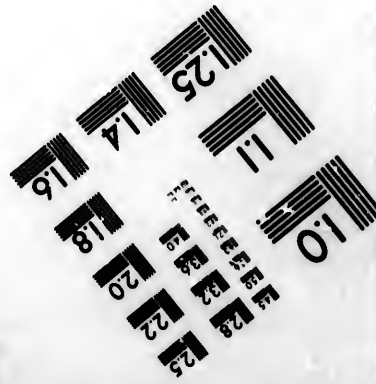
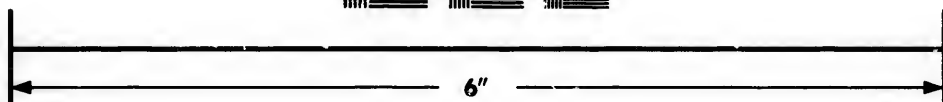
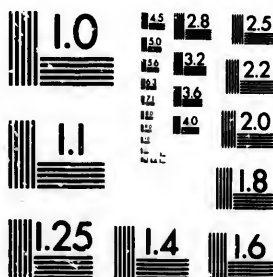


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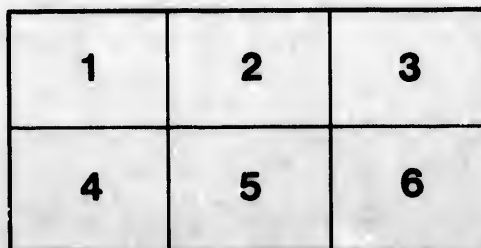
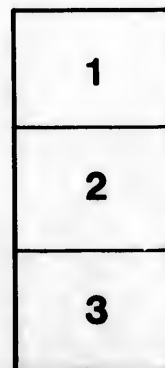
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EVIDENCE

OF

MR. J. W. ROBERTSON

DOMINION DAIRY COMMISSIONER AND AGRICULTURIST

BEFORE

THE SELECT STANDING COMMITTEE

ON

AGRICULTURE AND COLONIZATION

14th MAY, 1895

WITH APPENDIX

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
GOVERNMENT PRINTING BUREAU
1895

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COMMITTEE ROOM No. 46,
HOUSE OF COMMONS,
OTTAWA, 14th May, 1895.

The Select Committee on Agriculture and Colonization met this morning at 10.30, Mr. Sproule, Chairman, presiding.

Mr. JAS. W. ROBERTSON, Dominion Dairy Commissioner, was called and addressed the meeting as follows :—

Mr. Chairman and Gentlemen,—This morning I shall arrange what I have to say under four heads that you may have my work described as clearly as is practicable in the time at my disposal. I shall speak in the first place of the Dairying Service in connection with the various experimental dairy stations established in the different provinces; in the second place, of the action taken by the Department to help the butter trade by shipments of butter to Great Britain; in the third place, of the cold storage service and accommodation through which it is proposed to assist the development of the butter trade this summer; and in the fourth place, of the outlook of the cheese market for the current year. If there be any time at my disposal when I have finished these, and if the committee would like my opinion on the bill now before the House, dealing with the branding of cheese, I shall discuss that.

I shall begin in the far east at Prince Edward Island. In 1892 there was only one dairy station on the Island, at New Perth; it was put up by the farmers themselves. The government loaned the machinery to fit up the factory in Prince Edward Island. All the others there, were built and fitted up at the expense of joint stock companies of the farmers themselves. In 1893 we managed 11 dairy stations, patronized by 1187 farmers, turning out cheese to the value of \$48,000. The cost to the Government for taking control of these was about \$2,500 for the year, including the salary of Mr. Dillon, Dairy Superintendent on Prince Edward Island. In 1894 there were 16 cheese factories and two creameries. The new factories were put up without any direct promise of help from us, but they were put up by the people on the expectation that the Government would give them help similar to that afforded to the other factories in 1893. After they were put up I recommended to the Hon. the Minister of Agriculture that we take charge of the manufacturing of cheese and the making of butter in these factories on terms similar to what had been given in 1893. We charged $1\frac{1}{2}$ cents per pound for the manufacturing of cheese, and $3\frac{1}{2}$ cents per pound for the manufacturing of butter, the cost of delivering the milk at the factory being paid by the farmers themselves in both cases. Up to the end of December the value of the total quantity of cheese and butter manufactured in them was over \$90,000.

By Mr. McMillan :

Q. Had you not better give us the cheese and butter separately?—A. We had, from cheese, \$78,370, and in butter \$11,830. We had two creameries which were run all summer and were continued all winter, besides one creamery started at New Perth after the cheese-making was ended there for the season. The value of the butter is estimated in part because some of it was held at Charlottetown to meet the demands of the local markets. It is being sold at 16 and 17 cents. The average price of the whole of the cheese sold from the factories on the Island was a little over 10 $\frac{1}{2}$ cents per pound in 1893, which I think was the highest price recorded by any single factory in the Dominion for that year. This sufficiently proves that the cheese were fine in quality. Besides that, there is another substantiation of the claim that the cheese produced in Prince Edward Island was of fine quality. In both years, 1893 and 1894, the cheese were sold in a falling market at the top price at the time, and there has not been a

single complaint in quality from those who bought them. Everybody who has had anything to do with the sale of cheese knows that if there is the least ground of complaint, when the cheese is bought in a falling market, the purchaser is certain to let you know; but in Prince Edward Island we sold over 12,000 boxes and there was not a complaint. Last year out of 12,200 boxes, only 27 cheese were not fit to ship or sell at ordinary prices, which I think was as low a percentage of inferior cheese as any factory can show. The prices realized by the farmers in 1893 ranged from $66\frac{3}{4}$ to $76\frac{1}{2}$ cents per 100 pounds of milk. Last year, 1894, the prices ranged from $64\frac{1}{4}$ to $71\frac{3}{4}$ cents per 100 pounds of milk.

By Mr. Macdonald (Huron):

Q. Is the cheese all sold that was manufactured last year?—A. They were all sold in November, with the exception of those 27 boxes.

By Mr. McMillan:

Q. Is there any truth in the report in the "Globe" of the meeting held at Brockville about the condition of the cheese manufactured in Prince Edward Island not being what it ought to have been?—A. I did not see the report in the "Globe" but I will tell you what did happen at Brockville. Mr. M. K. Evertts had said at Mallorytown that the cheese of Prince Edward Island made in 1893 were inferior in quality and insinuated that they were not worth more than $8\frac{3}{4}$ cents per pound. I said that as a matter of fact the cheese were all superior in quality and were sold for half a cent a pound above the average price in Ontario, and for a price higher than was realized from the cheese manufactured in any of his factories.

By Mr. Coghane:

Q. Where was it sold?—A. It was sold from the warehouse in Charlottetown to a firm of merchants in Montreal. There was not a single iota of foundation for the statement that the cheese were inferior or that the price was one to be ashamed of.

There is one other matter which I think I should bring before the committee in connection with our work in Prince Edward Island. There have been some rumours going about that the government had somehow been bonusing the cheese industry thereby means of payments on account of milk supplied to the factories before the cheese were sold. The fact is that \$36,000 were voted by Parliament to enable me to pay advances of 50 cents per 100 pounds on milk supplied at all the dairy stations in all the provinces. No interest was paid by the government, so that it cost nobody anything and was of decided benefit and advantage to the farmers. The people themselves on the Island, the leading farmers there with whom I have conversed, say that of the \$90,200 worth of cheese and butter last year at least \$50,000 is the amount which they realized from the same farms and cows more than they did before they were acquainted with this method of conducting their business. The whole cost to the treasury last year up to the end of our cheese making season was about \$4,800, so that by the spending of \$4,800, the revenue of the farmers of Prince Edward Island from their natural resources was increased by at least \$50,000 more than it had been or would have been if this work had not been done.

Q. Was this from the same number of farms and cows?—A. Yes, from the same farms, but the farmers are growing more Indian corn to feed to more cows hereafter. It is not that they are drawing more money out of anybody's pockets, but they are making more wealth out of their own resources. The point I wish to impress upon the committee is that the spending by the farmers of the \$50,000 of additional revenue derived by them would more than recoup the treasury for all it cost the Government to start this work, so that instead of the other farmers of Canada contributing of their money for the benefit of those of Prince Edward Island the work there has been more than self-sustaining, and the increased revenue to the Government from taxation has more than balanced the expenditure.

Nobody in any other part of the Dominion is being called upon to sustain the work in that part of Canada. I might sum up the whole of our work in Prince Edward Island in developing the cheese-making industry, by saying: The treasury of the Dominion has been re-imbursed for all it has spent on it; the good name of Canadian cheese has been sustained and improved (hear, hear); because no single province has sent so much fine cheese, out of the quantity it did send, as Prince Edward Island; and the people there have been benefitted very much by what has been done for them. (An hon. member—Bully for you).

WINTER DAIRYING IN PRINCE EDWARD ISLAND.

Then the winter dairying movement has been commenced in Prince Edward Island in a most satisfactory way. The cheese factory at New Perth was fitted up last fall for the making of butter. It ran the whole winter; and when I was there in March, they made butter once a week, at the rate of over 300 pounds. That butter was all taken on the Island at prices ranging from 20 to 21½ cents per pound. Two other creameries that had been in operation during the summer, were also carried on in Prince Edward Island, during the winter, this year. Three factories have been running all the winter, although it was said we could not carry on the business past November, and we have applications from the directors of three other factories, to have butter making carried on in them during the coming winter. They would put in the butter-making apparatus and equipment at their own expense. All we would do would be to provide a butter-maker for making the butter, and charge them 3½ cents per pound for doing it. The one lack which the people of the Island still have for continuing this dairy business themselves, is that of close market contact. There have not been means of direct communication from the Island to Great Britain for shipping cheese or butter, and there have been no buyers on the Island to purchase the cheese or butter for export, except those who went at my invitation, and so it has been decided to run the factories there during the current year mainly for the purpose of giving the farmers, through the presidents and representatives of the joint stock companies, a chance to meet the buyers of cheese and butter, helping in the marketing themselves in some measure, and thus becoming fully acquainted with the whole range of business. When that is done, I think the farmers will be both competent and willing to run the factories themselves, except in the case of a few of the smaller ones, which might fairly and reasonably expect and really deserve the support we can give for another year by running the factories for them. Of the thirty cheese factories that are to be in operation this year, I estimate that ten of them will more than pay the whole of the expenses incurred, and leave a small profit, to be turned over and applied to meet charges incurred in the management of the smaller factories.

