter Home are in the meantime of the greatest importance, as pointed out in my last report. This, I hope, will receive due consideration at your hands. Butter of good quality may, at the present juncture, be placed on board the steamers, and, from the chambers not having the desired and uniformly low temperature (35° to 40°), it may not arrive in the Home market in good marketable condition.

As already pointed out, the more necessary requisite is sufficient cool-storage for the butter-product after manufacture, and while awaiting shipment. The irregular mode of shipment and want of space has during the past season operated seriously against the success of the butter-export trade, as at times butter ready for export has been kept on hand for two or three months, for the want of cool-space in steamers. And as no provision exists for the proper storage of the butter while awaiting transit, it has to be kept exposed to a high and varying temperature in the dairies and factories. When so treated butter soon loses its firmness of texture, and in many cases it becomes rancid in flavour.

New Zealand butter, from the defects of food, care of milk, treatment of cows, &c., soon deteriorates in flavour and grain. This cannot be too strongly impressed upon the butter-producers and exporters. I would again reiterate the necessity for proper cool-storage for the butter, both immediately after manufacture and while awaiting shipment. During the past season large quantities of butter have been sent by private individuals to export agents for shipment, and sometimes this butter was kept in the warehouses for a considerable time before it was shipped, subjected all the time to a high and varying temperature. I have, myself, often seen the butter-fat oozing through the seams of the boxes and kegs or casks. How could it be expected that butter so treated could, on its arrival Home, command remunerative prices? Another matter seriously damaging the butter-export trade is the practice of collecting large quantities of butter during the summer months from all sources by storekeepers, such butter being packed up in a haphazard way, and afterwards shipped Home. It is almost superfluous to point out the impossibility of making up a good sample of butter in this way. And, again, the reputation of the colony is damaged when exporters resort to the practice of branding the packages to make them appear to represent New Zealand creamery butter, with the object of deceiving the buyer. This too common practice, I think, should be put an end to by the strict enforcement of "The Patents, Designs, and Trade-marks Act, 1889," the provisions of which Act make such an action penal.

Without doubt the success of the butter-export trade rests upon obtaining the desired low temperature throughout the making, and while awaiting shipment and during transit. If all the butter exported from the colony was manufactured on the factory system the factories could devise the means of supplying the wants of the trade; but, as by far the greatest portion of the product is manufactured and exported by private individuals or the packing-house system, I would suggest for your earliest consideration the advisability of erecting cool-chambers at the principal ports of shipment. The butter could be sent to these after manufacture and kept until shipped. This seems to me to be the only solution of the difficulty as the industry stands at the present time. These establishments could be made self-supporting by making a small charge for storage. Were such cool-chambers established a classification of the product could then be made; but without such cool-storage chambers, classification at the port of shipment seems to be out of the question.

If butter is well made, and placed immediately in a cool-chamber at a temperature of from 35° to 40° , it will keep for an almost indefinite time. For the purpose of giving practical demonstration of this I have, during the past season, placed 56lb. of fresh butter in the Burnside Freezing-works. This butter was made over four months ago under my immediate supervision at the Mosgiel Dairy-factory. The temperature of the room in which the butter is being kept is about 22° Fahr., and the product is to-day in a first-class condition. This butter has not been packed in boxes, but is made up in half-pound prints, rolled in waxed butter-paper.

From the liability of New Zealand butter to soon lose its marketable qualities from the causes referred to, I cannot too strongly impress upon producers and exporters the necessity for shipping the product as soon as possible after it is manufactured—the sooner the better. Although it is not desirable to have butter frozen, especially if it is heavily salted, I have all along recommended that it should be but lightly salted and shipped in the freezing-chambers. Butter once frozen, especially if heavily salted, would not keep long when removed into a hot or varying temperature.

The question of packages is one which is continually cropping up, and is one to which no little attention should be devoted. It does not matter much what style of package is used, provided the butter is of good quality throughout, and the package is neat and attractive. The package should

