To my highly-esteemed
friend Mr John Lowe,
in grateful recognition and
remembrance of his wise and
kindly counsels which were
invaluable to me in carrying
to successful issues the work
for the public good, reported
upon in these volumes:-

1890 to 1895.

J. A. N. Robertson

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE.

FIRST ANNUAL REPORT

OF THE

DAIRY COMMISSIONER

FOR THE

DOMINION OF CANADA.

(AFFILIATED WITH THE CENTRAL EXPERIMENTAL FARM.)

REPORTS OF

JAS. W. ROBERTSON, DAIRY COMMISSIONER,—OTTAWA ;
J. C. CHAPAIS, ASSISTANT DAIRY COMMISSIONER,—ST. DENIS, QUE. ;

FOR

1890.

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1891

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APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

BEING

REPORT OF THE DAIRY COMMISSIONER.

OTTAWA, 30th January, 1891.

To the Honourable
The Minister of Agriculture,

SIR,—I have the honour to submit the First Annual Report of the Dairy Commissioner for the Dominion of Canada.

The initiatory movement which afterwards led to the creation of the Office of Dairy Commissioner, had not that purpose in view at its commencement. To give permanency to a record of the occurrences which led on to that end, a brief statement of them is introduced here. By a series of letters to the press, Mr. W. H. Lynch, of Danville, Que., who had acquired a wide and honorable reputation through his book "*Scientific Dairy Practice*," began an agitation in favor of the organisation of a Dairymen's Association for the Dominion of Canada. That culminated in the assembling at Ottawa of delegates from all the Dairymen's Associations in the several provinces on 9th April, 1889.

CONVENTION AT OTTAWA.

By the courtesy of the Speaker of the House of Commons, the meetings were held in one of the committee rooms. The following Associations were represented:—

The Dairymen's Association of Western Ontario;
The Dairymen's Association of Eastern Ontario;
The Dairymen's Association of the Province of Quebec;
The Creameries' Association of Ontario;
The Dairymen's Association of Nova Scotia;
The Dairymen's Association of Manitoba;
The Provincial Farmers' Association of New Brunswick.

Mr. H. S. Foster, Knowlton, Que., was chosen provisional president, and Mr. J. de L. Taché, Quebec, was elected secretary of the meeting.

After discussion a resolution was unanimously adopted in favor of the organisation of a *Federal Dairy Association.* A committee on organisation was formed by the appointment of the gentlemen whose names follow:—

Messrs. D. M. Macpherson, Louis Beaubien, W. H. Lynch, J. C. Chapais, E. Casswell, P. B. de la Bruère, Ed. A. Barnard, and Major Boulton.

At a subsequent session the following recommendations of the committee were adopted:—

I. "The name of the new association shall be: 'The Dairymen's Association of the Dominion of Canada.'"

II. "The aim of the Association shall be to promote the general interests of the dairy industry in the Dominion of Canada."

III. "In order to become a member of this Association it shall be necessary for the applicant to be a member of one of the regular District or Provincial Associations, except in the case of Senators and Members of the House of Commons who shall be *ex-officio* members of the Association."

IV. "The Association shall be under the control of a President, a Vice-President for each of the Provincial Associations, a Secretary, a Treasurer, and three Directors for each of the Provinces of the Dominion, in conformity with the Act of Incorporation, all of whom shall compose a Board of Directors of the Association, and report to the said Association at its general meeting."

(This recommendation was afterwards amended by allotting four Directors to Ontario and four to Quebec.)

The election of the Officers of the new Association was proceeded with and resulted in the choice of:—

President:—Mr. D. M. Macpherson, Lancaster, Ont.
Vice-Presidents:—The Presidents of all the Provincial Dairymen's Associations.
Secretary:—Mr. J. C. Chapais, St. Denis, Que.
Treasurer:—Mr. H. S. Foster, Knowlton, Que.

DIRECTORS.

Ontario:—

Mr. Wm. H. Eager, South Mountain, Ont.
Mr. James Haggarty, West Huntingdon, Ont.
Mr. E. Casswell, Ingersoll, Ont.
Mr. Thos. Ballantyne, M.L.A., Stratford, Ont.

Quebec:—

Hon. Louis Beaubien, Montreal, Que.
Col. Ora N. Patten, Brome Corners, Que.
Mr. M. Bernatchez, Montmagny, Que.
Prof. Ed. A. Barnard, Quebec, Que.

New Brunswick:—

Mr. Julius N. Inches, Fredericton, N.B.
Mr. Arthur C. Fairweather, Rothsay, N.B.
Mr. George Fawcett, Sackville, N.B.

Nova Scotia :—

Mr. L. C. Archibald, Antigonish, N.S.
Mr. Paul C. Black, Falmouth, N.S.
Mr. John McKeen, Mabou, Cape Breton, N.S.

Prince Edward Island :—

Hon. Alexander Laird, Bedeque, P.E.I.
Hon. D. Ferguson, New London, P.E.I.
Mr. John Hamilton, New Perth, P.E.I.

Manitoba :—

Major Boulton, Shellmouth, Man.
Prof. S. M. Barré, Winnipeg, Man.

North-West Territories :—

Mr. J. P. Dill, Wolseley, N.W.T.

At a later session it was " moved by Major Boulton, seconded by Mr. E. Casswell, and resolved that the Government be requested to appoint a *Dairy Commissioner*, whose duty it shall be to watch over the interests of the dairy industry of the Dominion of Canada. Carried unanimously."

Agricultural Committee.

On the morning of the second day of the Convention, an invitation from Mr. Peter White, M.P., Chairman of the House of Commons Committee on Agriculture, accorded the Association the privilege of laying its views before that committee at one of its sessions.

Messrs. D. M. Macpherson, Louis Beaubien, D. Derbyshire, E. Casswell, Ed. A. Barnard and Jas. W. Robertson addressed the committee and answered enquiries from its members.

Action was taken by the Committee on Agriculture, as set forth in the following resolutions, which were adopted unanimously :—

" Moved by Mr. Thos. S. Sproule, M.P., seconded by Mr. Samuel R. Hesson, M.P., and resolved : ' That in view of the extension and importance of the dairy industry of Canada, and the necessity of protecting its interests, the Committee thinks it its duty to recommend the appointment of a Dairy Commissioner, whose duty it shall be to watch over and promote, as far as possible, the progress of the different branches of this important part of the national industry.' "

" Moved by Mr. S. A. Fisher, M.P., seconded by Mr. Alex. McNeil, M.P. and resolved : ' That the Committee has learned with satisfaction of the organisation of the Dairymen's Association of the Dominion of Canada, and is of opinion that, considering the general advantages which must be derived from the labours of this Association, and the extensive programme which it has to go through, every possible encouragement should be afforded to it.' "

Deputation to the Government.

During the evening of the second day, an audience was granted by the Premier, the Right Honourable Sir John A. Macdonald, and the Honourable Messrs. Carling, Mackenzie Bowell and Costigan, to a deputation from the Association.

Messrs. T. S. Sproule, M.P., and Adam Brown, M.P., introduced the members composing the deputation and also spoke in favour of the requests which were afterwards preferred by Messrs. Macpherson, Foster, Lariviere and Prof. Robertson.

Rt. Hon. Sir John A. Macdonald discussed the matters presented to his notice. In effect, he intimated that he was well acquainted with the progress of the dairy industry in the Dominion of Canada; he knew that its success was identified with the welfare of the farmers in large areas, and therefore as it prospered it became a promoter of national prosperity; he knew that the manufacture of cheese had been improved more than that of butter-making, and he advised the new Association to try to improve the butter produced in the Dominion; he recognized the probable usefulness of a *Dairy Commissioner*, and would confer with his colleagues on the advisability of appointing such an officer. He asked Prof. Robertson to submit to him a memorandum on the matters which had been presented by the deputation.

The following is a copy of the memorandum which I had the honour to prepare and submit:—

Memorandum of the arguments presented by the Deputation from the Dairymen's Association of the Dominion of Canada, who had the privilege of waiting upon the Right Honourable Sir John A. Macdonald, G. C. B., Hon. John Carling, Hon. Mackenzie Bowell and Hon. John Costigan, for the purpose of urging upon the Government;—

1, The desirability of granting a sum of $3,000 to the said Association to be used by it, to aid in the further extension and profitable development of the dairy interests of the farmers of Canada; and

2. The advisability of appointing a Dairy Commissioner for the Dominion of Canada.

The deputation considered itself most happy in being privileged to bring the wishes and needs of the Dairymen's Association of the Dominion of Canada before the Government by an interview with two of its illustrious members, the Right Honourable Sir John A. Macdonald and the Honourable John Carling, Minister of Agriculture, who are everywhere known as taking a deep interest in all that concerns the welfare of the agricultural community.

It would be superfluous to recount the unequalled importance of the Agricultural interests in the Dominion. However, occasion is taken to very briefly remind the Government of the great value of dairy husbandry to the farmers and all classes of the population. Dairy farming as a branch of Agriculture is becoming more fully recognised as the permanently profitable method of obtaining satisfactory returns from farm products, without exhausting the fertility of the fields.

The Dairy Industry as represented by the 1,300 odd co-operative cheese and butter factories of the Dominion is not the least of our manufacturing interests.

Since it is the farmers' special sphere, in the following of their occupation, to provide food and the raw material for clothing for the rest of the race, whatever enables them to do these best thereby operates for their profit and benefit.

(*a*) Dairy farming increases the available food supply per acre. Taking for illustration the wheat crop, it is evident, that not more than half the possible life-sustaining value of the crop resides in the flour prepared for human food. The other parts of the crop—the straw, the chaff, and the bran—which are unpalatable, unsuitable and indigestible for man, can be profitably fed to dairy animals and by them transformed into milk, butter, cheese or beef. In that way, from the one crop largely, by the use of cows, the farmers are able to provide both bread and butter.

(*b*) Dairy farming enables farmers to sell their labour and their skill to more advantage, while retaining the substances of plant food in the soil. When wheat, to the amount of one million of bushels, is exported, at least $240,000 worth of the fertility of the fields has been removed in the grain. Whereas when fine butter, to the value of one million of dollars is exported, not more than $750 worth of these valuable elements of plant food has been taken from the country.

(*c*) Dairy farming provides remunerative occupation for a larger agricultural population. Since population alone gives value to property, dairy farming when generally engaged in, increases the value of all properties in the locality.

(*d*) By means of dairy farming, the fertility may be restored to exhausted soils and those of virgin richness may be saved by it from becoming barren or impoverished. Instances of that beneficial result, from the method of farming that is being recommended, may be cited from those counties in Quebec and Ontario that have extensively engaged in dairying. The condition of the lands in many other sections, where a sufficient number of cattle to consume the fodders and coarse grains have not been kept, is full of admonition and warning for the settlers in the Western Territories and Manitoba.

(*e*) Dairy farming enlarges the earning power of land per acre. By it the farms are made to be more of the nature of mediums through which the farmers are able to dispose of their labor and skill to advantage, and less of the nature of mines to be bagged up, piecemeal, aud their virtue shipped off to other lands.

(*f*) Additional marketable value is thus also put into the lands devoted to such uses. Already it is safe to state that a suitable farm situated within three miles of a cheese factory or butter factory will sell for $10.00 per acre more than the same farm or one like it would bring, twenty miles distant from either of these factories.

(*g*) The direct cash income of the farmers is added to, from milk butter cheese, beef and pork, without any lessening of the possible receipts from sales of cereals. A smaller acreage under cultivation will give a larger return in grain. The thoughtful improvement of dairy cows will make it possible to grow steers and produce beef at less cost. When a cow leaves a fair profit direct from sales of her milk product, her calves can be reared at less expense than when the whole milk of the cow of inferior milking power is consumed by her offspring.

(*h*) Dairy farming encourages and promotes co-operation among the farmers for their mutual profit. The confidence thus inspired in each for the others, begets a desire for the exchange of information and judgments on all other matters relating to agriculture. The Farmers' Institutes, which are now so popular all over this continent, are largely the outgrowth of the co-operation of dairymen, and they are everywhere found at the very front in that work.

(*i*) In the rearing and feeding of stock, there is offered scope for the application of the highest order of intellect to farm work, and thus a love for agricultural pursuits may be generated in the minds of boys, who would otherwise flock to join the ranks of city denizens who are less sure to aid in their country's development and in the securing of a competence for themselves.

(*k*) Dairy farming can be a hopeful means towards consolidating the factions of the Dominion into one prosperous, contented, progressive people.

(*l*) The dairy industry has done more to adequately and successfully advertise the nature of our country as one desirable to live in, than all other exports or advertising matter. The wonderful success of the Colonial and Indian Exhibition in giving millions of English people an object lesson in the variety and excellence of our farm products, merits a reference in this connection. Unquestionably much of that gratifying success was due to the energy and tact of Sir Charles Tupper. The exhibition of dairy products contributed not a little in winning a favorable judgment towards Canada from many desirable emigrants.

(*m*) While dairy farming had in it such capabilities to serve our country well, both at home and abroad, it languished until Provincial Dairymen's Associations were formed to foster its development. These associations in Quebec, Ontario, Manitoba and Nova Scotia, through means of conventions and the employment of experts,

have sought to bring to light a knowledge of better methods of how to make richer fields, more suitable fodders and crops, more productive cows and improvement in the ways of managing, feeding and caring for stock as well as in the processes of manufacturing and handling the product. By contributions of information, encouragement has been given to backward districts, and enthusiasm in the extension of the business has been created.

What these Associations in the several provinces have done and are continuing to do for the individual farmers and counties, it will be the opportunity and purpose of the Dominion Association to do for the several provinces.

(*n*) It will provide the channels for the passing on to other provinces of the discoveries, improved methods and appliances of each, through the medium of annual conventions, reports and otherwise.

(*o*) It will circulate for the benefit of farmers from time to time, information upon the constantly arising new needs and demands of the several markets for dairy products. Thus a work equally helpful and needful, but in no way trespassing upon the work of the Provincial Associations, would be done. The Presidents of the several Provincial Associations are the Vice-Presidents of the Dominion Association.