By an hon. member :

Q. Is the skim milk returned to the patrons, because it appears there is not very much left for them after paying 3½ cents for making butter? I think you said it sold at 17 cents per pound?—A. That was some of the summer and fall butter. Yes; the skim milk is taken back by the patrons from the creameries, and the whey is taken by them from the cheese factories.

By Mr. Innes :

Q. Is there anything in the report that the butter made on the Island is tainted by seaweed?—A. I do not think there is. There was a report that the cheese had a sectional flavour; that has been made fun of by a few unimportant people; but the sectional flavour of Prince Edward Island cheese is like the sectional flavour in the cheese from Switzerland, which fetches the highest price in the London market. That is why a merchant, who once got this Island cheese, has been wanting to buy it ever since. He was well pleased with the quality of it. The peculiar flavour is that from the bacteria which are common in the atmosphere there.

Q. Did it have any effect on the price when sold?—A. Not so far. The cheese was always sold at top market price; and there was no complaint afterwards. I might give one illustration. When the Prince Edward Island cheese went to Chicago some of the experts there discussed with me a peculiar flavour they had found in one of these cheeses. I went with the judges after the judging was done that day and examined other cheeses which were there, to compare the flavour with that of the Swiss cheese. They said: "That is good cheese. We thought it was some new and therefore objectionable flavour, but we find it is all right." It was merely the unusual flavour that puzzled the judges and so at first it was condemned by them. I think the Island is capable of turning out as fine cheese, in fact I think the finest cheese, that are made on this continent.

Q. Of that peculiar flavour?—A. Not so pronounced. The flavour is also somewhat like that of the Dunlop cheese, which long held the first place in Scotland.

By Mr. McMillan :

Q. Did these cheese go to the market in England?—A. The cheese were sent to England; that was the ultimate destination. We sold them to a Montreal house, but I learned that they had gone to London, England.

BRANDING OF CHEESE.

By Mr. Cochrane :

Q. Are these cheese branded?—A. They are branded on the boxes "Prince Edward Island."

Q. Not on the cheese?—A. Not on the cheese, because the brands on our summer cheese in a moist climate like that of Prince Edward Island would not be discernible after the lapse of a few months on account of the mould.

By the Chairman :

Q. All the boxes of cheese are branded before leaving Montreal?—A. They are branded "Canadian" because the English Trademark Act demands that the name of the country of origin be on the product.

By Mr. McNeill :

Q. Could not the brand be on something that would appear on the cheese?—A. In my opinion it would be quite undecipherable on the cheese. In a moist climate the mould would cover the brand and it would not be discernible if put on the side of the cheese. I had a letter from a large manufacturer of cheese in Nova Scotia a few days ago, referring to the same matter; and he said he had not been able so far to put his particular brand of "Antigonish, Nova Scotia," upon his cheese so as to have it discernible after the cheese had been kept a few months.

Q. Would it not be possible to have a label?—A. I think it would be difficult to have a label adhere on account of the greasy condition of the cheese cloth and of the exudation from the cheese in hot weather.

By Mr. McMillan :

Q. I have seen it done in June and July until September and the brand was all right?—A. In western Ontario you have not the same difficulty from humidity of the climate.

In Prince Edward Island the work has been under the immediate charge of Mr. T. J. Dillon, who is a very capable cheese-maker and a good business man. He attended forty-one meetings since my last report and has trained in these factories seven young cheese-makers, who take charge of seven of the new factories this year. After this year

there will be over thirty Island boys, farmers' sons in every case, ready to take charge of the factories on the Island, so that the people will be able in every respect to run the business themselves after this present year. The probable value of the output of cheese and butter this year will be about \$180,000.

The farmers are growing corn, building silos and feeding their cows much cheaper than they did, finding they can make milk after some of the factories close in October, supply themselves with butter and furnish all they want to the shopkeepers. So they have increased the milking capacities of their cows during the summer, prolonged the milking season, and found a market for their product.

SUMMARY

OF THE

BUSINESS FOR THE SEASON OF 1894

AT THE

NEW PERTH DAIRY STATION, P.E.I.

The factory was opened on June 1st, and closed October 30th.

Milk was furnished by 73 patrons.

The quantity of milk received was 600,413 lbs.

The quantity of cheese manufactured was 56,332 lbs.

The quantity of milk required to make a pound of cheese was 10.65 lbs.

The total quantity of butter fat was 21,335.88 lbs.

The average quantity of fat was 3.55 lbs. in 100 lbs. of milk.

The quantity of cheese manufactured was 2.64 lbs. per lb. of fat in the milk.

The average price realized for cheese was 9.92 cts. per lb.

The net value of butter fat was 20.225 cts. per lb.

<i>Receipts from Sales of Cheese.</i>		Lbs.	\$ cts.
Sold to Hodgson Bros., Montreal.....		35,018	3,361 93
Sold to R. Lawson, Toronto.....		210	21 35
Sold to H. N. Bate & Son, Ottawa.....		213	21 30
Sold for local trade, as per statement No. 3.....		18,322	1,927 93
Sold to patrons, as per statement No. 1.....		2,569	256 92
		56,332	5,589 43
<i>Disbursements.</i>		\$ cts.	
Charge for manufacturing—56,332 lbs. @ 1¼ cts. per lb.....			704 15
Amount paid for milk drawing, statement No. 2.....			515 56
Freight, wharfage and truckage.....			54 34
Divided among patrons for milk:—			
Cash, as per statement No. 1.....	2,591 00		
Cheese do do.....	266 92		
Seeds, &c. do do.....	46 52		
Balance paid by cheque, 1895, statement No 1.....	1,420 76		
	4,315 20		
Fractions of cents.....	0 18		4,315 38
			5,589 43

The full details of the work in Prince Edward Island are published on sheets (of which the foregoing is a summary) for every factory, with a further statement of the milk received, the cheese sold, to whom sold, and a statement of the account of every farmer showing the quantity of milk he sent, and the money he received. If any member of the committee would like to get copies of these, I have fifty extra copies of the statements referring to each factory. They are sent to all the patrons for educational purposes. Any patron, in the event of his neighbour getting \$250 while he himself only got \$100, can find out the reasons for that and endeavour to improve his own management.

DAIRY PROGRESS IN NOVA SCOTIA.

In the Province of Nova Scotia we have a dairy station at Nappan. We made cheese from the 1st of July to the 9th of October, and butter from the 9th October until probably the end of next month (June.) At this station our butter for the winter was sold at 23 cents per pound, being contracted for in Halifax early in the fall. That contract lasted until the middle of April, I think; and after that we have simply to take what the market will afford.

There have been many visitors to the dairy station at Nappan. Nineteen young men have learned butter making and cheese making there, and are now in good positions in factories either in Nova Scotia or the adjoining province of New Brunswick. This dairy station has been useful to the farmers who have found through it a market for their milk and in addition it has afforded a good opportunity to young men in these two provinces to learn the business and to follow it up. Mr. J. E. Hopkins is in charge of this dairy station, and it has also been his duty to visit the factories in the province to give instructions and advice. In 1894 sixteen factories were built, ten of them putting in the plant for making both butter and cheese. In that year there were 39 factories altogether in operation in that province, and they are commencing to make butter during the winter and cheese during the summer. In 1895, the present year, there will likely be 49 cheese and butter factories in operation in Nova Scotia, and that province this year will become an exporter of cheese. I may add that Mr. Hopkins has, during the winter, attended 22 public meetings.

DAIRY WORK IN NEW BRUNSWICK.

The Dairying Service in New Brunswick has been somewhat similar to that in the other provinces, although in each province, we have tried to adapt our work to the special needs of the farmers. At Kingsclear, the dairy station is now managed by a joint stock company. We had the management of it, for butter making for two years. At Sussex, N.B., winter butter making was started in 1893; the factory is now in charge of a company and it is managed very satisfactorily. We had a travelling dairy in this province which went into the more sparsely settled districts and gave instructions in butter making particularly for home dairying. We sent out posters on which the programme of the work for the day was given. This programme included the testing of milk, the use of the centrifugal cream separator, the making and packing of butter, in fact the whole practical art of butter making from its first steps until the product was ready for the market. This travelling dairy visited sixty-eight places in the province and was in charge of Messrs. S. L. Peters and W. W. Hubbard. We found one unexpected service rendered in this way. Farmers would bring their skimmed milk and buttermilk to be tested, and in some cases it was discovered that there was 40 per cent of the butter fat left in the skimmed milk, owing to the ignorance of the farmers of the best method for recovering it. In other cases there would be 5 per cent of butter fat discovered in the buttermilk when there should only be about a quarter of one per cent. From the instructions which the travelling dairy was able to impart to them, the farmers have learned how to avoid losses in these ways. The travelling dairies have proved themselves valuable in instructing farmers how to make butter for the home market. We commenced the dairy school

at Sussex, N.B., in 1894, and that year we had 30 students who took the course of instruction. This school is expected to meet the needs of the two provinces. This year 54 students were in attendance. During the last session in order to make the opportunity for instruction equally available to all the young men in the province, the local government co-operated with our department and paid half the railway fares of the students to Sussex. I am glad to acknowledge that the local governments have given us every aid, so that our work has not been in any way combative of that of the provincial governments, but in many instances we have arranged the plans for their work, and they have co-operated with us in the heartiest manner possible.

AGRICULTURAL CONFERENCES.