be thoroughly air-tight; and the wood used should be well seasoned, so as to prevent shrinkage, which is a too common fault with many of the packages at present in use. The best packages I have seen are kegs made of tawa wood, with galvanised hoops. These have a very attractive appearance, and are perfectly air-tight. Another package which might suit the trade is a square box, made of white-pine wood, treated so as to expel all the natural sap, after which the wood is thoroughly permeated with salt, or some other antiseptic which will not affect the contents. The box is finally carbonised on its interior face by special appliances; and thus the butter comes into contact with wood permeated with salt, &c., and carbonised, all of which have preservative effects. A square box has an advantage over kegs or casks in economy of space, as well as having a more attractive appearance. As the box can be put together with a few screw-nails, the sides can be taken away, leaving a neat square block of butter. A square box is, however, more difficult to make air-tight; but it is claimed by the manufacturer of the box in question that it is practically air-tight. I am at present experimenting with this box, in order to test its qualities as a package suitable for exporting butter. I have forwarded Home six of these boxes filled with butter, by the s.s. "Fifeshire," two containing fresh butter, two powdered butter, and two salt. This butter will be tested by two experts at Home; and a full report on the merits of the package, and the quality of the butter, will be published as soon as received by me. Packages made of timber not specially prepared, or without enamel, should always be well boiled in a strong solution of salt for several days. The cask or box should afterwards be allowed to stand full of the hot brine till it cools; and, further, the inside of the package, before used, should be well rubbed over with dry salt. If the wood has been well seasoned it will, by this means, get thoroughly saturated with salt, which will either destroy or expel hurtful wood-acids. Oak casks holding 1cwt. of butter are mostly used for packages in Denmark, and are prepared in the manner described.

In concluding this somewhat lengthy report on the exportation of butter, I have deemed it best to refer more directly to those matters which have a practical bearing, leaving a more minute statement of minor points, which affect the higher branches of the art of butter-making, for a future occasion. I cannot too often reiterate that the principal requisite in determining the success of our New Zealand butter-export trade is the necessary cool-storage for the produce while awaiting shipment and during transit. Until some practical solution of this difficulty is arrived at New Zealand butter can never be shipped Home as a reliable export. And just here lies the great secret of the success of any butter-exporting country.

At the present time considerable diversity of opinion exists among those interested in the dairying industry of the colony as to what method of instruction should be adopted to best bring about the needed reform in the manufacture of butter and cheese—whether instruction should be given by means of a travelling instructor or by itinerant or stationary dairy-schools. Without detracting in the least from the value of such dairy-schools, I am of opinion that, to suit the circumstances of the colony, the present system of travelling instruction is the best. Since the dairy-farmers are not disposed to go far afield in search of scientific instruction, such instruction must be taken to them. By means of travelling instructors, the factory system and packing-house system would each receive more attention, thereby causing a division of labour, upon which I place almost exclusive reliance for the future success of the industry.

There are many vital considerations in the manufacture of butter and cheese which demand a prompt and widespread diffusion of the requisite knowledge. In rough and sparsely-settled districts, where the factory system is not practical, and the packing-house system the one likely to be adopted, the services of a travelling instructor would be invaluable. I would further suggest for your careful consideration that a model dairy-school should be erected at some suitable centre, not only for its educational value, but also to prove—as it can best be proved by a cash demonstration—that butter can be made and sent Home as a reliable export. In such an establishment there would be refrigerating plant; and in connection with this there might be cool-storage space, available for the storage of butter from the surrounding factories. There should be no difficulty in making such model dairy-factory self-supporting.

The Hon. the Minister of Lands, Wellington.

I have, &c.,

JOHN SAWERS.

EXTRACT from the ANNUAL REPORT, Season 1889-90, of the PENINSULA BUTTER-PACKING COMPANY, Sandymount, Otago.

The committee regret very much that they have so unsatisfactory a statement to make, which, according to the various reports from London, arises from the butter arriving there in more or less bad condition, through having to be kept here six or seven weeks after it was packed, for want of shipping-space, in a package which the experience of the season has shown will not keep butter. The ten boxes that were at the Exhibition, and the eighteen boxes, the balance of season's make, were all more or less winded before they were sold. These two samples showed your committee that the butter sent to London had gone bad before it was shipped. That sent to the Mauritius would be affected in the same way, and only fetched a price to correspond. The want of shipping-space arose from the shipping companies finding no use for cool-space the previous year, owing to most of the New Zealand butter going to Australia. The space was used as frozen-space, and that space was hired six months beforehand. Your committee, finding that cool-space could not be got to meet our requirements, offered to take frozen-space and pay the holders of it a premium for their right, but they would not grant it to us. Towards the end of the season the Mercantile Agency Company were unable to get space at all for us. We made arrangements with the National Mortgage and Agency Company, who are agents for the steamers, and through them we got the remainder of our season's make sent away; but there is no difference in cost of handling between the two firms, and the same broker sells for both firms in London. The Mercantile Company tried another broker with part of what was sent through them, and if there is any difference it is rather in favour of the new broker. Findlay's boxes are said to be quite

as good as Pond's; but, as neither of them are quite satisfactory as a butter-package, we will have to settle what is the best package to get and how a sufficient number of them can be got pickle-tight. That package is not made at present in New Zealand. With the experience of this season as a guide, you will have to consider what alterations it will be necessary to make in our rules.