(*p*) It will receive reports from exporters upon the general excellencies or defects of the products sent abroad every year, and endeavour to disseminate such information as will enable dairymen to perpetuate and further improve the good qualities and to eliminate the bad qualities by removing or remedying the faults or the causes of such.

(*q*) It will become an easy and effective medium for the communication to the producers, of the proper preparation that shall be made for market, to ensure the best returns. In the matter of butter packages alone, either the apathy or the inability of merchants to bring about the adoption and use of only safe, neat and attractive-looking packages entails a very considerable loss to the country annually.

(*r*) The use of judicious newspaper and other literature to dispel prejudices still existing in some markets against Canadian dairy products as compared with those of English and Danish make will be undertaken by the Association. As a matter of fact, Canadian Cheese is still often sold under the name of English Cheddar. The extra price thus realized from the consumer, does not come to our people.

(*s*) By way of illustrating what has been done in regard to cheese and the possibilities of the market for fine butter, it may be cited that because we manufacture over 99 per cent. of all our cheese in co-operative factories, we are able to send from the Dominion about one third of all the cheese which Great Britain imports from abroad. Mainly because we manufacture less than 3 per cent. of our butter in creameries, does it follow that we furnish to Great Britain less than 2 per cent of all the butter she imports; and Great Britain imports altogether about two and a half times as many dollars worth of butter as of cheese.

(*t*) The Dominion Dairymen's Association will seek to foster and develop the butter trade of the country. No endeavour will be made or should be made to displace the cheese industry by a butter one. Our Country is exceptionally well fitted for the production of cheese during the summer, even if not so well situated as many other and competitive countries for the production of butter for export during that season. It is possible to develop the butter making industry during the winter months to as great magnitude and with more remunerative profits to agriculturists than arise from summer dairying. The possibilities of cheap and suitable winter feed by the use of ensilage, have been so well and satisfactorily demonstrated that now, milk can be produced at less cost during the winter than upon pasture only during the summer. In the winter season, the average price of butter is almost twice as much as during the summer. Safe transportation can be economically provided for, during the cold weather.

(*u*) Thus large sums of money, paid by England to European countries for dairy products, could to an agreeably appreciable extent be diverted to our Dominion in exchange for pure fine butter manufactured in creameries here during the winter.

(*v*) A minor but still valuable advantage from the development of such winter dairying, would be the remunerative employment of the farm workers for the whole year.

For these and other reasons, that might be set forth, a grant of $3,000 is respectfully asked to enable the Association to overtake the work outlined. The expenses of the Convention, which has been in session here for two days, have been paid by the individual delegates and members so as to save the whole of the sum which may be voted for the uses already specified. Through the assistance rendered by local Associations and the enterprise and skill of our citizens, Canadian Cheese stands to-day first in reputation for superior quality. The countries competing with us, in the food markets of the world, are alive to the advantages of that reputation which is alike creditable and commercially valuable to our Dominion.

(*w*) The Danish Government has afforded generous aid to the farming population of that country, in the way of legislating for the prevention of the adulteration of dairy products.

The Legislature of the State of New York last year voted $82,500 for the work of its Dairy Commissioner and Dairymen's Association. Their avowed endeavour is to beat Canada on the British markets. Other States have also provided large annual grants for the same purpose.

(*x*) To be able to hold our own, there is indeed need for a capable Dairy Commissioner.

(*x*2) The practice of slightly adulterating the milk furnished to cheese factories is all too prevalent. From a series of returns received from cheese factories last year, the reports set forth that the managers of these factories thought that eight per cent. of the total number of *patrons* furnished milk of doubtful quality.

(*y*) A Dairy Commissioner who could drop or send unexpectedly into any locality, would effectually deter many individuals from indulging in slightly dishonest practices.

(*z*) The detection and prevention of fraud upon the great number of honest farmers by a few persons in the community, would confer a benefit upon the whole agricultural interests of the Dominion. The action of the Dairy Commissioner would operate to prevent wrong doing and thus largely obviate the need for the infliction of penalties.

(*a*2) The Dairy Commissioner under the direction of the Minister of Agriculture could also be very useful in aiding the Dominion Dairymen's Association to foster, develop and extend the dairy interest of Canada with special reference to furnishing information as to adequate and suitable transportation facilities, the opening up of new markets and the dissemination of knowledge regarding the opportunities and needs of all available new markets. As a case in point, it is already a matter of report, I believe also of fact, that Danish butter, by way of England, has been sent across our continent *viâ* the Canadian Pacific Railway for Japan. Canadian producers should be able to acquire and occupy that market. A little timely information to producers at home and consumers abroad would stimulate and direct the enterprise of commerce to a trade that would be of great value to us.

(*b*2) The Dairy Commissioner could disseminate to the best advantage, the information of real value to dairymen that will arise from the working and investigations of Dominion Agricultural Experiment Stations.

The two points submitted for early and favourable consideration and action, are $3,000 for the Dairymen's Association and the appointment of a Dairy Commissioner.

Officers of the Dairymen's Association of the Dominion of Canada are:—

President.—D. M. Macpherson, Lancaster, Ont.
Secretary.—J. C. Chapais, St. Denis, Que.
Treasurer.—H. S. Foster, Knowlton, Que.
With Vice-Presidents and Directors from each Province.

APPOINTMENT.

Afterwards I had the honour to be informed by direction of the Minister of Agriculture that an Order in Council had been passed, by which I was appointed Dairy Commissioner for the Dominion of Canada, and also Agriculturist of the Central Experimental Farm at Ottawa. The Order in Council referred to, states that: "In view of the great importance to Canada of the Dairy interest, and the fact of the very great extension of both production and trade found to arise from improved methods of manufacture, particularly in cheese, in the Province of Ontario, it is advisable to appoint a Dairy Commissioner, to be affiliated with the Central Experimental Farm at Ottawa, for the purpose of diffusing practical information among the farmers of the Dominion, by means of bulletins, conferences and lectures on the most improved and economical methods of manufacturing butter and cheese, and of feeding cattle to produce the best results in obtaining milk."

My appointment took effect on 1st February, 1890; and from that date I entered upon the discharge of the duties devolving upon me as *Dairy Commissioner* for the Dominion and *Agriculturist* of the Central Experimental Farm. By the kindness of Prof. Saunders, Director of Dominion Experimental Farms, I was relieved from most of the work and responsibility as *Agriculturist* until the work of the *Dairy Commissioner's* office should be organised and set agoing in the different provinces of Canada. A brief report of my work in the capacity of *Agriculturist* will be found in the Report of the Central Experimental Farm; and for the sake of clearness and the better service of those who may seek information and guidance from its pages, the matter of this Report is arranged under the following heads.

I. Second Convention of the Dairymen's Association of the Dominion of Canada.
II. First visit to address Conventions in Nova Scotia and New Brunswick.
III. The work of travelling Dairy Inspectors and Instructors.
IV. Second visit to lecture in the Maritime Provinces.
V. Manitoba, North-West Territories and British Columbia.
VI. Dairy Bulletins.
VII. Standards for Milk and Legislation in reference to Adulteration.
VIII. A Distinctive Canadian Brand.
IX. Boards of Trade.
X. Experimental Dairy Stations.
XI. Butter-making in Winter.
XII. Mind and Muscle on the Farm.
XIII. The Establishment of Cheese Factories and Creameries.
XIV. Report of the Assistant Dairy Commissioner, Mr. J. C. Chapais, St. Denis, Que.

I have the honour to be,

Sir, your obedient servant,

JAS. W. ROBERTSON,

Dairy Commissioner.

I.—SECOND CONVENTION OF THE DAIRYMEN'S ASSOCIATION OF THE DOMINION OF CANADA.

The second convention of the Association was held in the City Hall, Ottawa, on Monday, Tuesday and Wednesday, 17th, 18th and 19th February 1890.

Addresses were delivered by His Excellency the Governor-General, Lord Stanley of Preston, Hon. John Carling, Minister of Agriculture, Prof. Wm. Saunders, Director,

Experimental Farms, Prof. I. P. Roberts, Cornell University, N. Y.. Messrs. D. M. Macpherson, Ed. A. Barnard, A. A. Ayer and myself as Dairy Commissioner. Many of the Members of Parliament attended the sessions of the Convention, and took an active part in the discussions. A full report of the proceedings was published ; and as Parliament ordered 50,000 copies for the use of its Members, a wide distribution was made. A limited number of copies of that report are still available at this writing, and I shall be pleased to send free one copy each, as far as they will go, to farmers who apply for them. The presence of His Excellency, the Governor-General who honoured the Convention with an address at one of its sessions, was the compliment of a statesman to the dairy interests of Canada and also to the farmers of the Dominion. Upon every occasion when reference has been made to the event, at meetings of agriculturists, it has called forth renewed manifestations of the heartiest appreciation. In order to give a wider publicity to, and a better acquaintance among farmers with the keen thoughtful and competent interest, which the representative of Her Majesty takes in the details of their occupation and the ways by which it can be bettered, the address of His Excellency, Lord Stanley of Preston, is given here in full.

ADDRESS BY HIS EXCELLENCY THE GOVERNOR-GENERAL.

"Mr. President and Gentlemen:—Your President has asked me to say the tra-
"ditional few words. I demanded of him whether I might take refuge under the rule—
"a very wise rule—which says that after the addresses the speakers are to limit them
"selves to five minutes. He, with a kindness for which I am not duly grateful,
"declines to give me an answer on that point, and therefore, if I transgress that limit I
"hope you will put the blame on the right shoulders. It is with great pleasure that I
"find myself present at your Convention. I think, in these days, the advantages of
"such meetings as this, and of such Associations as yours, are undisputed. In the first
"place, through co-operation of this kind you obtain a large range of experience under
"the differing conditions both of climate and of soil, and the other circumstances
"under which each individual farms. In the second place, you obtain better infor-
"mation than is accessible to a private individual ; and thirdly, perhaps, but not the
"least, you obtain a power of collective action in all matters which affect the dairy
"interest, whether for good or evil. I understand the object of this convention to be
"the bringing together from the different Provinces of the Dominion those who are
"interested in matters relating to the dairy industry. As the representative of the
"Sovereign, I need not say that I consider such a meeting to be of primary importance
"and therefore as Her representative, and understanding that there was nothing of a
"political character in your meeting, I readily and heartily consented to attend. It is
"a sincere pleasure, indeed, to me to be among those whom I might venture to call
"'brother farmers,' for when in England I was closely connected with what was
"largely an agricultural constituency for over twenty years, and I also have had, though
"in a minor degree to yourselves, some practical experience on these subjects which
"are of a common interest. I am here to-night rather as a learner than as a teacher.
"I can only listen to the experience of those who address you. But there seem to me
"to be certain points upon which even an outsider might venture to say a few words.
"In the first place, it is of the greatest importance that we should obtain, through
"the medium of this convention, better information as regards all matters relating to
"the dairy trade, not only as regards the practice of farm work, which applies to your-
"selves, but also as regards (and this applies to those who are interested in farming
"generally) what is going on in the outside world. Now, in explanation, I would say,

"for instance, as regards the information which is obtained by interchanging opinions "at such meetings as this, the attention of men is drawn to such questions as the class "of stock that are most suitable to be bred, what is the best mode of their treatment "under different conditions of climate, and along with all, that no man can listen to "what passes between practical men without picking up something which may help "to inculcate those habits of accuracy, of cleanliness, of attention to details, which one "and all will admit go far to making dairy farming what it is. For my part, as "having bred cattle in former days, I would lay great stress upon the first con- "dition of breeding good cattle rather than bad. Travelling through the length "and breadth of this land, as I had the pleasure of doing recently, any one must be "struck with the great agricultural progress made in a limited period of time. Still "one cannot help being also struck by the very large amount of indifferent, and "positively bad stock, which one sees in some places. Indeed, I have been in dis- "tricts where it seemed to me as if people had collected all the points which a "breeder would object to and tried to put them together in one animal. Happily "that is the exception—by no means the rule; but let it be the object of your con- "vention, among other things, to blot such a state of affairs out of existence. In "the next place, I would press upon your attention the importance of the factory "system. I have a few figures which will show the great importance of the trade "in dairying products, and they also indicate that while the exports under the head- "ing of cheese are very gradually and largely increasing I am sorry to observe "exactly the reverse must be said of the butter trade. I think it was a pregnant "remark of your President's just now, one which suggested a great deal, that "whereas in the cheese trade the factory system has become largely predominant, "in the production of butter it is exactly the reverse. In the days before the fac- "tory system was known at home it was said so much depended on the individual "exertion of the cheese-maker or dairy-maid, that it used to be a common saying, "'If you want good cheese marry your dairy-maid.' It meant this: that those who "were primarily concerned should be those who had a direct interest in the process "which had to be carried out. But we have improved on that, on this side of the "water. The factory system, so largely adopted, has tended to that regularity, "accuracy and the general advantage which accrue from any process being carried "on on a large scale instead of on a small one, and undoubtedly that is having the "effect, among other causes, in promoting public interest in the cheese trade. I "venture very humbly to back up what your President has already said with regard "to the consideration whether it cannot be further pressed in relation to the manu- "facture of butter. I have spoken of information to the farmers themselves; I "spoke also of that as between the farmer and what I may call the outside world. "I think it is good for people to know, not only what they are doing themselves, "but also what others are doing, and especially in these days of easy communica- "tion and extended markets, people should have a knowledge of what is going on "around them. If I wanted to put it concisely, I would say, especially to those in "the export trade: find your market, suit your market, keep your market. A "market may be near, and the higher-priced classes of butter, unsalted, &c., may find "a market close at hand. On the other hand, however, for the majority of the "people, and at all events for some years, it seems to me that the distant markets "will be those to which we must look. It is remarkable what can be done by a

"little careful attention to details. Denmark, a comparatively small country, by "no means a rich country, possessing over the rest of Europe no advantages of cli- "mate and soil, by great attention to details, scrupulous care and a considerable "amount of science, has place herself in a relatively high position in the European "market, and I am sorry to say, to the displacement of many neighbors who should "hold their own better than they do. As regards suiting your market, consider "that you have to look at not only your own mode of manufacture but that you have "also to suit those to whom you have to sell. Now, with great respect, I cannot "help repeating what I have heard elsewhere, and I have seen evidences of it here "in this country, that perhaps not enough care is taken as regards a good deal of the "butter which is exported. Speaking generally, a bad article costs as much to "carry as a good one; and in these days, when you have to meet competition in "distant markets, especially, by a better quality than can be found upon the spot, "too much stress cannot be laid upon the necessity for improving the quality of our "products. Cleanliness and care in packing have a good deal to do with that. The "French have gained a good reputation by the care in which in the dairies of Nor- "mandy and the northern Provinces of France, they suit the market to which they "are sending. There is a great difference in making up packages in an attractive "form, and I suppose even to the wholesale purchaser there is nothing like having "something to please the eye in thus making your goods attractive. But I am sorry "to say that in many cases those who are sending to market do not pay enough "attention to this, the result being, for instance, in the case of a mixed sample or "bad packing especially in butter, that the consumer eats bad butter and the pro- "ducer eats up his own profits.