There is one feature of the work in the Maritime Provinces during the past year which deserves special mention, namely, the presence of His Excellency the Governor General at the three great agricultural conferences at Charlottetown, P.E.I., Fredericton, N.B., and Truro, N.S. His Excellency's attendance and addresses contributed much in awakening interest and quickening the enthusiasm of the farmers about recognizing and making the most of the resources of their own country. I have always had a very great respect for and belief in the virtue and value of patriotic, unselfish sentiment; and when you have gatherings of from three to ten thousand farmers you can quicken the wholesome sentiment in those provinces in a way such as nothing else had done there previously. These gatherings were promoted and helped by the provincial authorities. The Lieutenant-Governors and the Provincial Premiers were on the platforms and delivered speeches. The general effect of the gatherings was to encourage the farmers and to stir them up to the task of developing the resources of their provinces, and making them better places to live in. At the meetings in question we had with us ex-Governor Hoard of Wisconsin, who attended the meetings as a matter of generous international courtesy. And here I may make a remark of a somewhat personal character. I have been criticised for visiting the United States and delivering lectures at a few of the large conventions there during the past winter. Ex-Governor Hoard came to Canada last summer without charging any fee for his splendid services, simply to oblige us and to enjoy himself. He is perhaps the greatest living authority on the philosophy of dairying and when he asked me if I would take his place and address a few meetings in the New England States I felt that on the principle of one good turn deserving another, I could do nothing else than accede to his request. The visit of ex-Governor Hoard through Canada last year has had most beneficial results to this country. He publishes four papers, one of which, "Hoard's Dairyman," is the most widely circulated dairy paper in the world, and goes into nearly all countries. Repeatedly since his return from the Maritime Provinces he has made practical references to what he saw there. In the issue of this paper of May 3rd, 1895, this is what he is reported to have said in addressing a large gathering of cheese makers in the United States with reference to Prince Edward Island. He said:—"They have hot weather there in the summer, though not as hot as we have, because they are so near the ocean. They make the finest cheese there that I ever saw. * * * I rode by carriage almost the length of Prince Edward Island which is 120 miles long. I visited factory after factory with Mr. D. M. McPherson and Prof. Robertson, and you would never know that all that cheese was not made by one man, on account of its uniformity. Every single cheese maker had been trained to a given standard, and the result was, factories all being constructed alike, that the goods were remarkable fine, and of great uniformity, though I do believe that they were no better than we can make here in Northern Wisconsin." Then, if you will allow me, I will read another short extract to show the recognition and appreciation which this gentleman, who occupies a foremost place amongst the dairymen of the United States, has of the work of Their Excellencies the Governor General and the Countess of Aberdeen in their visit to the Maritime Provinces last year. The Hon. W. D. Hoard says: "I found human nature just about the same as anywhere else; but I found this, that the government takes a wonderful interest in the dairy industry and stands behind it with a tremendous

force. Don't you think if the President of the United States should travel for a month holding dairy meetings that it would give great impulse to the sentiment of the country on that question? Suppose that President Cleveland and his wife and little Ruth should start out and hold monster dairy meetings and bid the people 'God-speed this work of civilization, this is the work of progress and hope,' Don't you suppose it would give a great impulse to public sentiment along that line? Now, this question is one which is objected to as being one of sentiment. They men go to their death for sentiment. I remember lots of times on the field of battle, when, if it hadn't been for my pride, my sentiment, I would have got out of there in a York minute. Sentiment, sentiment everywhere. We love our country because of sentiment, we take a pride in our country because of sentiment, we stand by 'Old Glory' because of sentiment, and we are all the time being, and doing things from mere sentiment. Now, we want a good, strong sentiment in this state, full of pride, concerning the character of our dairy products."

Governor Hoard has helped to foster that sentiment in Canada in a very large measure; and Their Excellencies are establishing in Canadians the inspiring sentiment and conviction that true nobility and a noble service of the people are inseparable.

INSTRUCTION IN DAIRYING IN QUEBEC.

In the province of Quebec the assistant dairy commissioner, Mr. J. C. Chapais, has been actively at work. He spends most of his time giving help as is needed to the French speaking citizens of Canada. During the past year he addressed nine meetings in Prince Edward Island, one in New Brunswick, eight in Ontario, and eighty-two in the province of Quebec. Besides these he delivered thirty-four lectures to the students at the dairy school at St. Hyacinthe. He has also spent a good deal of time in advising and otherwise helping in the formation of syndicates of factories in Quebec. These are organizations of factories, say of 15 or 25, whereby they employ the services of a competent inspector, who visits the factories as often as he can and gives practical illustrations and other information of how to make the finest butter and cheese.

The dairy school at St. Hyacinthe has received help to the extent of \$1,000 a year from the Dairymen's Association of Quebec; our department meets all the other expenses.

In 1893-4 there were 268 students in attendance at this school, and during the winter of 1894-5 the number rose to 328, so that a large number of the cheese and butter factories in the province of Quebec are in the hands of makers who have had a thorough course of instruction in up-to-date methods of carrying on their work. Then the superintendent of the school, Mr. J. D. Leclair, received leave of absence to visit Europe, his travelling expenses being paid by the provincial government. He went to look into the butter-making methods of Denmark and France and got most useful and valuable information which he has since given to the farmers at dairy conventions and to the students attending the course of instruction at the school at St. Hyacinthe.

We carried on a winter butter-making station at Lennoxville, Quebec, and that has been conducted by the farmers themselves since the beginning of April.

The total number of cheese factories in the province of Quebec is 1192 and of butter factories 262. I think that this year the province of Quebec will produce about half of the total amount of cheese exportable from Canada.

DAIRY TEACHING IN ONTARIO.

I come now to what we are doing in the province of Ontario through the Dairying Service. We commenced the work of our winter dairying stations at Woodstock and Mount Elgin, Ont. In 1894 we sold the butter making plant which we had loaned to companies of farmers at these factories, and during the past winter they have managed the business themselves. From reports I have received I learn that they have managed

it most satisfactorily and successfully. From these two factories the winter dairying movement has extended all over Canada, so much so that last winter there were in operation about 100 butter-making factories; and the first that were started were these two, at places I have mentioned, in 1892. We carried on butter-making last winter at Wellman's Corners, Ont., and this year we sold the plant to the cheesemaker there, who will carry it on hereafter. We carried it on at Chesterville, Ont., and the owner of the factory is in correspondence on the subject of buying the machinery there. I hope the dairymen will now be able to continue winter butter-making in Ontario without the direct management of any factories by our department. I think we may withdraw from that part of our work. We also carried on butter-making at Renfrew, Ont., last winter. The joint stock company put up the buildings and furnished them entirely themselves. We did not even lend the machinery. We merely carried on the butter-making so that they might have the advantage of the good name we have gained to get a good start in their business. Since the end of April the company has carried it on themselves, and my last word from the manager was that they would make a ton of butter a day after they were well going in June. We also carried on winter dairying at Kingston, Ont., and carried on a dairy school in connection therewith, at which 109 pupils were in attendance. That work was in charge of Mr. J. A. Ruddick, and was a part of the educational work of the school of Agriculture and Mining at Kingston, whose board of governors put up the buildings and found the equipment. The school of Agriculture and Mining works in harmony with Queen's University, Kingston. At the closing exercises Principal Grant was present, and was willing to express his opinion that no single educational movement in Ontario had been started or carried on with better prospect of helping the farmers in the eastern part of the province. The total cost to our department was about \$2,500, of which nearly \$1,000 was a loss on milk which we purchased for use in the school. It was therein different from our dairy station work. There appeared to be the threatened difficulty of getting a supply of milk for giving illustrations of making butter and cheese. The only way was to offer a good price for it, and we offered 30 cents per pound of butter-fat. As it turned out, the difference in the quality of milk was so great that at this rate one patron received \$1.05 per 100 pounds of milk, while another realized \$1.65 per 100 pounds of milk. We expected to sell the butter for what we paid for the milk, giving the labour for educational purposes. The price of butter went down in the meantime and we lost on it, but we did not lose any more than any other school in Canada that has been obliged to purchase milk for illustrative teaching. Hereafter we can purchase milk at the ordinary market rate, as the farmers have now the experience that they can produce milk in winter at a reasonable cost, which they did not know before. They were afraid of storms blocking the roads, but on no single day did we find it impossible to get a full supply of the milk required for the carrying on of the school. I might mention one matter here which perhaps does not come exactly within the scope of my evidence, but is closely connected with this matter. This \$2,500 was an entirely unexpected and unprovided-for expenditure, because the dairy school was only started last summer, and I think it would have been impossible for the board of governors of the school of Agriculture and Mining to run the dairy school satisfactorily unless our department had taken hold of it. This educational dairy work is so much in its infancy that it is impossible to estimate, at the beginning of the year, just how much money will be required to carry on the work efficiently and still keep within the exact limits of the estimate. When a department or division of a department is well organized and the work is, so to speak, stereotyped in certain channels and directions, then the expenditure can be kept within estimated bounds, but in the dairying service it is very difficult to do the work as it should be done, to undertake all the new work that crops up during the year and needs to be done, and still come out at the end of the year always within the limits of the estimates and appropriation. I hope the members will bear this fact in mind and deal generously with the Dairy Commissioner if sometimes the dairy vote is a little behind, which this year, however, I do not think it will be.

MANITOBA AND THE TERRITORIES.

Our work in Manitoba and the North-west Territories has been of two sorts. We started travelling dairies there last year to give the farmers instruction on how to carry on the making of butter at their own homes. The method of procedure was somewhat similar to that followed in the province of New Brunswick. We sent out posters about a month ahead, giving the names of the places where the travelling dairy was to be stationed:

DOMINION OF CANADA.

Department of Agriculture,

DAIRYING SERVICE.

OFFICE OF DAIRY COMMISSIONER,

CENTRAL EXPERIMENTAL FARM,

OTTAWA, May, 1894.

The Dominion Government has made provision for the maintenance of *Travelling Dairies* in Manitoba and the North-west Territories. They will be under the direction of the Dairy Commissioner for the Dominion.

The object of the travelling dairies is to afford those who are engaged in butter-making an opportunity to gain further, exact, practical and helpful information on all parts of the process, from the separating of the cream to the printing and packing of the butter.

One expert butter-maker and an assistant, with an outfit of dairy utensils, including a centrifugal cream separator, a churn, a butter-worker, a Babcock milk tester, &c., &c., will compose each travelling dairy. Two days will be spent at every place which is visited, if the local committee make the necessary preparations of a place for meetings, a supply of milk and a supply of cream.

The programme of instruction and illustration will be arranged, as far as practicable, in accordance with the following time cards:—

FIRST DAY.

- 10 to 12 a.m. (1) Running of centrifugal cream separator, and separating cream from about 10 gallons of milk to be supplied by the local committee ;
 (2) Testing samples of milk ;
 (3) Preparing about 2 gallons of cream, to be supplied by the local committee ;
- 2 to 5 p.m. (4) Churning of cream supplied by the local committee ;
 (5) Making butter, &c. ;
 (6) Ripening of cream from centrifugal separator ;
 (7) Address on butter-making ;

SECOND DAY.

- 9 to 10 a.m. (1) Testing samples of milk ;
 10 to 12 a.m. (2) Churning cream from centrifugal cream separator, and making butter ;
 2 to 4 p.m. (3) Running the centrifugal cream separator ;
 (4) Discussion on dairying.

REQUIREMENTS.