The committee, in retiring, beg to submit that, although the result of the season's operations are very unsatisfactory, there is no reason to despair of the ultimate success of the undertaking, for increased shipping facilities will exist in the future, being such as will enable us to send our butter away twice per month, once per month direct from Port Chalmers. The other matter affecting the success of the undertaking is the package, which we submit for your consideration. Your committee would also submit that, bad as we undoubtedly are in the result of our season's transactions, we are better than any one who has shipped butter from Dunedin this season, for it seems that nearly all New Zealand butter has this season arrived in London in more or less bad condition. How is this? In our opinion it arises chiefly from bad package. The sample of butter shown you to-day in wood-lined tin—an experiment of Mr. Riddell's—was packed on the 1st March; and, had the butter we sent to London arrived there as good as this sample is, our balance-sheet would be a very different thing. The tawa butter-keg shown to-day was kindly given by Mr. Bridger, of Messrs. Thomson, Bridger, and Co., as a sample of what they were making. The retail price of the size shown is 5s. For quantities of 500, more or less—that is to say, for our season's requirements—100lb. kegs, made in the style of that shown to-day, would cost £2 5s. per dozen; and 70lb. kegs of the same kind, £2 per dozen. As to their goodness or otherwise, until they are tried we will say nothing; but, as compared with Pond's boxes, they are just half the price, and there would be a saving in freight, as one keg would not weigh as much as two boxes.

THE BUTTER TRADE.

THE following review of the Australasian butter trade with Great Britain up to the 1st May, 1890, has been compiled by H. Trengrouse and Co., London:—

“This season has been a very disappointing one to all concerned. Early in the year first arrivals sold fairly well, although quotations for European were from 15s. to £1 per hundredweight below those of last year, but only a small proportion of the total imports could be designated as of fine quality, and most of the parcels answering to that description went off in flavour shortly after delivery from the steamers, causing dissatisfaction to consumers, which might feasibly confirm the theory suggested by us last year, through our representative in Australia, Mr. Meadows, that the refrigerating-chamber is not the most desirable medium for the conveyance of butter, and that freezing should be discontinued, a temperature of 35° to 40° being likely to show a more saleable condition upon arrival. When frozen, butter appears to lose its keeping-properties very quickly after its exposure in shops, and, indeed, before the packages have been opened, notwithstanding that they have been kept in cool warehouses upon this side, the trouble being considerably aggravated by such phenomenal mildness as we have experienced here during this year. In regard to secondary grades, great difficulty has been met with in finding buyers at fair prices in consequence of enormous supplies from all the European and American sources, which have ruled at very moderate figures, as already indicated. In the United States, similar climatic conditions having prevailed, very heavy shipments have been made from thence to London, sadly tending to aggravate an already-demoralised market. Although values of Normandy have rallied during the last few days to the extent of several shillings per hundredweight, there has not been any additional attention bestowed upon secondary Australian or New Zealand, which move very slow indeed at from £2 10s. to £3, down to £2 5s., indicating very unsatisfactory results to shippers and importers.

“The chief lesson to be learnt therefrom is the necessity of exporting only the finest grades, manufactured upon the factory system, as, except in seasons of great scarcity, inferior qualities are more than likely to result in loss.

“Packages are an important feature, and kegs containing from 60lb. to 70lb. are thought to be much superior to boxes, and are more capable than the latter of being made air-tight. Of course, if boxes can be made thoroughly air-tight they have the advantage of stowing better on the steamer.

“Some brands have been seriously prejudiced by the development of a ‘fishy flavour,’ which may possibly have been imparted by inferior salt. The cause, however, should be promptly investigated, with a view to prompt removal.

“It has been amply demonstrated that the antipodes can supply us with most excellent butter, and, with the improvements for transit which should shortly be attained, it cannot fail to occupy the position it deserves in the English market.

“*Comparative Prices.*—Finest New Zealand, January, 1889, £5 10s. to £6 6s.; January, 1890, £5 to £5 10s. Secondary (same dates), £4 10s. to £5; and £3 10s. to £4. Present nominal quotations of Australian and New Zealand, £2 to £2 10s., and practically unsaleable, whereas fine would command £4 to £4 10s. Danish, £5 8s. to £5 12s.; Dutch, £4 6s. to £4 10s.; Normandy, £5 to £6 (scarce).”

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