"Closely allied to the question of market is the delicate question of rates on your "freight. I am not going to ask you to embark in any controversy on that point. "In the last office which I held in the mother country, I had occasion to deal with this "question as a Minister—with the question of railway rates, especially as affecting "agriculturists. I can only hope that I fulfilled my duty, that I made the best com- "promise that was possible, because I have always heard that the best definition of a "compromise is to get yourself abused by the parties on both sides, and judging by "that, the compromise which I effected must have been satisfactory. But there is "undoubtedly a difficulty in the even adjustment of rates. Speaking generally, I "should be inclined to say what pays the farmers, in the long run, will pay the rail "way companies also, and I think a great deal can be done by the collective action "of a Convention, such as this, in bringing to bear the light of better information, and "the weight of public opinion, upon those who have to carry the goods which you "produce. I ought to say, with regard to collective action, what I meant by that "was, that a convention such as this speaks with great authority as the mouthpiece "of a particular branch of the farming interest. It speaks to the Government or "Parliament; it affords you better means for dealing with large bodies, such as rail "way companies, transportation companies, &c., and is also able, if it uses its wisdom "intelligently, to speak with great authority upon questions such as those affecting "the laws relating to contagious diseases among animals, &c. On all these things "there is a great work before you. As regards the importance of the question, not "that for a moment I doubted it, but because I wish to inform myself fully as to the "extent of the export dairy trade of this country, by the kindness of the Government

"statistician, and of the Deputy Minister of Agriculture, I am furnished with a list "of figures showing the export of butter and cheese during the past ten years.

"These figures, for convenience, I will ask you to take as read, only quoting a "few of them now in illustration of what I have to say:

DOMINION OF CANADA—Exports of Dairy Products—Home Production.

BUTTER.

Year.	Quantity.	Value.	To Great Britain.	To United States.	To France.	To Germany.	Other Foreign Countries.	B.N.A. Provinces.	British Indies.
	Lb.	$	$	$	$	$	$	$	$
1868....	10,649,733	1,638,042	544,707	1,015,702	.....	1,496	14,870	95,777	26,986
1880....	18,535,362	3,058,069	2,756,064	111,158	.....	.....	24,710	163,290	2,847
1881....	17,649,491	3,573,034	3,333,419	58,522	.....	.....	30,574	143,935	6,584
1882....	15,161,839	2,936,150	2,195,127	529,169	.....	.....	32,052	169,270	10,538
1883....	8,106,447	1,705,817	1,330,585	206,154	.....	.....	29,446	131,341	8,291
1884....	8,075,537	1,612,481	1,395,652	46,618	.....	.....	16,455	151,224	2,532
1885....	7,330,788	1,430,905	1,212,768	16,795	.....	15,172	21,473	161,862	2,835
1886....	4,668,741	832,355	652,863	17,545	.....	.....	17,577	142,485	1,885
1887....	5,485,509	979,126	757,261	17,207	.....	.....	23,789	180,238	631
1888....	4,415,381	798,673	614,214	13,468	.....	.....	5,226	164,329	1,436
1889....	1,780,765	331,958	174,027	7,879	.....	.....	22,921	124,349	2,782

CHEESE.

1868....	6,141,570	620,543	548,574	68,784	.....	.....	891	1,954	340
1880....	40,368,678	3,893,366	3,772,769	114,507	.....	.....	170	5,710	210
1881....	49,255,523	5,510,443	5,471,362	28,500	.....	.....	14	10,027	540
1882 ...	50,807,049	5,500,868	5,471,676	18,436	.....	.....	242	8,196	2,318
1883....	58,041,387	6,451,870	6,409,859	24,468	.....	.....	202	15,480	1,863
1884....	69,755,423	7,251,989	7,207,425	24,866	.....	.....	188	19,248	262
1885....	79,655,367	8,265,240	8,178,953	68,978	.....	.....	205	15,899	1,207
1886....	78,112,927	6,754,626	6,729,134	15,478	80	90	156	9,139	549
1887....	73,604,448	7,108,978	7,065,983	30,667	.....	.....	211	11,982	165
1888....	84,173,267	8,928,242	8,834,997	83,153	5	.....	828	9,087	172
1889....	88,534,887	8,915,684	8,871,205	31,473	.....	.....	1,582	11,208	216

"Thus I find that whereas, in the year 1880 the quantity of butter exported "amounted to over 18,000,000 lb. and its value to over $3,000,000, it had decreased "last year to 1,780,765 lb. and the value to $331,958. That is not satisfactory. On "the other hand, happily, there is good as well as bad; the cheese exports which in "1868 were only 6,141,570 lb., valued at $620,543, in 1880 had risen to 40,368,678 lb., "valued at $3,893,366. In the last year the export of cheese has risen to no less an "amount than 88,534,887 lb., valued at $8,915,684. This statement shows the satis- "factory progress in the exportation of cheese on the one hand and a falling off in the "exportation of butter on the other. These are figures which show the dimensions of "trade, and they indicate what important work, both as regards the dairy interest itself "and the future of the Dominion, this convention may very well have before it. I "entirely concur in the remarks of the president as regards the advantage of mixed "farming. In mixed farming you do not, as in grain-growing, depend upon one class "of produce, and further, if dairy practice is intelligently carried out you are really to "a great extent recouping the land for that which you take out of it, and, in fact, in "many cases you may be converting bad land into good land. All these are matters

"of experiment and of practice. I am glad to see that in various parts of the "Dominion, the Government has thought fit to establish experimental farms. I look "to them as being places where, in the future, much valuable information may be "obtained, and where experiments, which ordinary individuals have neither time nor "the means to carry out, and which, nevertheless, it is very desirable should be carried "out for the public good, can be made by those who have practical and scientific "knowledge combined, and who have no other object, as I thoroughly believe is the "case here in Canada, except the promotion of agricultural science and the advantage "of the Department to which they are attached. I join in the congratulations which "may be offered alike to the dairy interests of the country in the appointment of a "Dairy Commissioner and to the distinguished individual selected to represent the "dairy trade in the Government Department. I am glad also to recognise the services "and personal kindness also which I have received on all occasions from Professor "Saunders, who so worthily presides over the Experimental Farms. As an agricul-"turist, not a politician, I may venture to add one word of congratulation to the Min-"ister of Agriculture, Hon. Mr. Carling, for the results of the work already achieved "by the Experimental Farms, which he has been so instrumental in establishing, and "to join with you in wishing him a long life to continue his labors in this direction. I "have not long ago returned from a journey to the North-West and to the shores of "the Pacific. I have traversed the greater part of the Dominion, although I have not "seen nearly all I should wish to do, but I may say that passing through varieties of "soil and of climate—seeing the immense extent of country only waiting for the hand "of the farmer to come and bless it with an increase, seeing the millions of acres "which are still waiting to be taken up, I cannot doubt that there will be a great "future before the agricultural interests of Canada. It may take many years, even "centuries, before all this present waste land is taken up; but surely, sooner or later, "the time will come when your wide plains, desolate wastes, and vast forests will be "supplanted by a happy, prosperous, contented agricultural community. Then I hope "that those who come after us will look back to efforts of such as yourselves, who in "early days have striven to grapple with the problems which lay before them, and "have endeavored to throw the light of science upon the path of progress. I wish "the Convention every success." (*Cheers.*)

II.—FIRST VISIT TO ADDRESS CONVENTIONS IN NOVA SCOTIA AND NEW BRUNSWICK.

On March 18th and 19th, the annual convention of the Dairymen's Association of Nova Scotia met at Halifax. I was glad to be able to attend it. An official report of the proceedings, prepared by the Secretary Mr. Paul C. Black, Falmouth, N.S., was published. During the same trip the opportunity was afforded me of addressing meetings at Sackville, N. B., New Glasgow, N. S., Antigonish, N. S., Nappan, N. S. and Fredericton, N. B.

I have thought it to be desirable that the substance of the lectures which were delivered upon different occasions during the year, should be brought to the attention of many farmers whom the voice of one speaker cannot reach; and with that end in view I have inserted under this heading the reports of three addresses which I had the honor to deliver at Fredericton, N. B. By the courtesy of Mr. C. H. Lugrin, Secretary of Agriculture for New Brunswick, I was furnished with verbatim reports of them.

FIRST ADDRESS.—DAIRY FARMING.

Mr. Chairman, Ladies and Gentlemen :—

It gives me very much pleasure indeed to come down to the Province of New Brunswick to speak to those interested in farming. For a long time in our country and elsewhere, farmers have not understood and have not appreciated the value of their calling as they ought to have done. That state of things has left them isolated and disunited in their efforts for the improvement of their condition; and farmers instead of meeting together often in order to discuss their own business and how best to prosecute it with success, have stood apart and aloof from each other,—have been jealous and have not co-operated,—when they alone of all the classes could co-operate with most advantage to themselves and for the greatest good of the whole community. Before I begin to speak on Dairy Farming, I would like to say a few words by way of explanation as to why I am specially interested in the development of Dairy Farming in your Province.

DOMINION DAIRYMEN'S ASSOCIATION.

A short time ago a Dairymen's Association for the whole Dominion of Canada was organised, not to do the work properly belonging to Provincial Associations, but where possible to encourage and stimulate farmers in the several Provinces to organise and support Provincial Associations and use them for their own good. A convention of that Dairymen's Association of the Dominion of Canada was held in Ottawa a short time ago, and the delegates from New Brunswick were very urgent in their requests that something should be done soon, to try and stir up the farmers of this Province to pay more attention to Dairy Farming. Very largely in response to that request I agreed to come here. The Minister of Agriculture, Hon. Mr. Carling, was also anxious that I should come to the Lower Provinces and try to show the residents something of the methods that had been successful in Ontario. It is not expected or intended, as I said, that the Dominion Dairymen's Association will attempt to do the work properly belonging to the Provincial Associations.

NEED FOR PROVINCIAL DAIRYMEN'S ASSOCIATIONS.

But I would commend to you now the desirability, yea the need, of forming a Dairymen's Association for the Province of New Brunswick. Up in Ontario until the Dairymen's Association was organised and took hold of the dairy interest with both hands, intelligently and enthusiastically, it languished, made no progress and brought little profit. But as soon as the Dairymen's Association took hold of it with good judgment and well laid plans, the dairy business commenced to grow and flourish, and is growing more rapidly now than in any past period of its history. Permit me to give you one illustration of the wisdom of the Government in spending small sums judiciously to encourage and foster dairy work. After all that had been done in Ontario to extend the business of making cheese, there was still a very large quantity of inferior cheese made. Our cheese went to England in competition with American cheese made in that great and flourishing Republic to the South. Some years ago the American cheese sold rather higher on the average than the cheese from Canada. The Government commenced to give slightly larger grants to the Dairymen's Associations, enabling them to furnish more information and more instruction, not merely available to every cheese-maker but unavoidable to most cheese-makers; and last year the cheese of Ontario sold in the English markets for $475,000 more than they would have fetched if sold at the average price for the same month's make and at the same date as the cheese in the State of New York, our great competitor. The Provincial Government of Ontario gave grants last year amounting to $6,500 to help to pay Instructors, and as an immediate harvest from that little sowing we got back in cash $475,000 more than we would have got if our cheese had been sold at the American prices. But the $475,000 is not all we get

back for that investment of $6,500. Our people have been educated in the making of finer cheese, and the fruits of that education will be theirs for all the coming years. Besides, the very fact that our cheese has such a reputation abroad makes our farmers proud of the business, and being proud of it, more of them support it than otherwise would have been engaged in it. Sometimes farmers are wont to think that what they call sentiment belongs to literary people alone,—people who wear very long hair and use a good deal of hair oil. But if you can put right sentiment into a farmer's life and make him feel proud of his business, he will do that business the better for it, and such sentiment to him will prove a paying acquisition. The very sentiment of pride that Ontario farmers feel in having their cheese stand first in the English market helps them to make finer cheese and more of it, and if that is the experience of the people of the Premier Province of the Dominion, I think we can all profit by it. The Government's investment has brought back great returns to that class of people in the community whose prosperity means good times for everybody else.

WORK OF DAIRY COMMISSIONER.

Then, the Dominion Government recognising more and more the value of Dairy Farming as a branch of Agriculture, and recognising agriculture as the occupation of first importance in our Dominion, established an office called that of the Dairy Commissioner. The business of the occupant of that office is to furnish information, —information applicable to all the several sections of the Dominion,—information of a practical, serviceable kind, so that any man can read the bulletins issued from that office and put their teachings into practice with a certainty of not being misled. But what the farmers of the Dominion need more than information is stimulation. They require somebody to wake them up to the recognition of the importance and dignity of their own occupation, and the value of dairy farming as a means of helping them to follow that occupation with profit.

VALUE OF CONVENTIONS.