To enable the farmers, their wives and families to get as much benefit as possible from the practical teachings of those travelling dairies, it is necessary that a local committee or individual, in every place to be visited, should arrange beforehand :—

- (1) For a convenient place of meeting ;
- (2) For a supply of about ten gallons of sweet whole milk, to be furnished on the morning of the first day ;
- (3) For a supply of about two gallons of cream (ripened if practicable), also to be furnished on the morning of the first day ;
- (4) For the distribution of bills (similar to this which will be furnished free) announcing the dates and places of meetings, widely and thoroughly in the surrounding country.

Farmers are invited to bring samples of whole milk, of skimmed-milk and of butter-milk, to be tested ; about half a tea-cupful is plenty for each sample.

IMPORTANCE.

In many districts in Manitoba and the North-west Territories, dairying can be followed with profit and success. The soil, the pasturage, the fodder crops, and the climatic conditions, as well as the demands and opportunities of the markets, are all suitable for the production of the finest quality of milk, butter, cheese, beef and bacon. By a system of mixed farming, the growing of wheat at a profit may be helped and not hindered ; and thereby the farmers may protect themselves from the very serious risk of loss and failure which is incurred by any individual or community in the western provinces, that depends wholly or mainly on one crop or on the selling of grain only.

I urge the farmers and business men generally to avail themselves of the benefits which these travelling dairies are intended to give. The women from the farms are specially invited to be present at the meetings.

If you are interested in the welfare and progress of the district where you live, you are hereby invited to see that a local committee is formed and that it makes the necessary preparations for your locality in good time.

JAS. W. ROBERTSON,

Dairy Commissioner.

The travelling dairy will visit the following places on the dates named :—

* * * * *

For two days we gave the people as much information as we could, especially on the practical part of butter-making. The number of places visited was 63. Here again the reports of my assistants show that there were samples of skim-milk containing quite 40 per cent of the butter-fat ; and butter-milk containing from 5 to 8 per cent of fat. These losses have been remedied in large measure since the waste was pointed out to the farmers. This work was highly appreciated in Manitoba. Besides the thanks sent in correspondence, we have a resolution from the Manitoba Dairymen's Association which commends the work of the travelling dairies and says "No work of the kind has had more useful results or is meeting with more general appreciation." The resolution in full simply speaks well of the men who carried on the work and the good results that

followed. At the annual meetings of the Farmers' Institutes of Manitoba, in nearly every case they took occasion to refer to the work of the travelling dairies in their sections. I do not think it would be wise to read extracts from their reports, it would take too much time; but I have the reports underlined for the members of the committee to look at if they wish. I will read you one from the Virden Institute which I have taken by chance and without any preferential selection: "The travelling dairy meetings were large and enthusiastic. Over 200 farmers were in attendance and the work of instruction will do a great deal of good."

Our work up there has had the quality which the rest of our work has had as far as we could make it so, in that it was directly helpful to the farmers and practical in every part of its presentation. At the dairy station at Moosejaw, where we had 58 patrons, over 22,000 pounds of butter were made, and the C. P. R. take one-third of the supply, which they need for their whole western service, from this dairy station. There are many new cheese factories and creameries in course of erection in Manitoba and the North-west Territories, and already this year we have sent three travelling instructors to visit these newly established cheese factories and creameries, spending from two to three days at each, according to their needs and the limitations of the railway service. After that work is done we hope to resume the work of travelling dairies, and visit the most sparsely settled districts, giving them instructions in butter making and how to establish and support co-operative factories. At the present time the markets for dairy butter in Manitoba are in a most deplorable condition. At the present time in some places dairy butter cannot be sold for 7 cents a pound, on account of the surplus of dairy butter which is not wanted anywhere for export. The merchants are simply refusing to take it and the only alternative for the people is to get creameries put up for the making of a quality of butter that can be taken for export, and which must be protected against being spoiled during transportation, by cold storage service on the way.

The work at our branch dairy stations will be almost finished this year as far as I can see now. The object of these, as I said before the committee last year, was first to introduce co-operative methods in dairying, where these were unknown. We have done that in the Maritime Provinces and we are getting it done in Manitoba and the North-west Territories. The second object was to establish winter butter-making in factories. That is now being done so thoroughly that we may withdraw entirely from this work in Ontario. The third object was to improve the general quality of the dairy products throughout all the provinces; and there never was such excellence in the cheese and butter of the provinces at any time in the past as now. They are all graded up to nearly one standard of excellence. In consequence next year, that is the financial year 1896-97, I expect the Dairying Service can be administered with \$5,000 less than this year of 1895-96 and the following year with \$10,000 less again because the work of initiation being done and the industry being set well on its feet, the rest may safely be left to the farmers themselves and the enterprise of business men.

GOVERNMENT AID TO BUTTER EXPORT.

The next matter I had in my notes to speak of, was what has been done to foster the butter trade. That I might make what has been done entirely clear to the committee, I shall give a very brief resume of the causes which led to the unfortunate condition of our butter trade in Canada. The volume of the butter trade has shrunk very much. That was not due to anything so much as to the very rapid expansion of our cheese trade. The milk of cows being fed by farmers was turned towards cheese-making instead of being kept at butter making. The enlargement of our cheese trade at so rapid a rate was only possible by the reduction of our butter trade. Then the loss of the market for our butter was due to two causes:—first, to the change of taste on the part of customers who used to prefer the rather strongly flavoured but pure butter to the mild-flavoured imitation butter. Now the consumers in Europe would rather have the mild-flavoured oleomargarine than the stronger-flavoured pure butter

made in dairies, some of which necessarily has a strong flavour. By the change in the taste of consumers, we lost that market in a measure. By the tremendous increase in the production of imitation butters in other countries we lost it nearly altogether.

Then in carrying on the dairy work in Canada under the stress of fierce competition from all quarters, the farmers could find safety only in two directions. If they keep on extending the cheese trade only, and at the same time keep enlarging the flow of milk per cow and lengthening the milking season, the result will be that we will soon have our cheese trade in a very bad condition, because we already send to England sixty per cent of the cheese she imports and are thus pushing our competitors very hard to the wall. Our safety seems to lie in turning milk in larger quantities into butter making instead of continuing to enlarge the cheese-making. Unless we do that I do not see any escape from an era of low prices or from the calamity of over production in cheese. The next question that was to be settled, as far as it could be settled in advance, was, what was the most profitable time of the year to make our butter in order to find a good market. The influence of the Canadian butter on the ruling prices in the British market is hardly appreciable, because we send less than two pounds out of every hundred pounds imported there. But in England there has been a clearly marked yearly fluctuation in the butter market for fifteen years. This chart will illustrate what I want to say more clearly than words will do. The butter market in England has gone down in summer. The zig-zag line represents the price each year from 1880 for Danish butter, and the average price available in summer is about six cents a pound lower from April till August than from September to March. That accounts for the holding of butter made in creameries and elsewhere in June and July in Canada. Nobody cares to ship butter to the British market when the ruling price for fine butter is six cents a pound lower than it will be in a few months' time. The likelihood of this being the case has been based on the experience of fifteen years without a single exception. Then there seemed to be just two ways of meeting that difficulty. Either we should make butter at the season of the year when the butter markets are high and send the butter freshly made then, or we should make butter when it is most convenient to do so and provide for the holding of it without spoiling, so that it would reach the market when the ruling price was highest, and yet without any deterioration in quality. There were just these two ways of meeting that difficulty. We tried to meet it in both ways and that is why our winter dairying movement was started first:—Because the price for butter in England was always higher in winter than in summer, and we could ship then with safety on account of the cold temperature that prevailed at that season. Now, in starting this winter dairying movement, as I mentioned in dealing with the work in the province of Ontario, it was to my mind essential that the farmers should get some direct help which they could not avail themselves of through any other channel than that which the government could provide. When any new business is being started it seems to me essential that the people should co-operate until they have obtained the facilities for doing singly what they require. Let me make my meaning clear—because this lies at the very basis of my view of why we were not only justified, but would have been inexcusable if we had not helped the butter trade as we have been doing during this past year. At first when a man wanted to build a house for himself in this country he resorted to essential "bees." That was a form of co-operation. Now a man does not build his house by means of a neighbourhood "bee," because he can hire masons and carpenters and obtain by purchase all the material he needs. But in the old days men could not have had houses and clearings for themselves unless they had these logging "bees," when other men co-operated with them and helped to erect their cabins. That was the exact condition of the butter trade last winter, when we provided means for the shipments of butter. The Government had ample justification for their action, but there would have been no justification for a neglect or refusal to act under the circumstances.

For myself I believe in the widest possible application, within legitimate bounds, of co-operative methods for the promotion of the public good; and government in the highest exercise of its functions, is one way whereby the people co-operate for their own benefit. The protection of life and property is perhaps only the primary function of

government, and the making of one's country a desirable land to live in, is a responsibility inseparable from the carrying on of government in the highest order of civilization. The clearest illustration of this is found in the existence of schools maintained by the taxes of the people and kept in a measure under the control of the government. To go back to the old illustration of the logging "bees" and house-building "bees," someone in a new settlement might have said: "Why should I tax my time to help a new-comer who is going to be a competitor with me in the markets?" Had such a one let his question find expression in his action, his conduct would have been short-sighted and hurtful to himself, because it would have been of decided advantage to him as an individual, and eminently fitting and manly in him as a member of the community, to help a new neighbour. The winter butter-making dairyman is simply a new neighbour among the other productive labourers in Canada, and he is a labourer through whom the welfare of the whole community will be promoted.

I would like to make a few observations as to how far the promotion of winter dairying, through the Dairying Service, may be a fair use of government money. If wealth can be created from natural resources through dairying, the business men and manufacturers do not sustain any loss by a portion of the taxes being devoted to helping to develop the butter and cheese trade; because, if the incomes of the farmers are increased they will be able to spend more; and their extra spendings will give a chance for increased profits to the merchants and will cause a demand for products of the manufacturers. What I want to do is to make it clear that, after all, none but the farmers themselves are contributing to the aid which we are temporarily rendering them. But for the organization of dairymen's associations, the employment of travelling instructors, the holding of conventions and the issuing of reports, the cheese trade could not have been established as it now exists. That trade has grown so much that while in 1886 the exports reached only a value of \$6,754,626, last year the exports reached a splendid total of \$15,488,191. The increase in the value of the output of cheese during the last eight years has been more than a million of dollars a year; and it would not have been possible but for the fostering help this business received in the ways I have indicated. This increase has been gained without any depreciation in price, because the thoroughly practical aid given made improvement in the quality of the cheese as fast as the increase in the quantity manufactured. Thus we have been enabled to hold our customers and gain others. This has saved the country from financial distress in many respects, and I may ask here, how much better off would the country have been if we had had half as much more coming in yearly from the exports of butter? I have no hesitation in saying that this is quite within our capacity within a few years. If we had five or seven millions of dollars' worth of butter to export annually, everybody in Canada would have a chance of being better off. That is the possibility and the legitimate outcome of aid to the butter trade.

It is fair to the cheesemen, although a few of them say it is not fair to apply public money to aid those whom they call their competitors. It must not be forgotten, however, that the winter dairying stations have been supported by farmers who were supplying milk to cheese factories in the summer. Those who support the winter creameries are the same men who enable the cheese manufacturers to carry on their industry. The interests are not hostile in any respect; they are identically the same men who are being helped through the cheese business in summer and the butter business in winter; and consequently there is no ground for complaint.

Assistance to the butter makers of Canada is only fair because they ought to receive similar help to that given to the butter men by the governments in other countries. In 1886 when I first visited Denmark, I found two dairy experts in the employment of the government of that country, together with five dairy chemists, while we in Canada have not a single dairy chemist yet. We have Mr. F. T. Shutt, one of the most efficient chemists in the Dominion, and capable of doing any class of work, but he is chemist of the experimental farms, and his work is principally confined to soils, fertilizers, fodders and waters. In Denmark there were five special dairy chemists at work in 1886. In 1883 Denmark exported 14,000 tons of butter and in 1894, 54,000 tons.

By Sir John Carling :

Q. What are our exports in butter at the present?—A. Less than 3,000 tons a year; and think of it, 54,000 tons as the output in Denmark! The people of Denmark were even more inert in regard to buttermaking and improved agriculture than the Canadians were; but from the judicious guidance which they have received, it has become, I think, the most prosperous agricultural country in the world. The change wrought in fifteen years has been most remarkable, as about 1880 it was reported to be the most severely distressed agricultural country in Europe. If, then, we are to compete with the Danes in the British market, and to-day they have the largest share of that market, we need to help our farmers in a measure as they have been helped by the government in Denmark, in order to make the conditions of competition, fair and just for our people. Last winter, when we found winter dairying was making satisfactory progress, I had letters from many farmers saying, We cannot sell our butter. At that same time we were selling the butter from the government dairy stations at 21½ and 22 cents per pound, but the men who would ordinarily have been buying and shipping butter at that time of the year were laden down with held butter made last summer. It had not been kept in refrigerators or cold storage and was therefore partly spoiled. Thus it was that the usual channels of commerce were blocked by the speculative action of the dealers who bought last summer's product and who were holding it for a rise in the market. On considering the matter I had no hesitation in recommending to the Minister of Agriculture that butter from these winter creameries should be taken at twenty cents a pound, or a cent and a half per pound less than we were getting at the experimental dairy stations at that time. I should remark that our winter-made butter had been greatly improved in quality and was quite as good as the best Australian, and almost as good as the best Danish. The English merchants, however, did not know that. All things considered, it was an opportune time to make shipments from the Canadian dairy stations in order to attract customers who might be large buyers next summer, and give them an opportunity of judging of its excellent quality. Arrangements for shipments to Great Britain were made, and we sent a less quantity than I had expected. The total number of packages forwarded was 915, plus about 200 from Prince Edward Island, of which I have not yet received the exact particulars. It was understood that we were only to take butter made between the first of January and the last of March. In order to give the committee an idea of the feeling of the trade in Great Britain with regard to our products of butter, I will read you one or two extracts from letters which I have received from prominent produce dealers in the mother country.

After receipt of the first consignment Messrs. Andrew Clement & Son, Manchester, wrote:—

"The high colour of Australian is against even the best qualities. The paler the colour, the better the demand on this market.

"We are much pleased with the quality of boxes marked 'Chesterville' and 'Lennoxville No. 3', (Government Dairy Stations). These will sell in preference to Australian on this market, being paler in colour, and at least equal in flavour. For these we made 86 shillings to 90 shillings, which is more than Australian brought.

"Most of our customers were surprised at the quality of this parcel, as they expect Canadian to be something inferior. If you can ship quality equal to 'Chesterville', and ship it when fresh-made, we can handle all you send."

Under date 25th April, 1895, the same firm wrote:—

"We have received delivery of 215 packages of butter ex "Ottoman"; most of this shipment is fresher than last." If I may be allowed to interject an explanation here, I may say that even it was not very fresh, because, in some cases, the butter had been held at the creameries two or three weeks before it was shipped to Montreal, and, moreover, held in unsuitable places. The letter goes on:—"fresher than last, and altogether superior, and proves to us that if care be taken with details at your end, and the goods shipped absolutely as soon as made, you need not fear what quantity you send. They will certainly suit this market better than Australian; of course it will take some time to get them known. * * * We have sold about the half of this

shipment at various prices from 74s. to 84s. We have had several of the best buyers in Lancashire examining these, and the general opinion is that you could run the Danes very hard in a year or so."

By Mr. Taylor :

Q. What will the prices that you have just given net?—A. Not more than 15 cents on the average; our first two shipments realized a little over 16 cents at Montreal.

By Mr. Wilson :

Q. Was that Ontario butter?—A. It was butter from Ontario and Quebec. I may state that the butter market was never in a worse condition in the Old Country than of late. The Canadians were not the only people who held butter in unsuitable places. There were some 2,000 tons of Australian butter held in England since the winter of 1893-94, and that quantity held over the heads of the trade had a most depressing and demoralizing effect on the market. If those 2,000 tons could have been bought by the butter merchants and dumped into the Thames, it would have paid them in the end, and would have created a far better state of trade in the butter market. I recognize that the winter dairying business in Canada has grown to such dimensions that we will have to take a price on the export basis for butter, because we will have a surplus to sell. If the summer creamery butter could be shipped out by October, the local markets in Canada would take 90 per cent of the winter-made butter for another year. In the Maritime Provinces the butter-makers have suffered as in the other markets, because Montreal merchants have been shipping summer-made creamery there and selling it at 14 and 15 cents a pound, paying freight and insurance in addition.

That shows the folly and risk of the practice which has been in vogue of holding a perishable product for a rise in the market without protecting the product against injury in quality.

By Mr. McNeill :

Q. What does Danish butter generally bring in winter?—A. I will read notes from the next letter from the same firm, dated May 1st. It says: "Yesterday Danish dropped to 84 from 88 shillings."

Q. What would that be a pound?—A. That would be from 18 to 18½ cents a pound there.

Q. Is that abnormally low?—A. Yes, nearly 50 per cent lower than usual, and in part that is in consequence of the holding of butter that came from the colonies mainly, and was held under very unsuitable conditions.

Q. What might we fairly expect for winter butter in England?—A. I think taking the last five or six years' experience as a basis to found an opinion upon, about 18 cents per lb. here. I do not think our farmers may look for much above that for winter-made butter. Of course markets fluctuate, and I am giving that as tentative and approximate only.

Q. For the last four or five years what did Danish butter net?—A. It has been gradually shrinking, but this chart gives the prices. In 1893 it was as high as 119 shillings per cwt. at Copenhagen, that is 25½ cents per pound, and as low as 86 shillings per cwt. in May of that year. For ten years the price at Copenhagen, Denmark, has been from about 120 shillings per cwt. to 84 shillings per cwt. The highest prices have been on the average from October to March and the lowest prices from May till July.

Q. If they ship such large quantities there from Australia that will have some effect?—A. Yes, some effect, no doubt.

In another letter from the same firm, under date of April 29th, they say, "As it is, to offer Canadian Butter means that you must spend some time explaining that it is not that which is usually known as Canadian Butter."

COLD STORAGE SERVICE FOR BUTTER.

By Mr. McMillan :

Q. Do you think it possible to make butter in summer and hold it and put it on the butter market in winter in good condition?—A. Yes, I am coming to that point now. As long as seven years ago I publicly advocated cold storage for the summer made butter in order that it might be held in good condition if it was to be kept until prices were higher than when it was made. It is quite possible to hold it without deterioration if proper storage accommodation be provided. I would not provide it to facilitate or encourage speculation, but if it is to be held for the natural rise in the market owing to the scarcity of butter in winter, then it should be held safely so that its quality would not be injured.

By Mr. Wilson :

Q. Is there any difference in the quality of butter made in summer and in winter? Does it vary according to the time of the year?—A. There need not be any marked variation. Our butter made in January was as good as that made in June, and it is as well liked in England.

By Dr. Roome :

Q. Is it the same with cheese?—A. No. It is possible to make fine cheese in winter but not in the ordinary buildings because they are not suitable. It is necessary to regulate the temperature for cheesemaking and cheese curing.

Q. Is the June and July cheese as good as in October?—A. No, the milk is richer in October and the cooler weather favours the curing of cheese with mild flavours, which are preferred.