One reason why conventions will be held all over the Dominion is to get into touch with the farmers and bring them into closer touch with each other. If you can gather 500 men into a hall to discuss agriculture, every man will be better satisfied and more enthusiastic over his own business,—and this is not a small thing, because sometimes men find it very hard to become enthusiastic over agriculture. I was down in Antigonish, N.S., last Saturday; the weather was favourable and the people turned out and packed the hall, and some could not get inside. After the lecture, a townsman came to me and said that a good old farmer had come up when the meeting commenced and asked what all the crowd meant,—he had not heard of the meeting. A neighbour told him that it was a meeting to discuss agriculture,—meaning Dairy Farming. "Aha!" said he, "aha!" "Great Scott, I thought it was a meeting called to discuss politics!"—and the sneer to which he gave vent, at so many people coming together to discuss agriculture merely voiced a common feeling among farmers themselves. If we can induce farmers to come together oftener to discuss agriculture, we will not only make them proud of agriculture, but make their occupation more lucrative.

DOMINION EXPERIMENTAL FARMS.

The office of Dairy Commissioner has been associated with the Dominion Experimental Farms for the purpose of ascertaining the most economical way of raising and feeding cattle upon fertile lands which are to be found in every part of our Dominion. That is why we have Experimental Farms in different parts of Canada—to meet the requirements of the different climates, of which we have a great variety in this wide country. A further intention is to discover, if possible, the foods best adapted for the feeding of cows, sheep and swine in the most economical way, so as to realize the largest profits. Another reason why the Dairy Commissioner's office has been associated with the Experimental Farms is to give, if

possible, a unity to all their teaching that bears upon animal husbandry in the whole Dominion. Canada is really the home for neat cattle. No other place on all the earth gives cattle such excellent, vigorous health as these animals enjoy in our climate. Then, people who keep cattle with success should also keep sheep, and feed swine and breed horses, that all animal husbandry may be linked into a system for harmonious action ; that the one may not compete against the other, but aid the other, and altogether make the *farm* richer in plant food and the *farmer* wealthier in the return he derives.

IMPORTANCE OF THE FARMER'S CALLING.

Having said so much by way of introduction, I would like to say that farmers fail to recognise the value of their occupation, because they have seldom given any thought to what their occupation means in the world. I have lived with farmers most of my life-time, and I have found very few of them who have any clear conception of what they are trying to do on a farm. A farmer out west was travelling with a friend of mine who was much interested by the man's intelligence. By and bye he said to him : "My dear sir, what do you do when you are at home?" "What is your business?" "Well," said the man, "I ain't got any business ; I am only a farmer." There is a too common conception which the farmer summed up in that, "I ain't got any business ; I am only a farmer." Now, if a farmer had a true idea of the meaning of his business, he would see that his is the most important of all businesses that occupy the powers and engage the attention of men, in a material sense. The farmers furnish the food of the world, with the exception of fish. You cannot think of anything you eat, if you except the product of the fishermen's toil, that does not come from some farm. You have porridge and milk —porridge and cream they call it in Halifax, but the cream is so blue there that you could see a mosquito six inches down. Halifax cream! I will never forget the liquid. You have perhaps potatoes, ham and eggs, tea and coffee, everything you eat is the product of some farmer's toil, some farmer's skill. Now, if the farmers produce all the food for the world, they are doing a very important work. The better men are fed, the better men live. Farmers have not been the laggards in the progress of civilisation, but if you will scrutinise history with a thoughtful eye, you will find that where farmers have improved the food of the people, the people have become more powerful and influential. The old rich pastures of England produce beefsteak which accounts a good deal for England's influence in the world to-day. The better a man lives at his table, the better he lives at other places and otherwise. Give a man bad food and he gets out of joint with the world and it is hard to preach him such a sermon as will help to make him a good man. Good living in that sense means good living in other senses. Not only do farmers supply the world's food—that is only one half of their work—they furnish the raw material for the clothing of the world. Wool and cotton and leather are first products of the farmer's toil and husbandry, which the manufacturers elaborate into the finished articles for our comfort and service. The farmer himself should be both producer and manufacturer. He cannot afford to manufacture clothing, by not only feeding the sheep, but by washing the wool and spinning it and weaving it ; that is not his calling. He cannot afford to do that, but he can afford to produce grasses—corn and oats and barley and pease—and manufacture these into food that the world is willing to pay the highest price for. The man who sells raw material alone gets only one half of the profit belonging to his calling, when he fills his place to the full and both produces and manufactures.

VIRTUE OF KNOWLEDGE.

To be a good producer and skilful manufacturer, a farmer needs to have knowledge of his own business, and I hope that men who think that knowledge has no place on a farm will soon have no place in the farmer's ranks in our Dominion. Farmers used to require very hard hands to swing the axe all day long, to remove physical obstructions, to construct roads, to build bridges, and to do all that kind of

manual labour, but the conditions are changed now and horses are made to do the heavy work, and steam the most difficult of the heavy tasks. Man does not need hard hands so much as a clear head. The farmer of the coming time must be a man who will rule his hands through his head, and not toil so hard with his hands as to make his head too tired to do his own thinking. No system and no machinery on a farm can ever take the place of personal thought and good judgment on the part of the farmer. But as I propose to speak on an aspect of that topic to-night I shall not do so now. I will simply say that the scarcest and most valuable commodity on the farms of our Dominion to-day is common sense with good skill. A man has no common sense who sneers at knowledge as applied to his own business. Because a man may have a good deal of knowledge laden on his back or in his head, so that he is both a tired man and a tiresome man, it does not follow that knowledge is of no service to the man who uses it well; and farmers should have particular, accurate and practical knowledge of their own calling. They should have knowledge of how to plough well, so that the frosts will work upon and through the soil all winter. They should have knowledge of the kind of grain to sow, so that sunlight and rain may work their best for the crops. They should know the best cow to keep, so that the cow will not live on them without paying back for what she takes. They should have knowledge of the best goods to send to market, so that they will not have to take a second place or a third-rate price. Knowledge, I say, above all things, is needed by the farmers of our Dominion to-day.

CHANGED CONDITIONS.

It was not always thus. Manual strength was most in need in past years; but changed conditions have come and we ought to adapt ourselves and our work to those changed conditions. Not only have conditions changed, but they are still changing. They are changing right in these Provinces—changing so that men who live away west of Chicago furnish the hotels of this city with beef-steak, instead of it being furnished by the men who live on the fertile soil around about us. Men will say: "O! we cannot compete with the cheap beef of the West." Well, why is it? Because we have not enough knowledge and we don't put the knowledge we have into practice to aid us in our work. Where does the cheap beef come from? Well, I have been West a good deal trying to talk to the farmers, and I have gone upon the farms there and found men feeding steers on land that was worth $100 an acre, upon fodder corn from the silo at a cost of 2½ cents per head a day—the cattle gaining from a pound to a pound and a half a day. They could sell them in Chicago at a profit at 3 cents a pound. The beef that comes here, comes not from the cheap lands of the West alone, but from land worth as much as ours, and after paying freights and charges of the middle men, it is driving us out of the market, because we have not been using the same skill and knowledge. I see no reason why we cannot produce good beef here at a profit, as cheap as it can be produced anywhere in the world, and if we do that we will occupy our own markets and give occupation to our own people.

LOCAL MARKETS.

Suffer a few words as to your markets here and their requirements. You have in these Lower Provinces, an unsupplied butter market. True, there is plenty of butter here worth 10 cents a pound, and very dear at that, because, unlike some other things, people do not pay up for butter according to its strength. But there is a very large demand here for butter of a mild flavor at 25 cents a pound; and that demand is not met and never will be met until better butter is made. Then, you have a market for cheese here. There is no reason why you could not send cheese to England (after supplying your own wants) and get back English gold just as Ontario is doing now. Then there is the market for pork and bacon. I find that a large quantity of pork and bacon is imported here from the Western States. Well, the hog is not such an undesirable citizen, if he is well fed and well kept. He is the one great citizen of the

American Republic that has helped most to make it wealthy. Of course, I mean the kind of hog that is fed in pens.

BRITISH MARKETS.

Then, there is a large home market for fresh beef. Now, after you have filled the home markets with these products you have still the best market in all the world for food products—the market of the British Islands. It is not so very far off. People sometimes say it is too far away. Well, how far is it away from us here in New Brunswick? For butter, it is distant not more than one cent a pound. I have been at places in Cheshire in England, that were just as far from the London market as I was away back in Guelph, Ontario. You see in commerce, men do not need to count miles, but they have to count costs. We are less than one cent a pound on butter and cheese distant from the English markets, and the English people themselves are very often quite as far as that from their own markets. I would ship butter to the man in the moon if I could land it there at a profit, and safe transportation were possible at one cent a pound.

The English markets will take all the food products we can send them for a long time to come. You need never fear that you will glut these markets, if you have fine products to send. Canada sends to England 90,000,000 lb. of cheese, and England buys abroad 213,000,000 lb. per year. So we send her over 42 per cent. of the cheese she buys abroad. We send to England 2,000,000 lb. of butter per year and she buys abroad 216,000,000 lb. So we send her less than 1½ lb. in every hundred pounds of butter she buys abroad. We could send her more, and we will send her more, when we put more knowledge and skill into the prosecution of our own business. We send to England 100,000 cattle yearly and she buys abroad 500,000; we send her 20 per cent. only of her imported cattle. The advantage of being permitted to send our cattle inland through the British Isles without their being slaughtered on landing, is a privilege worth at least one half cent a pound to us. With that premium on our cattle—due to their general healthy condition which I referred to before—why could not we send a larger share abroad? It is either that something is the matter with Providence, with the country, or with ourselves. I am just modest enough to think the fault is with ourselves rather than in Providence or our country. Then, we send to England, of pork and bacon, 8,530,000 lb., and she buys abroad 545,000,000 lb. We ought to continue to send at least one third of the cheese that England buys abroad, besides a much larger share of the products I have mentioned which would yield us good profits, leave the soil rich and give our people the most profitable occupation. Now, Dairy Farming will help us to do that.

It should be our aim to follow these three lines of farming effort—the producing of food, the maintaining of the fertility of the soil, and the providing of remunerative employment for our people. Any system of agriculture that will do that, is a kind of agriculture that will pay the people, who follow it with energy and skill.

PROFIT AND PRICE.

I would like also to lay down this proposition and make it clear, namely, that men who farm for *profit* should concern themselves far more with getting *profit* by reducing *cost*, than by trying to raise the market *price*. There is only one way in all the world whereby a man can raise for himself, with certainty and equity, the market price of anything he sells, and that is by improving its quality. The quality governs to every man the price he may obtain. I will give you an illustration. In all the large cities of our Dominion, butter ranges in price from 10 to 25 cents a pound. Now, no single farmer and no combination of farmers can force the butter market up or down. If it is forced up too much, then the butter that would otherwise go abroad is kept at home; if it is forced down, the butter is sent abroad. Thus we cannot influence the market price. But any man can raise himself from being a 10 cent-a-pound man to being a 25 cent-a-pound man, by sending to the market just the butter for which the people will pay 25 cents. A man can change his place on

the scale any time, by improving the quality of his product to that of superior excellence. Men are always looking for profit at the market end, instead of the home end of their business; and being mistaken in the direction of their effort, they have small success. Profit lies in any business between the price that is realized and the cost of production. If we can reduce the cost of production we lengthen our line of profit certainly at one end, in lessening the cost; and if the market goes up we have two profits,—one made by our skill and the other by the rise in the market. If the market goes down we still have our profit at the safe end of our endeavour by having reduced the cost of production. So the man who can reduce the cost of production, is the man who is farming with most profit, because reduction in the *cost* of production does not reduce the *price* he may realize. Another illustration:—Suppose that two men are living on neighboring farms, and one man produces his butter at 25 cents a pound. He feeds hay and meal to rather poorly bred and badly kept cows, and his butter costs him 25 cents a pound. The other man keeps cows that are better adapted for butter making, feeds them on the cheapest kind of suitable feed, including corn ensilage, and produces butter equally fine at a cost of 15 cents a pound. They both sell in the same market. Does this man who produces his butter at a cost of 15 cents, have to take a price less than the man who produces at 25 cents? I trow not. He gets at least an *equal price* but a *larger profit*. He has *a profit* whereas his neighbor may have none. So our endeavour should be more along the line of reducing the cost of production than raising the price to be realized, except in this, that the price can be modified by an improvement in the quality. The farmer will work out his own economic salvation far more surely, if he will give his attention to that, than if he pays heed only to the market.

FOODS FROM FARMS.

The farmer's sphere of occupation is concerned with the production of food and the obtaining of service from all the resources of nature. The world to-day wants food in the form of animal products; and the farmer who would farm skilfully and successfully must keep stock, that through them he may provide the kinds of food that the people want and are willing to pay a high price for. The man who would farm to the full extent of his farm, and with a view to the greatest profit, should grow plants suitable for the needs of the animals that he keeps; and herein is offered a sphere for the exercise of the best skill. It is the highest exercise of sound judgment, for a man always to grow in his fields, plants adapted to the needs of the animals he keeps, that from the plants direct, and through the animals he may obtain complete food and all the food the people want. A man who keeps animals can always increase the food supply per acre of his farm. When a man grows a crop of wheat, not more than one-half the total life-sustaining value of that crop resides in the flour; the other half of the total life-sustaining value of that crop is held in the straw, chaff and bran. True a man cannot live on these things, but a man who provides flour for the world's use, and feeds these things to his cow,—(not as the cow's sole food, since they can be supplemented so as to make them profitable,)—may get from his crop both bread and butter. In that way, a man who keeps animals may always increase the food supply per acre from his farm.

SUITABLE CROPS.