Butter has two values. The market value is fixed by all competitors in accordance with the law of supply and demand. Then butter has an intrinsic value, so that one butter is worth more as a palatable food than another butter because of its superior quality, regardless of market fluctuations altogether. All we can expect to do is to put our butter on the market in such a condition that by its higher intrinsic qualities it will command the highest price which is being paid at that time. If by its more excellent intrinsic qualities it fetches higher prices than that made in other countries, that is all we can expect. Butter changes in intrinsic quality by the progress of the process of fermentation. In making butter we add a fermentation starter to the cream as the housewife adds yeast to the dough to make it rise. That is how we can make as good butter in winter as in summer, by adding to the cream for winter butter a certain kind of bacteria that are common in the atmosphere in June. If you could introduce or apply a fermentation-stopper as well as a fermentation-starter the butter would remain unchanged. Butter made in June would be liked just as much in January as in June if no change in taste or appearance or smell could be detected. We obtain the flavour we want in butter by heating the cream to 165° Fahr. so as to kill the forms of fermentation we do not want, and then after it is cooled adding the proper fermentation starter to as mentioned in the appendix. The increase of temperature above 165° Fahr. will practically stop fermentation, and a decrease below freezing point will also stop it, so that butter held in a dark place, protected from other bacteria and at a temperature below 32° Fahr. will stay practically unchanged for months. There is little change in the butter except from the disintegration of its constituents through the action of germ life in it. A fermentation-stopper is simply to put it in a refrigerator so cold that the fermentation will be stopped. About 20° Fahr. (12 below freezing point) is necessary, because an ordinary package of butter stored at a temperature of 32° Fahr. would not be cooled to that temperature at its centre for four or five days, and during that time fermentation would go on, damaging the quality. At a temperature of 12° below freezing point the butter will be cooled in every part in 24 hours and thus be protected from change and consequent damage. The plan for cold storage service

this year includes the getting of cold storage on railways once a week whereby the butter can be conveyed to some central place without being injured in transit. We also want cold storage in Montreal in warehouses, at least 12° below freezing point, where it can be held unchanged after arriving at the port of shipment. Then we want cold storage on the steamships in one of three ways, all of which will be tested. First of all, in insulated compartments so that when 10, 20, or 30 tons of butter are taken out of these warehouses and put into the insulated compartments, it will continue of a temperature not appreciably above 32° Fahr., and be landed in England without undergoing any change on the voyage. The second system to be tried is that of using ice and salt placed in tubes at the sides of the insulated compartments, so as to keep them and their contents below 32° Fahr. The third method will be by fitting up one or two refrigerating machines for the cooling of insulated compartments by the compression and expansion of ammonia circulated inside pipes. We expect to try all these systems during the coming summer, and my opinion is that with the receiving warehouses at Montreal at 20° Fahr., we will have no difficulty in landing butter in unimpaired condition in England simply by putting it in insulated compartments. Having arranged for the carriage of our butter to the market in good condition, we must make the best arrangements we can for its sale. I have had letters from several of the large firms who have been accustomed to handle Danish, Colonial and Irish butter, and who have received small quantities of our winter-made butter. They say: "We did not know you made such butter as this." I am of opinion that by sending small shipments in June, July, and probably August, when the market is low, and no merchant would ship and sustain the loss to be met under such circumstances, we could introduce our creamery butter favourably to many, who would become large and permanent customers, and it would pay the country to invest a few thousand dollars in this manner, and develop a demand so that customers would be waiting for the thousands of packages that would go later in the season. Just that far I think the department might go into a commercial enterprise, reluctantly and only for the purpose of opening up channels of trade, leaving it to the enterprise of commercial men to continue the business thereafter. The best packages for shipment are packages similar to those I exhibited in the committee rooms two years ago, or square boxes lined with parchment paper inside. The square boxes are preferred now to the tubs in most markets, and they can be purchased for from 16 to 17 cents a piece. They hold 56 pounds of butter. They are made of spruce wood, $\frac{3}{4}$ -inch or 1-inch thick, and 12 inches deep, 11 inches wide, 12 $\frac{1}{2}$ inches long, inside measurements. They should be lined inside with strong thick parchment paper.

Then we have been making experiments in the preservation of butter by the use of a saline preparation. Salt is used for preserving butter in some measure, and we have used another entirely harmless and wholesome substance which put on the butter as a brine helps to keep it unchanged for an indefinite period of time. I have kept butter this winter from some of our dairy stations for two months which then did not show signs of having been made much more than three days. We expect to send directions how to prepare the brine to the creameries in the course of a week or two, and also small quantities of the material to use, the latter at cost price. That will provide a means of keeping the butter sweet even if cold storage be not reached immediately after it is made; and we will be able to send our creamery butter to the English market and get it before the consumers there just as nice as though it were only two days' old from the creamery where it had been made.

By the Chairman:

Q. What is the element used?—A. It is composed partly of salt. It is perfectly harmless. I have taken the opinion of the best experts on that point and it is as free from objection as is common salt.

PROSPECTS OF THE CHEESE TRADE FOR 1895.

I now come to make a few observations on the outlook of the cheese trade for 1895. At the present time the outlook for cheese is gloomy in point of prices; a good many of the farmers and salesmen are getting rather disheartened and timid, and I think that some of the English importers and other buyers are making that a handle wherewith to get our cheese at a lower price than they are entitled to have it. I have given some careful examination to the market conditions and outlook this year as compared with last year. I find that in 1894 we had very cheap meats, and meats are competing foods with cheese in Great Britain. With cheap meats the likelihood is that people would eat less cheese or only buy it when it was comparatively cheap. Then last year we had a year of high prices for July cheese; the prices were kept up by speculation, cheese being held off the market when they should have gone forward into consumption. That was an unfavourable condition. Last year there were many strikes in Great Britain as you will remember, amongst the cheese-consuming population, which was an unfavourable condition, lessening as it did the purchasing power of our customers. Then there was the largest make of cheese in Great Britain last year that has ever been known. With all these unfavourable conditions the market took care of all our cheese last year at fair prices with very little loss, and the losses were only suffered by those who bought on speculation at high prices in the summer.

Seeing that the market with these unfavourable conditions took care of our cheese last year at fairly satisfactory prices let me analyze the conditions this year. Up to the end of March the cattle which were killed in the three large markets of the United States were 270,000 short of the number the year before, that is three times more cattle than the whole of the cattle shipped from Canada in 1894. That means high-priced meats, and, therefore, a better outlook for cheese. Then there is a revival of trade all over Great Britain. The cotton market is going up and the cotton factories are more active, business is brisker and better. The shipbuilding trade is improving by reason, perhaps, of the war between China and Japan which has contributed to the building of some large ships. Then the coal trade is reported as being steadier, and those trades which give employment to the cheese-consuming population are in a better condition now than they were in 1894. Therefore our customers will be better able to buy our goods at higher prices than last year. It will be allowed that between eight and nine cents are fair prices for cheese made in May and June. If the cheese go forward and into consumption at those prices they can be retailed at sixpence per pound. That would mean a practically unlimited increase in the rate of consumption of cheese, so that the market can take care of an enormous quantity at that price. Last year instead of the cheese going forward at that price they were held in cold storage here and some of the people were compelled to eat something else because they would not buy cheese above sixpence a pound. Another reason is that we are having a constantly improving reputation, so that more people want Canadian cheese than before. Now adding all these things together, in my opinion the market prospects now are a great deal stronger than they were at this time last year, and I see no reason at all to look forward to a year of very low prices in the cheese market. The main thing that needs to be corrected at the present time is that feeling of timidity on the part of the farmers and on the part of buyers which makes them suppose that the British markets cannot afford more than seven cents a pound for cheese. This week cheese is selling at seven and seven and a half cents, and I see no reason why we cannot send cheese to Great Britain to be retailed at sixpence per pound, leaving us an advancing market for our cheese throughout the season. At ten cents per pound here, our cheese will still be cheap food in Great Britain.

NUTRITIVE VALUE OF FOOD PRODUCTS.

I have put on a chart illustrations by lines of different lengths of the food value of twenty-five cents' worth of several common foods. The black line represents calories, indicating the force value or the fuel value of the food. A calorie is a unit designating the amount of heat which would raise the temperature of a pound of water four degrees

Fahrenheit. The number of calories which a man needs to sustain him at hard labour is about 3,500 per day. In twenty-five cents' worth of beef at fifteen cents per pound the food value is equal to 1,620 calories. The food value of one dozen eggs at fifteen cents per dozen is 1,860 calories. The food value of five quarts of milk at five cents a quart is 4,062 calories. The food value of twenty-five cents worth of cheese at fifteen cents a pound is 3,455 calories, so that a pound of cheese is the equivalent of about 2½ pounds of the best beef you can buy for food purposes. That is why the Englishman's diet of bread and cheese gives him a well balanced ration at the very lowest cost. That is the reason, you see, why although the cheese market may temporarily pay a low price for it, a large output of cheese is a safe thing in coming years, because it is a cheap food compared with other foods. Men who have to study economy in buying, buy the foods which they like best and which at the same time contain the largest quantity of nutrients for the price paid for them.

TABLE I.*

Nutritive Ingredients contained in twenty-five cents' worth.	Albumin- oids.	Carbo-hy- drates.	Fat.	Calories.
	Lbs.	Lbs.	Lbs.	
Beef, sirloin, 15 cents per lb.....	.25	.....	.27	1,620
Eggs, 15 cents per dozen.....	.34	.....	.29	1,860
Milk, 5 cents per quart.....	.45	.58	.50	4,062
Cheese, 15 cents per lb.....	.47	.03	.59	3,455
Butter, 25 cents per lb.....	.01	.....	.85	3,615
Skim milk, 3 cents per quart.....	.72	1.00	.07	3,495
Oatmeal, 3 cents per lb.....	1.22	5.70	.59	15,370
Beans, 5 cents per lb.....	1.16	2.96	.10	8,075
Cornmeal, 3 cents per lb.....	.77	5.88	.32	13,705
Wheat flour, 3 cents per lb.....	.91	6.24	.09	13,705
Wheat bread, 5 cents per lb.....	.44	2.82	.08	6,400
Potatoes, 1 cent per lb.....	.45	3.80	.02	8,000
Rice, 6 cents per lb.....	.31	3.31	.02	6,795
Sugar, 5 cents per lb.....	.....	4.89	.....	9,100
Standard ration per day for man at moderate work.....	.28	.90	.30	3,455

* For some of the information in Tables I and II, I am indebted to Farmers' Bulletin No. 23, by W. O. Atwater, Ph.D., issued by the United States Department of Agriculture, Washington, D.C.

TABLE II.³

NUTRITIVE Ingredients contained in twenty-five cents' worth.

	Albuminoids.	Carbo-hydrates.	Fats.	Calories.
Beef, sirloin, 15 cents per lb.				
Eggs, 15 cents per dozen.				
Milk, 5 cents per quart.				
Cheese, 15 cents per lb.				
Butter, 25 cents per lb.				
Skim milk, 3 cents per quart.				
Oatmeal, 3 cents per lb.				
Beans, 5 cents per lb.				
Cornmeal, 3 cents per lb.				
Wheat flour, 3 cents per lb.				
Wheat bread, 5 cents per lb.				
Potatoes, 1 cent per lb.				
Rice, 6 cents per lb.				
Sugar, 5 cents per lb.				
Standard Ration per day for man at moderate work.				

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Calories.

- 1,620
- 1,860
- 4,062
- 3,455
- 3,615
- 3,495
- 15,370
- 8,075
- 13,705
- 13,705
- 6,400
- 8,000
- 6,785
- 9,100
- 3,455

23, by W.

The nourishing constituents of food may be considered under two main heads:— The albuminoids, sometimes called "protein," "proteids," or "nitrogenous compounds," are those which contain about sixteen per cent of nitrogen. They get the name albuminoids from a typical albuminoid, well-known to us as albumen, the main constituent in the white of eggs. Albumen is also a constituent of milk. It composes the thin film which is coagulated when milk is heated above scalding point. The albuminoids are the "flesh-formers" in foods; and, while they may be consumed to produce heat in the body, their main function is to nourish and repair the muscles, nerves, skin, and other parts of the body which contain nitrogen.

In contradistinction to the albuminoids are the "heat producers." These are the carbo-hydrates and fats of foods. They are the starch, sugar and gums which are obtained in vegetables, cereals, fruits, etc., and the fat which we obtain in the form of the fat of meat, the butter-fat of milk, or the oils from grains and other plant sources.

The term "nutritive ratio" is the one used to denote the proportion of albuminoids or flesh-formers in food to the sum of the other nutrients in the food. The heat-producing or fuel value of fat in food is two-and-a-quarter times as great as that of carbohydrates, such as starch and sugar, and also two-and-a-quarter times greater than albuminoids.

That the "flesh-forming" and "heat-producing" parts of our food should be in correct proportion to each other is important for the health and well-being of the race. In the food of the well-nourished peoples of Europe the proportion is about 1 of the "flesh-forming" to 4 of the "heat-producing," or 1 to 6. In the diet of Americans the ratio is usually from 1 to 6½, or from 1 to 8 or 9. In our experimental work in the feeding of animals we find that it is never economical to feed animals which are being kept for profit through increase in weight or the production of milk upon a ration which has a very wide nutritive ratio. In the fattening of swine upon foods with a wide nutritive ratio, such as would exist in Indian corn, a very much greater proportion of lard or fat to the lean meat is produced in the animals, than when similar animals are fed upon a diet containing a larger proportion of flesh-forming material, as in ground peas, oats, barley or wheat, with a little skim milk. The vigour, healthfulness, and apparent contentment of the animals, as well as their profit yielding capacity, are in a large measure determined by the proportion which these two classes of nutrients bear to each other, as well as to the palatability and digestibility of the food which is consumed. I think that the same principle might correctly and beneficially be applied for the guidance of people in purchasing and preparing food for themselves. We have been studying on the experimental farms the best methods for supplying plant-food to plants, in order that they may give us the most desirable returns in quality, size and appearance. We have been carrying on extensive experiments upon the methods of feeding domestic animals to discover what foods yield the best increase in live weight, or through the giving of such products as milk. I think the Department of Agriculture might carry the investigations a step further and provide for an examination of the most economical and beneficial foods for nourishing the people through these plants and animals which are grown and fed for that ultimate purpose. It does not seem wise to stop this investigation at a point where they might, by being continued, become capable of rendering the largest, widest and most lasting service to the people. Information of this nature is what would help to make the nation stronger in the physique and personality of its people, as well as richer in the realizations from its resources. This is one reason why I believe in promoting the making of good butter and fine cheese. These have high values as foods, and can be easily used with other portions of our diet to make well-balanced and nutritious meals at a low cost to the people. If you look for a moment at the chart, you will observe that oatmeal and milk are among the best balanced foods that can be obtained, particularly during the growing period of life, and they have the decided advantage of being cheap. I have observed the diets of some of the people of Canada, who cannot afford to buy extravagantly or carelessly, and I find that I can buy for twenty-five cents considerably more nourishing food than many of these poor people, who do not know anything about the nutritive value of foods, buy for one dollar.

If we can help the people to understand these things and the principles which underlie them, and thus teach them how they can get more value for their money, we shall make our country more prosperous and better worth living in.

Mr. O'BRIEN—I would like to ask the Dairy Commissioner's opinion on the branding of cheese.

The CHAIRMAN—I think it might be well for us to call Prof. Robertson again, when he can enter into that subject much more fully than would be possible to-day.

Prof. ROBERTSON—Without discussing the general question there is one observation I may make. At Brockville the other day there seemed to be a feeling on the part of the dairymen that they would like to be represented by a deputation before this committee. I know also that the Honourable the Minister of Agriculture would gladly receive a deputation of these gentlemen. If it be decided to invite them to Ottawa, I think the Dairymen's Boards of Trade would be represented from Belleville, Kingston, Brockville, Montreal, London, Ingersoll, Listowel and other places.

By Mr. Cochrane :

Q. Are they the makers or buyers of cheese?—A. Nearly all of the members are the salesmen who represent the factories, and in the membership are also the men who buy cheese. I am given to understand that the Cheese and Butter Association of the Montreal Board of Trade, which represents the buyers, also wishes to be represented.

Having examined the preceding transcript of my evidence, I find it correct.

JAS. W. ROBERTSON,

Dairy Commissioner.

APPENDIX to evidence of Jas. W. Robertson, Dairy Commissioner, before the Select Standing Committee of the House of Commons on Agriculture and Colonization.

ON THE MAKING OF BUTTER.

A thimbleful of milk of average quality contains over ten millions of globules of butter-fat. They are lighter than the liquid or serum of the milk, in which they float, and when it is left at rest they rise to the top. Cream is only that part of the milk into which the globules of fat are gathered in larger numbers than they are in the whole milk. It has no constant or regular percentage of butter-fat. There may be only 8 pounds or there may be 75 pounds of butter-fat in 100 pounds of cream.

SEPARATING THE CREAM.

Two methods of separating the cream from milk are in common use; one is known as the natural or setting method, and the other as the mechanical or centrifugal method.

In the natural method, the force of gravitation attracts the heavier portion of the milk, commonly known as skim milk, downwards in the vessel which contains it, with the result that the globules of fat are pushed upwards towards the top. The serum of milk is the name given to the heavier portion consisting of water, containing the casein, albumen, sugar and ash, nearly wholly in solution in it. Sometimes the serum becomes viscous or sticky, and a small quantity of it adheres to the surface of the globules of fat, and like a coating of gum hinders their movement upwards.

A small quantity of lacto-fibrin occurs in milk after it is drawn from the cow, and its delicate mesh is similar to the fibrin which forms in blood, causing it to clot after it is drawn from an artery or vein. That also retards the separation of the globules of fat into cream.

In the mechanical method, centrifugal force is applied to the milk in a metallic bowl which is made to revolve very rapidly, in some machines at a rate of over 7,000 revolutions per minute. By the force thus applied, the serum of the milk is thrown outwards against the resisting inside of the bowl, and the globules of fat are pushed inwards towards the centre. In the form of cream they are then conducted by a mechanical device into one vessel, while the serum, which is practically the skim milk, is conducted into another vessel. The machine which is used for this purpose is called a centrifugal cream separator.

The following paragraphs are based upon the information derived from tests conducted at the experimental dairies, of which particulars are contained in the annual reports of the Experimental Farms and Dairy Commissioner.

THE SETTING OF MILK.

1. All milk should be carefully strained immediately after the milking is completed.
2. When shallow pans are used, they should be placed in a room with a pure atmosphere, at a temperature as even as possible at between 50° and 60° Fahr.
3. When deep-setting pails are used, the water in the creamer or tank should be kept below 45° Fahr. or as near 45° Fahr. as is practicable. It is advantageous to have a supply of ice for use in the water.
4. When an abundant supply of cold water from a flowing spring is not available, the cooling power of fresh cold water may be applied economically by conveying it in a pipe to the bottom of the tank or creamer, and allowing the warmed water to run off

from the top. If the water be scarce, the overflow may be carried into a watering-trough for the live stock of the farm.

5. It is advantageous to set the milk as soon as practicable after it is drawn from the cows.

In a test with deep-setting pails, it was found that the quantity of butter fat not recovered in the cream, and consequently left in the skim-milk, was 11.48 per cent greater when the setting of the milk in ice water was delayed one hour, than it was set immediately after it was drawn.

6. There was not much difference in the percentage of butter-fat recovered into the cream, due to the temperature at which the milk was set, when between 88° and 98° Fahr. The loss of butter-fat unrecovered from the skim-milk was 2.53 per cent greater when set at 78° than when set at 98° Fahr.

7. The milk should be left undisturbed for about 22 hours. The quantity of butter-fat not recovered into the cream was 8 per cent greater when the milk was set for only 11 hours than when it was set for 22 hours, in deep-setting pails in ice-water.

8. With ordinary milk, there is no gain from adding water "to thin it" when it is set. There was practically no difference in the percentages of butter-fat not recovered into the cream when, (1) 25 per cent of water at 160° Fahr. added to the milk, (2) 25 per cent of water at 60° Fahr. added to the milk, and (3) no water added to the milk, were the differences of treatment in the setting of milk, in deep-setting pails in ice water.

CREAMING MILK FROM COWS CALVED MORE THAN SIX MONTHS.

9. The milk from cows which have been milking more than six months does not yield its cream so readily as the milk from cows more recently calved.

During the cold weather of autumn and winter, by the setting of milk (in deep-setting pails, in cold water, at a temperature of 38° to 40° Fahr., for 22 hours) from cows which had been milking for periods of from 6 to 12 months, about 33 per cent of the total quantity of butter-fat in the milk was left in the skim-milk.

Where the milk of one fresh-calved cow was added to the milk of eight cows which had been milking for periods exceeding 6½ months each, and the milk set as stated above, about 14 per cent of the total quantity of butter-fat in the milk was left in the skim-milk.

When the milk of cows, which had been milking for periods of less than 6 months each, was set as stated above, from 7 to 15 per cent of the total quantity of butter-fat in the milk was left in the skim-milk.

During the autumn and winter when the milk from cows which had been milking for periods of more than 6 months each was set in shallow pans for 22 hours, from 5 to 15 per cent of the total quantity of butter-fat in the milk was left in the skim-milk.

By the use of the centrifugal cream separator all the butter-fat in the milk, except about 3 per cent of the total quantity, may be recovered into the cream, from the milk of cows at all stages of lactation and during all seasons of the year.

SEPARATING CREAM BY THE CENTRIFUGAL METHOD.

10. The milk for the separator should be carefully strained and heated to a temperature of 80° or 85° Fahr. If it be used at a lower temperature, the cream is apt to become thick and clotted in the separator. Cold milk has a greater density than milk at a higher temperature; the higher the temperature up to 85° Fahr., the greater the efficiency of the separation of cream, all other conditions being equal.

11. Particular care should be exercised to prevent the use of any bitter milk. If any appreciable quantity of bitter milk be mixed with the general supply, the result will be a yield of butter which is likely to be more or less bitter in flavour. In very bad cases, the butter may become quite oily. These are both serious defects.