A man should always see that the plants which grow on his farm are the ones best adapted for the attainment of the object he seeks. A man who would grow hay only for cattle fodder, forgetful that hay is not by any means the plant or crop through which he can get the largest service by keeping animals, would soon go to the wall. You would not think a man was wise, who made his business that of a swine feeder and who grew nothing but hay as the crop on which he meant to fatten them. He would not be adapting the raw material of his farm to the business of manufacturing animal products. We sometimes think that because a cow will eat almost any kind of plant, therefore everything is adapted to the cow. That is not

the fact. By feeding expensive food, we increase the cost of production; thereby the cow consumes more value than she produces and thus becomes unprofitable. It does not pay to feed a cow on strawberries. I tried that one time myself. While I was talking to a young lady one evening, a cow ate two baskets of strawberries out of my buggy, and yet she did not give any more milk or produce better butter. Some men are all the while feeding their cows on plants too costly for the value of the products of the animals that eat them.

SEED TESTING.

Emphatically, in dairy farming, are skill and judgment needed to provide seed of the best variety. There are in this country now known over 75 varieties of corn. They have not all equal feeding properties—equal powers of service—and many experiments have been conducted of late years to discover the variety of seed which will render the largest service through its plant growth. This is also one of the uses of Experimental Stations:—To discover for the benefit of the farmers the varieties of seeds of all kinds which can render them the most service in the growth of the plant. That is also the value of having seed-testing stations, because in these Lower Provinces a very unfortunate state of things exists with regard to the growth of cereals. In some of the tests that have been made, the grains have not shown more than 47 to 48 per cent. of vitality; and that may be why you sow down here 4 bushels of oats to the acre instead of 2 or 2½ as they sow elsewhere. Every farmer ought to test the vitality of his seed grain before it is sown or planted. We will try and look into it at the Farm at Nappan, and see if it would not pay the farmers better to import their seed for a short time until they re-invigorate its quality and thus get back seed-grain of all sorts which will give them at least 95 per cent. of plants from the number of seeds sown.

VALUE OF MANURE.

Then, after the seed is sown or planted, the farmer's business should be to provide plant food in abundance and of suitable sort for the sustenance of the plant, that it may grow in size and accumulate nutrition within itself for feeding animals and sustaining human life. It is a question of food all the way down,—food for animals and food for plants; and the man who fails to feed his plants through his soil, will by and by fail to find food for himself through his farm-work. Very many farmers have been so neglectful of providing food for their soil, that their soil has become poor and they must of necessity partake of a like quality; because when a man impoverishes his farm, if he stays on it he must in time grow poor himself. That is an unavoidable, inexorable law in agriculture.

Now, the soil of the farm in agriculture is mainly to be considered as a storehouse of plant food, and a feeding place of plants while they absorb that food into themselves. Water is in the nature of a vehicle for the conveyance of plant or animal food to its proper place inside the plant or animal. A man begins to understand that water is a vehicle for the conveyance of things in nature,—nature's wonderful omnibus, in which she puts things big and little to have them moved about easily,—when he sees what it does in the case of large streams and great rivers which bear on their bosoms the commerce of the nations. But that is a far-fetched illustration as far as the use of water in plant-growth is concerned. Here is a better one. I knock a piece of skin off my hand. I do not go to a doctor or shoemaker to have a piece stitched on. I merely go on eating as usual and the water in my blood keeps on circulating and depositing in that place, just the right kind of material, until the skin is replaced in its former state. Water is like the hod-man that carries around the material for the skilled workman to put in place; and my life is the master builder that in this case builds on the skin.

USE OF DRAINAGE.

Then, you would say if water be so valuable and necessary a commodity, the more water you have for plants the better. Well, if any man in seeking to carry out that hastily formed conclusion, should plunge me into water and leave me for several minutes in water that was over my head, what would be the result? The result would be a drowned man. As soon as the water stays around the whole of my body, the water inside my body stops running; and the skin that is knocked off stays off, though I may have lots of food in my stomach. When the roots of the plant are surrounded by water, the water inside the system of the plant stops circulating; there may be abundance of food around its roots, but it cannot live on that because there is too much water there. That indicates one of the many values of drainage,—it removes all surplus water and leaves just enough for use in the circulation of the plant. Too little water is as bad as too much water. If I have my food all dry—made entirely free from water,—why I cannot chew it; it refuses to be swallowed. I must have a vehicle to carry it down my throat easily. If I do not drink any water, I cannot sustain my life. That is why plants cannot grow in dry soil and weather, because there is no omnibus to carry the food up into their system. Good drainage provides for the plants an abundant supply of water—enough and no more. So I would recommend that in all cases where it can be done and has not been done by nature, you should have the soil drained to have all the surplus water removed, and yet to have a sufficient supply brought there and left there, from the atmosphere and the great reservoir down below.

THE AIR AND SUN.

The air is the other store-house of plant food. Between 92 and 98 per cent. of all the substances of plants comes from the air. The man who farms well, will have his plants grow a suitable distance apart, as far as practicable, in order that the air may circulate freely and the sun shine in brightly, that the plants may get from the air the food it contains for them. This is one reason why it does not pay a man to grow a crop of broadcast corn; the stalks are so close together that there is not enough circulation, the plants have less vigor and the soil becomes exhausted. * * *

The spring in my watch is merely what the plant food is in the soil. The spring is a contrivance into which I store my own strength; the plant food is a convenience into which the sun can store his strength, his energy. And then, when a horse eats a bundle of hay, he is merely transferring into horse-power, the power which the sun rolled into that peculiar plant-spring. In that way the sun is doing all the work of the world. A long time ago the sun was shining down on the earth, hotly, vigorously and continuously. He was rolling himself up, year by year and century by century into plants—plants that stored his strength with avidity. Then there came great changes in Nature and those big trees and plants, full of the sun's energy, were buried away down deep in the bowels of the earth; but still they held the sun's strength. Men open mines, they dig up concrete sunshine and energy, in the form of coal; the furnace is filled; the magic liberator—fire—is applied; and as the mighty engine moves, wheels are turned to-day with the energy which the sun wound up in the vegetable kingdom of the earth ages and ages ago.

The man who furnishes in the soil no plant-food for the young plant, keeps the sun idling on his field all the day long. So a man ought to make it his pleasure, as it is his privilege to harness the old sun every day in his farm work, and make it do his will by making it roll its strength into such plants as he wants for his service. Now, a man could never afford to hire half a dozen men on a farm and have them "loaf" all day long, while he is wearing himself out with working. But the man who wears himself out with working and keeps the sun idling all day long, is doing a far more foolish thing. So a man should recognize that he has the right—that he has the power—to control the sun's working, make it work upon his fields, and thus save himself from the reproach of leaving the best working

power in the world idling on his place. The farmer requires skill, he needs knowledge, he must have above all things good judgment in order that he may fitly control and exercise the power placed at his command.

Let me show you what all this means, practically in Dairy Farming. The man who farms successfully and skilfully in Dairy Farming will always have abundance of plant food in his soil, and therefore he will keep the sun working for him by giving the sun the raw material out of which to build plants. If the sun be deprived of that he does not intend—using the word figuratively—to work; he will not make bricks for any man without clay. There are men who are all the while running counter to these old foundation laws that were made for agriculturists. One man thinks that it makes no difference how much sunshine he has or how little. It makes all the difference in the world, and that is why in Canada we have the best chance in all the world for making farming pay, because we have more sunshine than they have anywhere with an equally favourable climate in other respects.

ELEMENTS OF PLANT FOOD.

Three of the elements are becoming scarce in the soil of this Dominion. These three things, which plants need most are nitrogen, phosphoric acid and potash. These are becoming scarce. Farmers sometimes think because these words are uncommon, therefore they have nothing to do with the substances. A farmer's calling consists in providing food for himself, for his family and for mankind, then food for animals, then food for plants. Plants cannot live unless they have these three substances in their food; this lies at the very basis of the farmer's work, and he should know the meaning of these terms, and of what main ingredients the food of plants consists. He need not be able to analyze the food, or to spell the words; but he should know the meaning of the things themselves, and if he does not know he ought to know. I have no apologies to offer a farmer when I tell him that he ought to know what nitrogen, phosphoric acid and potash mean. Plants cannot live without these substances, and therefore farmers should know about them.

If a man sells the whole crop from his field, he sends away all these things which the plants take out of the soil. He sends these substances that are of value to him, off to somebody else. If instead of doing that, he will feed the plant to the cow, he may sell the milk the cow produces in place of the plant. In selling the milk he will send away less than 20 per cent. of these valuable constituents which the plants contained, and have 80 per cent. to go back again into the soil. That is why it pays to sell animals and their products, rather than the crop raised in the field.

The *nitrogenous* portion of the grain or plant, goes to make the muscles of a steer which is being fattened. The *phosphoric acid* goes to the building up of the bones and nerve tissues. The *potash* stimulates the green colouring matter which secretes the starch, sugar and gum in the growing plant. You see, therefore, that these substances are concerned in the formation of muscle, bone, nerve and heat producing substances. Every plant needs these things. The animal needs these things. The animal keeps some of these from the plants; and the remainder goes back into manure for the use of the plants again. Thus we have a rotation, not of crops, but of fertility which keeps the man's soil always rich while enriching himself; but the man who sells his crop all off, prevents the rotation of fertility, keeps the old sun half idle and thus loses his profit.

BARNYARD MANURE.

A word or two as to the composition of barnyard manure. Farmers do not pay half enough attention to it. It is a topic that is generally ignored in farm literature. I mean with regard to the practical details of its management. There are people who are so eminently fastidious in the use of language that they try to, or succeed without effort in making ideas misty instead of making them clear; and because some people forsooth have thought that to discuss barnyard manure would not be quite

polite, therefore it has been left almost in the background, and farmers have suffered in consequence. There is nothing vulgar in all the world,—nothing truly vulgar, —except stupid ignorance; and that always is. So I have no apology to offer for mentioning barnyard manure. You see it is a peculiar power that nature possesses, to take the most vile substances, refine, reglorify and build them into plants and food for mankind. And the man who would do his work well, must complete his knowledge on this phase of it, as well as the rest of his operations. These are the average compositions of barnyard manure as obtained from these animals, and in every ton of manure there are just as many pounds as these lines are in length—half an inch to the pound. Now, I have not the time to go all the way down that list with you, and a few words must suffice. On an average in every ton of whole horse and cattle manure there are between 29 and 19 pounds in all of these three substances. If a man by careless treatment or neglect loses these 19 or 29 pounds, the rest of the substance is of no value for feeding plants. What remains may weigh as much as manure ought to weigh, and look exactly as ordinary manure would look, but it is of no use to the farmer. Therefore for lack of knowledge farmers frequently let the valuable portions of their farm-yard manure trickle off down to the sea, getting no returns for it whatever, whereas if they would save these substances, the old sun would multiply their value a thousand-fold.

A man who sells $1,000 worth of butter, sells less than $1 worth of these substances. So that a man who farms skilfully and intelligently can be a manufacturer, giving his raw material the greatest increase of value possible to obtain. Much the larger part of the total nitrogen in the voidings of animals is contained in the urine. The man who keeps his stable clean by the convenient process of boring a hole in the floor behind each horse or cow, is losing more than two-thirds of the value of his manure. That liquid should be all absorbed by litter and put in the manure. Escaping steam from the manure carries off the nitrogen, and the only way to prevent that loss, is to have the whole of the manure well mixed together and gypsum sprinkled over it. Gypsum will fix the escaping ammonia and thus save the loss of nitrogen. Great waste too, arises from the leaching of manure. If the manure be heaped under the eaves, rains will trickle through it and carry off the potash without which plants do not grow. If a farmer wanted to make soft soap, he would not be a wise man if he wheeled the ash barrel into the angle of two buildings where the ashes, as he put them in, would be rained upon by all the rain that ran from the roofs, because he was not ready yet to make his soap. The rains running down through the ashes would carry off the lye, and when he got ready to make his soap he would be very badly left, because the lye had left some time before. So the man who treats his manure-pile in that way, will fail to realize his expectations. It will not be strange if you hear him saying, as many farmers do say, that manure does not seem to make the land any richer. Leached ashes will not make soap and leached manure will not make plants grow vigorously.

FODDER CORN.

Then a man should drain and cultivate his soil in such a way as to make its constituents most available for the crops he is raising. His judgment too, should select the variety of seed that would give him the best service. Just here I will refer shortly to fodder corn and the silo. Fodder corn is the most serviceable of any of the plants grown in our Dominion. Men who imagine that fodder corn can never be grown to advantage on their land, have never tried to grow the right variety. On the average in our Dominion farmers can grow 16 tons to the acre of fodder corn,—in many sections far more than that; but that would be the average over the whole Dominion. At Nappan, N.S., last year, corn was grown to a height of 14 feet; at Guelph last year we had no corn higher than 12 feet, and we had there on one piece over 22 tons to the acre, actual green weight. All through the Province of Ontario I had reports from farmers who got from 22 to 27 tons to the acre, with stalks not as tall and no more vigorous in growth than what I saw at Nappan yesterday. It can be grown in this Province to great advantage, if you select the right

variety. Fodder corn is essentially a plant needing plenty of sunlight and free circulation of air. It is also a plant that grows deep in the soil, and hence is a valuable plant to employ in the rotation of crops. The roots go deep and the plants obtain support where the roots of many other plants cannot go. Therefore fodder corn does not exhaust the soil if planted in successive crops as much as turnips, or oats or even barley do, because its roots go very deep and loosen the soil. The roots at first sight seem to be quite short, but if you should take the trouble of washing the soil from the roots you would find them extending from 14 to 22 inches, mostly in an oblique direction. A leaf forms at each joint and only one leaf. In most illustrations that I have seen, two leaves are shown, one on both sides of the joint. I have never seen any growing in that way. Because there has been a good deal of book-teaching of an erroneous character, farmers have been disposed to despise all information given in books. When I went to prepare my diagrams I could not find a single diagram in all the collections I had, that had not two leaves at each joint, though I had never seen a corn stalk growing that way. The agricultural press of to-day, however, is not filled with statements that have been guessed at. There was a period in our history when that was the case, but now-a-days Experimental Stations have been established everywhere, by which exact information is given to the agricultural press, which is now a great power for the elevation of the farmer's mind and position. I have heard of men attempting to do all sorts of things depending on the teaching of books, and they don't always succeed. Those who relieve the dull routine of their own existence by writing all kinds of questions for the editors of these papers to answer, will not always find their answers to be gospel. Mark Twain was the editor of one of these papers, it seems, at one time, and when asked what was the best way of harvesting the turnip crop, replied "Send a small boy up the tree to shake them down." It does not always pay to follow a book, even when the general teaching of the book is good. Common sense is a good complement to mix into all advice received, before it is acted upon.