12. Where the heating and cooling conveniences are rather limited, the milk may be separated at a temperature of 80° Fahr.; but in those cases, the inflow of milk should

be lessened and be regulated according to the percentage of butter-fat which is discovered to be left in the skim milk. That should not exceed one-tenth of one per cent. The Babcock milk tester should be used every day to check the percentage of fat in the skim milk and in the buttermilk. For the testing of the skim milk, the sample should be composed of small quantities taken from the outflow of the separator at different times.

13. The efficiency of the separation of the cream depends largely upon the skill and management of the operator, although there are differences in the capacity and construction of the different centrifugal machines. The thoroughness of the separation of the fat into the cream depends mainly upon (1) the speed at which the separator is run (2) the temperature of the milk, and (3) the quantity of milk run through per hour. The operator should study carefully the instructions which are issued by the manufacturer or agent of the separator which he uses. It is desirable that the separator be run at its maximum speed, and that it be not exceeded. The separator should be set exactly level, and it should be kept so. Where belt machines are used, the belts should not be intensely tight; and in setting up the machines and calculating the speed between the engine and the separator bowl, from 3 to 5 per cent should be allowed for slippage of belts.

14. When the quantity of cream to be separated can be regulated by a set-screw in the bowl, it should be set to allow from 14 to 16 per cent of the quantity of average milk to flow through the cream outlet. A good rule is to take off cream which contains from 20 to 25 per cent of butter-fat, or cream which contains about one pound of butter to from $3\frac{1}{2}$ to 5 pounds of cream. The set screw inside the machines should be loosened occasionally, to prevent it from becoming immovably set.

THE RIPENING OF THE CREAM.

15. The cream from the centrifugal separator should be cooled quickly after it is received from the machine.

16. The cream from the setting method should be kept cold and sweet until the quantity intended for one churning has been gathered.

17. The temperature of the cream, when set to be ripened, may vary from 65 to 80 degrees Fahr. according to the season; the higher temperature is used during the late fall and winter.

18. The temperature at which the cream is set for ripening should be maintained about six hours, during which time it may be stirred occasionally. After that, it should be left undisturbed until ripe for churning. No close cover over the cream vat need be used. A clean canvas cover is sufficient. Care should be taken to purify the canvas or other cover frequently.

19. "Fermentation starter" is the designation applied to the portion of fermented or sour milk, buttermilk or cream, which is added to the cream to ripen it for churning. The ripening of the cream consists of the development of the ferment or ferments which are added to it, or which get into it from the atmosphere, from contact with vessels or utensils, or from other sources.

20. It is quite important that every butter-maker should have on hand a fermentation starter of pure clean flavour, and of a uniform smooth consistency.

21. The following is the way in which a culture of lactic ferment was made at the Central Experimental Farm dairy, from which "fermentation starters" were prepared:—

A quantity of about two quarts of skim milk was heated to 205° Fahr. The temperature was maintained at that point for ten minutes after which, and while exposed to the atmosphere of the butter-making room, it was cooled to 80° Fahr. It was left in a closed glass-stoppered bottle at the ordinary temperature of the dairy-room, from 60° to 70° Fahr. for five days. It was then found to be coagulated and to possess a mild pure lactic-acid flavour, which became more distinct after it had been kept in cold water at a temperature of 40° Fahr. for three days. That was the culture. The flavour of it was such as was characteristic of cream from which fine flavoured butter had always been obtained; and "fermentation starters" for the ripening of cream were prepared from it.

22. A "fermentation starter" may be prepared from skim milk which is pure, sweet and free from taint. It should be heated to 150° Fahr. and left at that temperature for ten minutes. It may then be cooled to a temperature of 80° Fahr., when a portion of the culture, as described above, at the rate of ten per cent of the quantity of the skim milk should be added to it. That becomes the "fermentation starter."

23. The "fermentation starter" should be left to ripen at a temperature not exceeding 80° Fahr. for 20 hours. When the flavour and odour are distinctly acid, it should be placed in cold water at a temperature of 40° Fahr. in order to arrest a further development of the ferment.

24. The bacteria cultures for the making of "fermentation starters" may now be obtained also in the market from firms who deal in dairy supplies.

25. Where no undesirable flavour exists and no difficulty has been experienced in churning, some buttermilk of pure, nice flavour may be used as a "fermentation starter" for the cream. If at any time the flavour of the butter seems to deteriorate from that method, a new "fermentation starter" should be secured, as described in paragraphs 21 and 22.

26. The "fermentation starter" may be added to the cream at the rate of from five to ten per cent of the quantity of cream.

In any case where the cream has become somewhat tainted, if the taint be of fermentation origin, a larger quantity than usual of the fermentation starter should be added. This may in a great measure check the development of the taint and leave the particular fermentation of the starter which is added, to be the prevailing one in the cream and butter.

27. If for any reason it is desired to churn the cream while sweet, the churning should be commenced at a temperature of five to eight degrees colder than for the churning of sour cream. In all our examinations, the butter from sweet cream has been rated from two to three points lower in valuable commercial flavour than butter from a portion of the same cream which had been ripened or soured.

28. Although it is usually not desirable that turnips should be fed to milking cows, when they are fed, the odour and flavour may be prevented from appearing in the butter.

In a trial which was made from the milk of cows which were being fed the excessive quantity of 90 pounds of turnips per head per day, the odour and flavour of turnips was not perceptible in the butter which was made after the following treatment was given to the cream:—

The cream was heated at 150° Fahr. and stirred at that temperature for ten minutes while it was still sweet. It was afterwards cooled, ripened and churned in the usual way. A portion of the cream from the milk of the same cows was ripened and churned in the usual way without being heated above 68° Fahr.

The butter obtained from the cream which was not heated above 68° Fahr. had a distinct odour and flavour of turnips; while the butter obtained from the cream which was heated to 150° Fahr. was excellent in odour, flavour and grain, and was without any perceptible odour or flavour of turnips.

From the cream heated to 150° Fahr. before being ripened for churning, eight-tenths of one pound less of milk was required to yield each pound of butter, than from the cream from a portion of the same milk which was not heated above 68° Fahr.

29. It has not been found advantageous to thin the cream by adding a quantity of water to it before it is churned or before it is ripened. Quantities of water were added to cream at the different rates of 10, 20, 25 and 30 per cent of water added; and the conclusions were that (1) the churning was slightly less efficient in the recovery of the butter-fat, (2) the quantity of marketable butter obtained per 100 pounds of milk was one ounce less, (3) the butter was not so firm or solid in the grain, and (4) the churning period at an equal temperature was longer by from one minute to thirty minutes, when water was added to the cream than when cream was churned without the addition of water.

CHURNING.

30. The preferable degree of ripeness in the cream will be indicated by the following points,—a mild, pleasant acid taste, a uniformly thick consistency, and a glossy appear-

ance, somewhat like white oil paint. If not at the exact temperature desired for churning, it should be cooled or warmed to that point, which may range from 54° to 58° Fahr. according to the season. It should be strained into the churn and the churn should not be filled to more than two-fifths of its capacity.

31. If butter colour is to be used, it should be added to the cream before the churning is commenced.

32. The regular speed of a factory revolving churn should be about 65 revolutions per minute; and when butter granules are formed in the churn, a few gallons of weak brine (salt and water) should be added, to assist in the separation between the granules of butter and the buttermilk, and also to give a firmer body to the butter.

33. The churning should then be continued until the granules of butter become a little larger than clover seed. The buttermilk should then be drawn off and a quantity equal to the buttermilk, of pure cold water, at a temperature of from 50° to 58° Fahr., according to the season, should be put into the churn, for the purpose of washing out the buttermilk from the butter granules. The churn should receive a few quick revolutions, and the water should be drawn off immediately. Attention to this is of some importance, as the water will contain more or less curdy matter, which, if allowed to settle on the sides of the churn, forms a film there, where it is apt to adhere to the butter when that settles gradually as the water is drawn off.

34. After the butter has been left to stand for some 20 minutes, it should be salted at the rate of from one-quarter of an ounce of salt per pound of butter, to one ounce of salt per pound of butter, according to the preferences of the market which is to be supplied. The very finest quality of pure butter salt only should be used. That which is of a uniform fineness of grain and velvety to the touch is suitable.

35. Care should be taken to prevent the salt from being exposed to an atmosphere that may leave on it impurities causing foul odours and taints, as these may readily be introduced into the butter by that means.

THE WORKING OF THE BUTTER.

36. After the butter is salted it should be left for 2 or 3 hours, to allow the salt to dissolve. Then, by a second working, the excess of moisture may be expelled, the salt thoroughly mixed, and any streakiness in colour corrected. Care must be taken that the butter be not overworked and made greasy. This may result from the butter being worked at a temperature either too high or too low. Where practicable, it should be worked at a temperature which leaves it in a waxy condition, causing it to bend about one-half towards the under layer when it is being doubled on the butter worker. A temperature of 50° Fahr. will usually put the butter in the best condition for being worked. Sometimes injury results from a larger quantity being placed on the butter worker than can be handled conveniently.

PREPARING PACKAGES AND PACKING THE BUTTER.

37. Where the butter packages are not tinned or paraffine lined, they should be filled with strong hot brine and left to soak for a day. The brine may be used several times if boiled each time. The insides of the packages should be lined with butter cloth or parchment paper—preferably the latter. The package will then be ready for filling.

38. In packing, the butter should be pressed against the side of the package, keeping it slightly hollow in the centre of the package, the object being to pack the butter so close to the side that no air spaces will be left between the butter and the package. These are often seen when a tub or box of butter is "stripped." Care must also be exercised in using the packer, not to move the butter more than is really necessary to make it compact. When the package is filled, the surface should be smoothed with a hardwood ladle or scraper, and then covered with fine butter cloth or strong parchment paper.

CLEANING THE UTENSILS.

39. In the washing of churns and all other vessels for milk or cream, they should first be rinsed with cold or tepid water. The addition of washing soda, or a small quantity of borax to the water, will increase its cleansing properties. They should then be washed with warm water, and scalded with water "boiling hot." The use of a brush for the cleansing of dairy utensils is much preferable to the use of a dishcloth.

40. All wooden utensils and vessels should be scalded, cooled and dipped into cold water before they are used. Small wooden utensils should be kept floating or immersed in cold water.

41. Where closed drains flow from a dairy or creamery, they should be flushed out occasionally with a strong solution of concentrated lye, followed by hot water.

I certify this correct as an appendix to my evidence.

JAS. W. ROBERTSON,

Dairy Commissioner.