COWS AS BOARDERS.

So when a man becomes an economical producer of feed, he should also become an expert and skilful profit-making manufacturer of saleable products from his own raw material. A man who keeps cows, or steers or swine, or sheep is merely thereby seeking to concentrate and give increased value to the raw material which he has obtained from his farming operations. The animal therefore is to the farmer what the machine is to the manufacturer,—an appliance or convenience for elaborating and making more valuable the raw material he has produced or obtained.

But without arguing further along that line, let me take up another style of discussion. A cow eats the food that is provided by the man who owns or keeps her. Therefore the cow boards on somebody. Now, I cannot board ten men at my table for the sake of their company. I am not fond enough of company for that. Well, if I boarded ten men for the sake of the pay, and five men paid for their board and five did not, I would soon find that out and let the five men, who did not pay, find another boarding-house. I do not see any difference in the economical aspect of the question, if you substitute cows for men. If ten cows board in my stable they board on me and I look for pay for their board. I am not likely to keep them for their society or simply for their company. If I find that five of those cows are not paying their board, I am not likely to keep them for their society or because I am fond of looking at them. Neither do I think, though many would do so, that it would be quite fair for me to palm them off upon my neighbour. That would not be good farming or good citizenship. An unprofitable cow should be sent to the butcher and made to give up through her carcass what she won't give through her milk-bag. You will need to understand the kind of cow that is likely to pay for her board. Here are five points that may serve a man to judge a good cow, because all good cows have power to make profits, and power in any department of the physical world is usually indicated by certain external evidences. A real good

dairy cow should have a long udder lengthwise of her body; and it should be very elastic in quality. The elastic quality means room to make milk. She should have a soft skin,—a mellow skin covered with mossy, silky hair. That a cow has only one skin is self-evident, and still most people hardly ever think of it;—one skin around her body and clear through by way of her stomach. The skin, if coarse or harsh, means sluggish digestion inside, and that means an expensive cow that does not digest her food or thrive well. Then, a cow should have a large roomy barrel for holding plenty of good, rough, bulky, cheap feed; it should be filled up twice a day. It will pay a man who has never done so, to try the experiment of feeding his cow twice a day. Those who have done so, have never gone back to any other practice. Then, again, while a large barrel is an indication of profit-making power, it will pay a man to see that the milk veins under the cow's belly are prominent. Prominence is a far more important indication than actual size would be. Firm muscles mean good constitution. They are one of the best evidences of endurance and thrift that you can find in a cow; and endurance to stand the strain of giving milk continuously is what you want. A cow should have broad loins with long rumps. She should have a rather long, lean neck, with clean cut face and prominent eyes. These points indicate enduring power to stand the strain of a long milking season. If a cow has these five points she will usually have the power of serving a man well, namely:—Long udder, broad and elastic; a soft mellow skin covered with mossy silky hair; a large barrel with broad ribs wide apart and very firm muscles in the abdomen; broad loins with long rumps and lean hips; long neck, clean cut face and large eyes.

She should be given a chance of paying for her board. She should be kept where she is comfortable. Comfort is the essence and sum total of all stabling of cattle whether the stable be of stone, brick or wood. All are equally good if the cow is equally comfortable. If a man keeps his cow uncomfortable, he has so far deprived her of the power of making profit. The cow should be curried every day. My thoughts go back to the old homestead where we had forty cows, which were curried once a day. A cow gives more milk when she is comfortable. She should be made to pay for her board just as she eats it; that is the best way. A man is not a good manager who lets his cow live on him for six months in the year without paying, and then expects her to pay for the whole year's board in the other six months. He can hardly expect that the cow will pay for her winter's board in the summer.

MILKING DURING WINTER.

It is folly to keep your cow for six months without getting any pay, and then come down on her in the spring and say "you have got to pay for your board or get out." I would have the cow make me a weekly offering, as the churches commend. Most of the churches have good business tact and are managed by men of good sense, and if they had more of it they would be appreciated more than they are. A man will give a dollar a week to his church when nothing would induce him to give $50 at one time Make the cow give a weekly offering. A cow will give more milk, if her milking season commences in October than if it begins between March and May. If a cow calves in March or April, when the cold weather comes in the Fall she dries up anyway, and therefore boards on the man during the winter too long without paying for her keep. Butter is dearer in the autumn and winter, skim milk is worth more; and if our cows generally calved in the Fall we would be able to largely develop our export trade in dairy products. Butter made in the winter time is worth more and keeps longer; and calves grown at that time are more vigorous and can be attended to more conveniently, as they come at a time when the farmer has leisure to devote himself to stock-raising practices.

WATER AND SALT.

Then the cow needs to have access to all the water she can drink. We sometimes see milk that has too much water in it, but it is not put there by the cow.

If a cow has abundance of good food, the more water she drinks the more and better milk she will give. Cows need salt every day, not so much here by the sea as they do further inland, but still they need some. I made a test at one time, and I found by changing the salt back and forwards among the herd, that the cows gave 14½ per cent. less milk on the average, for two weeks when they got no salt than when they had it; and furthermore that milk obtained from cows which had no salt would not keep as long by 24 hours. It does not pay to throw your cow a little salt once a week. There are people who act thus but they are not Scotchmen. They are never quite sure that their observance of the Sabbath has been quite complete until they have placed a little tin pail on their arm and started for the pasture. Giving salt to cows regularly means more milk and better milk; and the kindly handling of cows at all times means increase of milk. If the cow is abused or excited or rendered uncomfortable in any way, she gives less milk. A cow fed on cheap food in a comfortable stable at regular hours, with access to all the water she can drink and an allowance of salt every day, can and will pay her board if she is well bred. Good breeding does not mean long pedigree. It means good behaviour both in cows and men. The man who keeps his cows boarding on him becomes a servant to his cows, instead of them being his servants. The man who would be a successful farmer is a man born to rule, to rule nature, to rule plant-life and make it subject to his needs, to rule animal life and make it develop and continue for his service and pleasure. Such a man will not be a mere beast of burden, but will employ the skill of his head and hand to the advancement of his material welfare and of the noble profession to which he belongs. Knowledge applied to work, with skill and enthusiasm, is what is required, and then the farm will pay and give the farmer pleasure as well as profit.

SECOND LECTURE—CO-OPERATION AND THE SWINE INDUSTRY.

DELIVERED BEFORE THE MEMBERS OF THE NEW BRUNSWICK LEGISLATURE AND OTHERS.

Mr. Chairman, Ladies and Gentlemen:—

I am very glad to have an opportunity of speaking to-night to such a distinguished audience, and I have to thank the members of Parliament here for the compliment they have paid the farmers of New Brunswick in giving their time to listen to a few remarks concerning a subject of much importance to them. When the legislators throughout all these provinces of the country think it not beneath their notice to discuss the farmers' calling, then every man may take more heart and courage to prosecute that calling with new vigor and success.

I think, sometimes, that if the *leading* men of the country would pay more attention to the agriculturist's tasks, his place in society and his economic progress, there would be more real leaders among them.

When a farmer sees men, with larger opportunities for forming sound judgments, ignoring his claims, forgetting his calling and concerning themselves wholly about other things, he is tempted to look upon his calling as being one of manual toil only; and often seeks to leave the farm, when, were his calling looked upon as it should be, an impetus would be given to it, and the country would profit thereby. Your province has set a first example to the other provinces, by your legislators giving their presence this evening at the expense of other public duties,—advertising by that presence here to-night the interest they feel in the welfare of that honorable class of men who follow farming for a living.

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The farmer follows no mean calling; his is no mean occupation. It does not demand toilsome effort and strength alone; but it requires now-a-days first of all good judgment and clear headed application of intellect to the requirements of his business. So on this chart I put "man," typical of his race, above his food; and I think that is where he ought to be always and everywhere. The farmer's occupation is to find

food for himself and his race, and to obtain it from all the resources of nature which the Creator gave to him, that he might exercise dominion over them. The man who farms, and farms well, rules; but that requires the most careful judgment, and the highest intellectual qualities. When he has learned to govern animal life and plant life, then he has ruled to some purpose; and then that farmer may rise to rule higher forms of activity. Thus by and by we shall hear of farmers ruling the world. After they have learned to rule the lower phases of life correctly, they may rise to rule others with advantage. In doing his work the farmer must raise animals, as the world requires numerous and varied products for food. England and this continent consume more food per head of their population than they did 25 years ago. We eat more beefsteak per head, we eat more mutton per head and more bacon than the people of 25 years ago. Vegetable products are replaced by animal products; consequently the farmer must keep animals adapted for the yielding of food, and he must necessarily keep them at a profit. A farmer, who takes more out of his land than he gives back, is not farming; and a cow that eats more than it gives back to him is a burden on him, instead of being his helper. The man who keeps a good cow, keeps a friend; and a poor man can best afford to keep the most cows, if he keeps them on good food. When he learns the business of raising good cows, then he will succeed. The world's market is never glutted with superior food; there is often a glut of inferior things in every market and every climate, but there is seldom a glut of superior food; and people are willing to pay for it at high prices, when they get a chance of buying it.

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The only three elements which give manure any value as plant food, are nitrogen, phosphoric acid and potash, and these are the only three to which I have attached any value on this chart. If a man lets these run off, how can he afford to buy fertilisers? Let me give an illustration to make my meaning plain. A man says: "I must have some food for my boys, hungry boys at home." In the carrying out of his judgment he starts to some baker's shop, meanwhile carrying on his back a bag of flour, with a hole in the bottom of the sack. On his way there, he loses sufficient flour to make the loaves. He starts home after having purchased the bread, and upon his arrival congratulates himself in saying, "I have done a fine thing; I have brought bread for my boys." And so he has, but he has lost twice as much flour as would make bread for his boys. So it is a good thing to buy bread, but not to trickle flour on the sidewalk while going to make the purchase. When farmers buy commercial fertilisers without first caring for their barnyard manure, they are in the same state, as the man who went to the baker's shop to buy bread while carrying flour on his back. When farmers allow or cause the nitrogen, phosphoric acid and potash to escape, they lose the only three things that give the barnyard manure its value as a fertilizer.

The soil is mainly a store house for plant food. During the past ages when the Lord was making the earth, He used great powers to grind the rocks up fine; and He did it so well that He pronounced it very good. The farmer ought to know enough to keep up the same practice,—to operate by the same process that nature used. If you examine the soil you will find it to be composed of particles separated by spaces, the particles being full of pores. Every plant needs light, heat, air and water. If a man in the course of handling the soil lets the tiny parts be immersed in water, it loses some part of its nutritive power; and if a man removes all the water he cannot get a thrifty plant to grow. A man who would farm well should have drains under the soil, so that the water may leave behind in the soil, the nitrogen which would otherwise run off on the surface; he should also let the frosts work for him; he should plough in the Fall, that later on, the frost might crumble some portion of the soil and so make it finer.

To illustrate: When one walks at the base of a steep cliff in the spring and sees pieces of rock strewn on the path below, he may reason back to the cause that brought those pieces there. He will find that the water found its way into the little crevices and that the frost came, and wedge-like burst off a portion by its own action

on the water. If you examine the surface of a small piece that fell off, you will find that it has been acted on in the same manner; of course, the surface is smaller and the process is slow, but little fine pieces are broken off, and this same process is carried on and on. These small particles are left in the soil, so that alternate freezings and thawings pulverize it and make it more easily available for plant food. A man is not warranted in forcing down the fine tilth, eight inches deep the next spring; but he is a wise farmer who follows surface cultivation in the spring. The roots of some plants go down deep, and in going down deep they die, decay and make more plant food. I have seen on a tombstone in a churchyard tiny little plants growing. They are at first almost invisible to the eye. They die and become plant food for other plants. After successive generations of plants, the stone is hidden from view. These changes are going on continually. When one plant dies, it furnishes food for others. The further the decayed roots lie below the surface, the further the succeeding crops send their roots. Care will naturally quicken the activities of plants. It is only when a man takes advantage of all the facilities which nature provides for him that he farms with success. Every man should do that for this reason, that if a man does not adopt some means of increasing the feeding scope of his plant in the soil, he so reduces the plant food area, that he leaves the soil on his farm poorer and shallower than when he found it; and every man should farm so as to leave his soil deeper and richer for his successors than when he took hold of it. That is good farming; every other man robs the soil and no man has the right to do that, after it is cleared.

Water is a circulating medium—nature's omnibus for moving things around. I will not speak as to its action, but will give you an illustration as to the possibilities of co-operation. Water, so useful in nature, is composed of molecules so small that they are not visible to the unaided eye. I sit down and I watch a little boy blowing soap bubbles,—you will think it foolish both for the boy and me. I watch the soap bubbles burst; I cannot see the water, but from one of them I try to get a conception of the molecules that compose the water of its film. I get just a glimpse of a conception of the size of those molecules, so important and so useful in the world. By using an illustration—I think from Prof. Tyndal—if you were to have that soap bubble magnified till it became as big as a waggon wheel, you would imagine that you could see the molecules upon its surface. That, however, is not his proposition but a stepping stone of mine to it. If you had that bubble enlarged till it was so big that it would make a jacket for the whole earth, you might see the molecules like No. 6 shot, that is, after that soap bubble was magnified to that tremendous tenuity. You may see from this what these infinitesimally minute things can do when they all act together. Put a quart of water in a strong vessel constructed from the best material of iron or steel, into which man has put the skill and experience of centuries, and all the ingenuity of workmanship that can give it toughness and strength. Have it 6 inches thick; let its hollow chamber be filled full of water all composed of those little molecules. Let it be closed securely and then let it freeze. What happens? Those tiny things all push for the one object. They seem to stand sideways and shoulder to shoulder, and as these little things push they burst the strong vessel as if it were an egg shell. This iron vessel gives me an illustration of coercive combinations, and the action of the water gives me a conception of what farmers can do when they learn to co-operate for industrial improvements.

I will not speak to you of the air and the sun, or how the sun assists in the formation of plant structure and food, or how its wonderful strength is stored up to be used at man's discretion. If a man will do the chores, the sun will get in its work. That good old man, the Hon. Harris Lewis, who used to come from New York to Ontario to give us some talks on dairying and agriculture, in the course of the talk one night, said some things that struck very hard against the prejudices of some present. He was a man who spoke without trying to raise them, but who went to the root of what he was talking about,—that is the best kind of a speech to have. After he got through, one of the bumptious fellows in the assembly said: "Mr. Lewis, when you are at home you don't farm, you make vinegar don't you?" The old man arose with one of the kindliest expressions to answer this rough fellow.

"Oh no," he said, "I never make vinegar. There is a vinegar factory on my farm, and when I do the chores the Lord makes the vinegar." It is no mean job to do the chores, it does not belittle us any. You can see the need for co-operation and education, so that man can do that work well and with the largest service to the world, while leaving to himself the most leisure that he might be the better man.

There is a difference between co-operation and the commercial combinations of to-day. No man need say that one who desires farmers to co-operate is urging them to combine. The combine has always in it an element of commercial coercion. Co-operation is to help men to act together, to *give more* to the world; the combine is to *get more* from the world and give back as little as possible. I believe in farmers co-operating in doing their work, and they will get more back in return because they will have given more. Farmers can afford to co-operate more than any other class. You will find merchants co-operating; if one gets a customer it is partly at the expense of the other; and still they co-operate although their interests are rather competitive—almost antagonistic. But in farming, when this man learns to breed better horses, the others likewise do so: they create a demand and prices go up because buyers are brought in to pay for the better animals. Co-operation is for the good of each and for the good of all. Thus men who farm would serve the country well by co-operation.

I am sometimes amused,—oftener pained at the foolish attitudes and actions of some farmers. Although they ought to help and encourage each other, yet they often try to hinder. If John Brown builds a big barn, then Jones will ask if somebody had to back his note in the bank to get the lumber. If a man gets better horses to have better stock, he is said to be putting on style, etc., etc.; and instead of this co-operation of sentiment which would help them along, jealousy and envy bitterly spoken keep them back. Those men who co-operate become economical. Co-operation reduces cost, and it is applicable to nearly all branches of farming and particularly so to dairying work.

A good while ago men used to do all their threshing in their barns by the use of an instrument,—rather than a tool,—wholly the property of each and often made at home, when every man threshed his grain with his own flail. Here was an illustration of what I shall call "single endeavor"; but men cannot afford to do that now. They have now steam separators and other appliances and gather together for two days at one farm to do all the threshing there. So economy of labor is promoted by co-operation, and that applies to all farming work.

In the making of butter, in 10 lb. or less lots, the women do not co-operate. Each does her own work alone and it takes six times more labor to make it, than it does in 200 lb. lots in a creamery; but it does not maybe cost any more, because a great many men hire their wives for their lifetime just for their board. It is a waste of time and a cruel unnecessary labor imposed on the women of the country, when they have to do unprofitable work, such as the making of butter in small quantities, when the very same butter would bring more than enough extra to pay for the manufacturing expenses, if made in a creamery. When the women of the country are relieved from this work, there will be fewer boys leaving the farms. They leave because the work is—too often—drudgery without pay. When the women are not overworked then the boys will remain at home, in brighter homes, and by their strong hands will further lighten the burdens of the women and leave them more liberty, leisure and opportunity for true housewively duties.

Then co-operation in dairying would increase the price of the product. When butter-making is carried on in the farm houses, the work under such circumstances does not yield a uniform quality; and uniformity is an essential, if we would have our butter fetch the highest price and become an article of commercial importance like our cheese.

Up in Ontario over 99⅘ of all the cheese is made in the cheese factories. The same is true of the rest of Canada, to the extent that over 99 per cent. of all the cheese manufactured in Canada is made in cheese factories by co-operative methods. The result is that we stand first in the British markets for the quality of

our cheese, and we send more cheese there per head of population than any other people on the whole earth. We send 42 per cent. of their cheese to the people of England, and why? Because we have co-operated and have given our cheese a quality of uniformity. As to our butter, we send her less than 2 per cent. of all the butter she buys abroad; but we make our cheese by the co-operative method and send 42 per cent. of all their imported cheese to England. When we make our butter in the same way and establish a standard of uniformity for it, then we shall probably send larger quantities of it than of cheese. I must remark that England buys twice as much butter abroad as she buys of cheese, and when we send them 42 per cent. of their imports of butter, there must necessarily be an increased volume of wealth coming this way. Co-operation would help us to establish a reputation there, and reputation has a peculiar value in all things,—you cannot weigh it, but it is of great worth. It is not measured by dimension, but it applies to everything. Reputation is not character. If you have a factory with a superior reputation and send to England one shipment of inferior goods, those inferior goods will sell for the same price relatively as did the previous good quality. Men buy on the established reputation of a factory expecting that the quality will be all right; and hence its reputation would carry it along all right that once, but it could not do so undeservedly very often. That is why we are trying to have such regulations that any Canadian may brand his cheese, assured that it will be counted a misdemeanor for anyone to use a similar brand on inferior cheese or on cheese from the United States going through our Dominion in bond. We have an excellent reputation and we certainly should have enough pride to look after it and protect it for ourselves. Co-operation has been a means whereby we have assured and established a reputation and a demand for our goods.

I think a Dairymen's Association for the Province of New Brunswick should be organised and that such an Association should receive a liberal grant from the public treasury of this Province. I do not think, so far as I can see, that any Province can spend public money to more advantage than for the agricultural education of its farmers.

The Association, when formed, and co-operation in factories will give farmers more enthusiasm in their work. If a man has to do specially difficult work he has to get up enthusiasm and put *himself* into his work; farmers must do their work in that way. This enthusiasm will help the farmers to do their work better, and they will have more profit from it. Co-operation would give more value to all property owned by farmers. I will not argue this, but will give one illustration. If a man wants to sell or rent a farm within a reasonable distance of a cheese or butter factory, he will advertise the fact, and for why? Because he will see an increased source of revenue through the cheese factory or the creamery, and thus their proximity increases the value of the property. Were every man to try to support the factory in his locality, he would get an increased price for his farm, if he wanted to sell; and if every man would support the creamery it would never go down, and it would be still more profitable to each one patronising it.

There is one other point I would like to mention. I give an instance which was mentioned in conversation this afternoon,—a co-operation of men to govern a township for themselves. That co-operation will educate these men in the Council, and then in the County Council; and so men of approved worth and ability are brought forward who were never heard of before. And the same is true of these co-operative factories. We never would have had these Farmers' Institutes, but for the cheese factories and co-operation in favour of creameries.

In the Kingdom of Denmark the people had very hard times to make farming pay, but now they proceed on what is called partnership dairying; and they have carried it on so successfully that they send the best and most of the butter sent to England from any part of the world. But that is not all; they learned to co-operate and to produce it so cheaply and get such a profit that they raise their stock on the skim milk, so that now they export more beef than we do from this vast Dominion.

We cannot compete with the great wheat fields of the West, but we should not, so to speak, throw up the sponge and show the white feather in the cattle trade of the world.

Where does the cheap beef come from? A great deal from land worth $100 an acre, farmed by men who hire help at $45 a month, and I have seen it fed on corn ensilage costing 2½ cents per steer per day on high priced land. In old England, where land is worth $500 an acre, they still grow wheat against all the world, because they keep cattle and keep their lands rich. We have less competition here and good lands, and there is no reason why we here should not succeed in raising cattle cheaply in any part of our own Dominion.

If in any section, farmers wish to co-operate, a cheese factory of 500 cow capacity can be erected at a cost of $2,000 for a building of the best sort and construction, equipped with the best utensils that recent improvements can provide; and the cheese can be made at a cost of from two to two and a half cents a pound, including the drawing of the milk.

In Nova Scotia where they have a few co-operative factories, they paid more on an average for the milk than in Ontario; and if they can do that in Nova Scotia why not in New Brunswick. You have your home market and the people of England are always ready to pay and willing to pay a good price for good cheese. A creamery of 500 cow capacity to be operated upon the cream-collecting plan can be completed at a cost of about $1,500. The collecting of cream and the making of butter will cost about 4 cents per pound, and the persons sending the cream to the factory will be saved all the labor of manufacturing it into butter, as well as the cost of the tubs, etc. The larger the output, the lower the cost per pound of putting it on the market. I think the best kind of agriculture in dairying, for us to follow, is to make cheese mainly in summer months where farmers are raising much stock, support creameries during the winter and make one building do for both. When we make butter during the winter, more stock can be raised and the three businesses will run hand in hand; they will add largely to the profits of the farmer and by the production in such a manner, of butter, beef, cheese and bacon, the farmers will grow richer. In small districts where the area is large and the number of cows is small, it is well to establish the creamery on the cream-gathering plan.

You can never put too much water in milk if you always put it through the cow's mouth. There are 3·75 per cent. of fat in milk. Cheesemakers should learn how to prevent this waste of fat into the whey. It becomes dairymen to learn, that most of it may go to make cheese. If the milk is not properly aërated there will be less of this retained in the cheese. If the milk has not been perfectly coagulated the casein is wasted. There are 4 per cent. of sugar and ·07 per cent of ash in milk. Where the whey is kept sweet, it is good food for calves and hogs, but it may become poisonous by being in a foul state.

I think every cheesemaker, to succeed in his business, should so study those problems that he will be able to render intelligent answers as to why he wants certain treatment given to cows. The cheesemaker does not understand the whole of his business; he should study up the cow, the animal that makes the milk, and the food of the cow, so that when a man says "my milk is as good as my neighbour's," he can prove to him the why and wherefore of the effect of care and management, and adopt such treatments as are required for the quality of milk he handles. He will make better cheese and can make the whole neighbourhood respond to his own investigating, observing disposition. We want in our own country that our business men should look things squarely in the face; see them as they are and make other men think. If we can make them think wisely, it will make them successful dairymen, strong citizens and good men.

You can see that milk contains the very things necessary for animal growth, and all in correct proportions for food; and cream is merely a portion of the milk with a larger share of fat globules in it. So cream bears no definite ratio to the quantity of milk. You may have milk set in deep vessels, and you can take from the top 16 or 18 per cent. and call that cream, or half of the whole milk if you like.

I know down in Halifax they call the bottom half, *the cream*, and give you that on porridge.

The animal that should supplement the cow in producing food and rendering service is the despised hog. Farmers seldom understand the hog, or they would keep more around their places. It does not pay to import $2,000,000 worth of pork and export hog feed to other countries. If we would feed the hogs ourselves and sell the bacon, we would have the producer's profit and the manufacturer's profit. It does not pay us to buy pork and rob the soil of all kinds of grain, to give others the manufacturer's profit. Besides this they,—the hogs,—are interesting in other phases of their behaviour. I have studied the hog a good deal. I used to feed a great many—600 a year; and I was not a prodigal boy either. They are worthy of observation in regard to general demeanour.

I went down on Monday morning to one of the hog yards, some years ago. The man whose business it was to look after them, had allowed an alcoholic fermentation to act in their whey. In this case it was quite pronounced, and I got my arms on the rail-fence and studied 70 drunken hogs for a time. 'Twas a study in animal husbandry and moral philosophy combined. There was "the funny hog," which would tickle the others and run along and laugh; then there was "the fighting hog" who would show his tusks and snarl; and "the sluggish hog" that would lie in the mud on the ground and grunt and grunt. I concluded that it was foolish for even a pig to let his appetite get the better of his judgment and will.

In feeding hogs, the man who feeds them well will succeed with them. You must remember that the hog has a preference for being clean. In feeding last year a great many pens, one side of each was kept clean for a week; afterwards the pigs themselves kept that clean for their bed. One week's education did it, and if the hog gets a good chance and a good example he is all right. Every farmer, with 100 acres, ought to feed 20 to 100 hogs. The common way of constructing the floors of the pens is unsuitable. If the floor slopes backward from the trough, it will be kept wet. That means sickly hogs that do not thrive well. I prefer to make the floor slant towards the trough. Twice the profit can be made when the hog lies dry all the while; and besides that, the health of the hogs is much better. Then the feeding trough should have its holding capacity in length and not in depth.

It pays to have them fed with good clean feed; that means the difference between profit and loss. They will take the waste from the table. It does not do, as is usually the case, to have it put into a tub or barrel that is never emptied or cleaned out. That becomes poison for the hog. It becomes fermented and sour, and makes bad blood. With the sow and young pigs taking it, why the consequence is that they die before they are ten days old. Every animal should get clean food, and even little pigs have the right to be well-born. Hogs fed on clean food should gain at least one pound for every four and a half pounds of grain used; a man can tell whether it is paying to keep them or put his labour to other sources of profit. If any man feeds his hogs too long, it costs more than he can make out of them. I quote the following from my last annual report as Professor of Dairy Husbandry at the Ontario Agricultural College:—

"Dairymen neglect one of the best servants they can have in the animal creation, when they do not avail themselves of the hog to aid in making money from the by-products of milk. The attitude of farmers towards the pig has been an unfriendly one. It is a popular, though untrue, saying that 'the only good Indian is the dead Indian,' and farmers seem to cherish a similar belief in regard to the hog. That opinion, however, is in direct opposition to the best interests of the men who keep cows for the manufacture of dairy products. If the man who keeps ten cows will fatten twenty hogs in the summer and half as many in the winter, he will find, perhaps to his amazement, that this little branch of business will bring him in more money and profit than he thought could be made from it. Whey is a valuable hog feed. There

are nearly seven pounds in every hundred pounds of whey which the hog can use to advantage. The composition of sour whey may be given as follows:—

	Per Cent
Water	93·00
Nitrogenous substances	1·00
Fat	0·50
Milk Sugar	4·25
Lactic Acid	0·50
Ash	0·75
	100·00

These elements of food value in whey should produce at least two pounds of live weight in hogs. One hundred pounds of whey, fed in the most judicious manner, should produce two pounds of pork; it will not do it when fed alone, but fed in combination with other foods it will. Sows, like cows, should be selected for their profit-making powers. A man who knows well enough that unless he has a good dairy cow he need expect no profit from her, often acts as though he believed that anything that grunts and squeals will make money for him out of its feed; but the squealing and the grunting are the main part of it with some hogs. In selecting a sow, she should be selected first for her length, then for her depth and then for her breadth. The three qualities should be valued in that order of merit—length depth and breadth. A sow should be made to farrow in March or April and in September. A breeding sow should never be fed upon decayed food. The waste from the kitchen and the table is wholesome feed for pigs when it is fed clean and before it becomes decomposed; but a never-empty and consequently never-clean swill barrel is a menace to the health of the hogs and a hindrance to profit. A breeding sow should always get as much salt as she likes to take; her food should be salted and she should have access to salt besides; she will not thrive without it. The quarters of breeding sows during the winter should be comfortable. They too often lie in and under strawstacks, or out in open sheds, and the other swine which are being wintered lie with them and on them to make more warmth. Dead pigs and sickly pigs from birth are the consequence. Their sleeping places should be well ventilated and dry.

A boar should be selected for length, depth and breadth. He should have proportionally large bones, for small bones are indicative of a weak constitution and a disposition to lay on lard instead of muscular meat. A plentiful supply of hair indicates a strong constitution, and a predisposition to lay on flesh.

Young pigs should be suckled for about three months; if they are weaned when five or six weeks old, they will not do as well. The sow can nurse them as well as not if properly fed, and the pigs will grow and thrive so much the better. Skim-milk butter-milk and bran should form some part of a milking sow's ration. It is profitable to scald or boil her feed until after the pigs are weaned.

The little pigs should always have access to cold water for drinking. In feeding and fattening these little pigs, they should have the trough room in length, not in depth. Many of the hog troughs, I see around the country, seem to have been constructed with the object of affording bath accommodation for the pigs, so deep and wide are they that the pigs take headers right into them. The feed room of the trough should be in length and not mainly in depth for all sizes of hogs, and it should be kept clean. Pigs have the reputation of being filthy animals, but a pig will keep itself clean if it gets instruction in that way for one week and a good example. The feed for little pigs should be sweet, not sour. In the souring of whey, some of the sugar is converted into acid. Lactic acid has no feeding properties. It has a slightly helpful digestive action, so that whey or milk which is sour will do a pig no harm, but part of the food value has been lost. Thoroughly sour whey is extravagant food and unsuitable for pigs. All meal fed with whey had better be of a mixture of grains: pease, wheat, middlings and bran are suitable. And let me remark in passing, that a farmer can frequently grow thirty bushels of "goose wheat" to the acre, in this

time of cheap wheat, and he cannot market that so well any other way as through his hogs. With their mixed feed, pigs should receive a liberal allowance of salt every day; charcoal or wood ashes are very beneficial when hogs are fed mainly on whey. A very small quantity of saltpetre and sulphur once a week would help to keep them thriving when the whey is unavoidably sour, as it will sometimes become in spite of the best of care. A mixture may be made of eight pounds of salt, eight pounds of charcoal, half a pound of saltpetre and one pound of sulphur. The hogs may be allowed to take all they like of the mixture. Pigs should have some green feed in the summer time when penned up; half an acre of clover will yield the best returns in pork when fed to pigs that are also given whey and grain in combination therewith.

The sleeping quarters of pigs that are fed should be dry, clean and well ventilated. The best weight at which to sell hogs in order to realise the highest price and the best returns for food consumed is from 150 to 200 pounds, live weight."

The following tables give the observed results from five of the pens of hogs that were fattened during the season:—

On Aug. 9th sixteen hogs were separated into three pens, containing 6, 5 and 5 respectively. They were divided to be as near alike as possible in age, size and breeding. None of them were pure bred, though most of them showed Berkshire or Chester White points. They were all fed on middlings only, with salt and water, and were allowed as much as they could eat, being fed three times a day. The middlings were mixed with cold water in the troughs immediately before the time of feeding.

——	Number of Hogs.	Weight Aug 9th.	Weight Sept. 13th.	Gain.	Middlings Consumed.	Middlings consumed per lb. of increase live weight.
		Lb.	Lb.	Lb.	Lb.	Lb.
Pen 1	6	586	924	338	950	2·81
2	5	465	726	261	836	3·20
5	5	399	673	274	908	3·31
	16	1,450	2,323	873	2,694	3·08

The average live weight of the hogs on Aug. 9th was 96.6 lb. each
" " " Sept. 13th " 145.2 "

The object in feeding the middlings was to prepare the three lots for an experiment in the feeding of corn-meal alone, pease-meal alone and a mixture of barley-meal and middlings alone in the fattening of these 16 hogs. The hogs of each of the three lots in pens 1, 2 and 5 were weighed every week. The meal in each case was fed, as were the middlings, mixed with cold water in the trough, immediately before the hogs had access to it. They were fed three times a day and each pen was allowed as much as the hogs would eat. In the tables I have arranged the figures under *four* feeding periods of four, four, four and three weeks each.

Pen 1—Six hogs fed on cornmeal only with water and salt, Sept. 13th to Dec. 28th.

Feeding Period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Cornmeal consumed.	Cornmeal consumed per lb. of increase live weight.
	Lb.	Lb.	Lb.	Lb.	Lb.
September 13th to October 12th	924	1,184	260	1,111	4·27
October 12th to November 9th	1,184	1,447	263	1,174	4·46
November 9th to December 7th	1,447	1,666	219	1,161	5·30
December 7th to December 28th	1,666	1,842	176	911	5·17
September 13th to December 28th	924	1,842	918	4,357	4·74

Pen 2.—Five hogs fed on pease-meal only with water and salt, Sept. 13th to Dec. 28th.

Feeding Period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Pease meal consumed.	Pease meal consumed per lb. of increase, live weight.
	Lb.	Lb.	Lb.	Lb.	Lb.
September 13th to October 12th	726	945	219	1,049	4·79
October 12th to November 9th	945	1,140	195	931	4·77
November 9th to December 7th	1,140	1,390	250	1,126	4·50
December 7th to December 28th	1,390	1,534	144	815	5·66
September 13th to December 28th	726	1,534	808	3,921	4·85

Pen. 5—Five hogs fed on a mixture of barley meal and middlings alone with water and salt, from Sept. 13th to Dec. 28th.

Feeding Period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Feed Consumed.		Mixture of barley meal and middlings consumed per lb. of increase, live weight.
				Barley.	Middlings.	
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
September 13th to October 12th	673	877	204	399	399	3·91
October 12th to November 9th	877	1,070	193	436	419	4·43
November 9th to December 7th	1,070	1,275	205	486	489	4·75
December 7th to December 28th	1.275	1,403	128	351	361	5·56
September 13th to December 28th	673	1,403	730	1,672	1,668	4·57

The following table is arranged for comparison of the quantities of feed consumed per lb. of increase live weight:—

Feeding Period.	Corn meal consumed per lb. of increase, live weight.	Pease meal consumed per lb. of increase, live weight.	Mixture of barley meal and middlings consumed per lb. of increase, live weight.
	Lb.	Lb.	Lb.
September 13th to October 12th	4·27	4·79	3·91
October 12th to November 9th	4·46	4·77	4·43
November 9th to December 7th	5·30	4 50	4·75
December 7th to December 28th	5·17	5 60	5·56
September 13th to December 28th	4·71	4 85	4·57

On November 9th, after a period of preparatory feeding, eight hogs of similar age and breeding were weighed, and left four in each of two pens. They were not pure breed, but in appearance would have passed for Berkshire hogs. A test was undertaken with them to obtain some information on the value of rape ensilage for fattening purposes. The four hogs in pen 6 were fed on middlings only, with water and salt mixed in the trough before the hogs were allowed access to it. They were fed three times a day, and were fed as much as they would eat. The four hogs in pen 7 were fed on about one-third the quantity of middlings consumed by the hogs in pen 6, and were allowed as much rape ensilage as they would eat. The treatment otherwise was alike. The feeding lasted from November 9th to December 21st, when the supply of rape ensilage was exhausted.

The following table shows the comparative quantities of middlings and rape ensilage consumed:—

——	Feeding Period.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Middlings and rape ensilage consumed.		Middlings consumed per lb. of increase, live weight.
					Middlings.	Rape ensilage.	
		Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Pen 6: 4 hogs	Nov. 9th to Dec. 21st	905	1,164	259	1,491	.....	5·75
7 4 do	do do	905	1,084	181	487	2,840	

According to this one test, one pound of middlings is equal to 5.12 lb. of rape ensilage for the production of pork. The *cost* of the rape ensilage in this case could not be correctly calculated.

I desire here to call attention to the fact that in the feeding of the hogs in Pens 1, 2 and 5 from August 9th to September 13th on middlings only, from an average weight of 90·6 lb. each up to 145.2 lb. each, *only* 3·08 *lb.* of middlings were consumed for each pound of increase live weight, whereas in feeding the hogs in Pen 6,

on middlings only, from an average weight of 226·2 lb. each up to 291 lb. each 5·75 lb. of middlings were consumed for each pound of increase live weight.

The twenty-four hogs of Pens, 1, 2, 5, 6 and 7 were killed on December 31st and January 1st. The last feed was given to all the hogs on the morning of 30th December. The hogs of Pen 1, and numbers 4 and 5 of Pen 2, were killed on January 1st. The following table will give some interesting and probably useful information. The live weight of each hog was taken immediately before it was killed, and the dead weight was taken immediately after it had ceased to bleed. The hogs were all scalded, scraped, dressed and hung up where they would not freeze. On January 6th the dressed weight was taken:

Pen.	Number of Animal.	Fed on	Live Weight.	Dead Weight.	Dressed Weight.	Weight of lard on guts.		Per cent. of shrinkage from live weight to dressed weight.
			Lb.	Lb.	Lb.	Lb.	Oz.	
7	1	Middlings and rape Ensilage.	.....	.....	218½	5	2	14·3 per cent.
	2		.....	.....	254½	5	10	
	3		260	254	224	6	2	
	4		249	242½	212	4	14	
6	1	Middlings.	298	292	257	7	0	13·3 per cent.
	2		282	273	245	6	11	
	3		259	252	225	6	2	
	4		305	300	264½	6	11	
5	1	Barley-meal and Middlings.	273½	26 ½	229½	7	9	15·6 per cent.
	2		283	277	242½	10	1	
	3		238	232	201½	7	14	
	4		298	291	251	6	4	
	5		253½	246½	211	6	0	
5	1	Pease-meal.	289½	282½	238½	7	14	17·0 per cent.
	2		288	282½	242	9	12	
	3		301	293½	246	9	0	
	4		279½	273½	232½	7	12	
	5		312½	305½	261½	6	15	
2	1	Corn-meal.	295	290½	257½	6	2	14·1 per cent.
	2		342½	336½	293½	9	0	
	3		241	235½	206½	6	10	
	4		332½	326	287½	5	13	
	5		283	276½	238½	8	11	
	6		277½	271½	237	7	4	

One hog of each lot was cut through in front of the shoulders, behind the shoulders and in front of the hams. It was intended to photograph these sections, had the difference between the proportions of fat and lean from the different kinds of feed been decidedly apparent. The difference would not have been evident to the eye from an exact photograph. A few of the notes made on the spot are transcribed here.

Corn-Meal Fed.—Lean meat rather brighter in the color than the other; equal to the pease-meal fed, in firmness and proportion of fat and lean; lard more chalky in shade than others.

Pease Meal Fed.—The color of the lean meat hardly so bright as the corn-meal fed.

Barley-Meal and Middlings Fed.—Color of the lean meat rather pale; larger proportion of lean to fat than in the corn and pease-meal fed; flesh and fat softer in body than in the two other lots.

In the following table is shown the order of quality under the three heads of 'color,' 'largest proportion of lean to fat,' and 'firmness of flesh and lard.'

Order.	Color.	Largest proportion of lean to fat.	Firmness of flesh and lard.
First.	Corn-meal.	Middlings and rape ensilage.	Equal { Corn-meal. Pease-meal.
Second.	Pease-meal.	Middlings.	
Third.	Barley-meal and middlings.	Barley-meal and middlings.	Barley-meal and middlings.
Fourth.	Middlings.	Equal { Corn-meal. Pease-meal.	Middlings.
Fifth.	Middlings and rape ensilage.		Middlings and rape ensilage.

Other hog-feeding has been in progress. From the data given in these tables, and from conclusions safely reached by observation, I desire to point out that as a hog becomes older and heavier there is a gradual increase in the quantity of food consumed per pound of increase live weight. It is not prudent to base a scale of the per cent. of increased consumption of feed upon these few tests, but I may mention that in the case of feeding hogs upon middlings only from 226.2 lb. each up to 291 lb. each (pen 6), they consumed EIGHTY-SIX PER CENT. more feed for every pound of increase live weight, than did the hogs from 90.6 lb. each up to 145.2 lb. each.

By comparing the qualities of feed consumed per pound of increase live weight by the hogs in pens 1, 2 and 5 on corn-meal, pease-meal and barley-meal and the middlings respectively during the first eight and the last seven weeks the following results appear:—

Feeding Period.	Corn-meal consumed per lb. of increase, live weight.	Pease-meal consumed per lb. of increase, live weight.	Mixture of barley-meal and middlings consumed per lb. of increase, live weight.
	Lb.	Lb.	Lb.
September 13th to November 9th.....	4·36	4·78	4·16
November 9th to December 28th.....	5·24	4·92	5·06

The increased per cent. of the consumption of feed per lb. of increase live weight in the hogs in the second period from Nov. 9th to Dec. 28th over the rate of consumption during the period from Sept. 13th to Nov. 9th, is as follows:—

In corn-meal fed hogs, 20 per cent. more feed per lb. of increase live weight.

In pease-meal fed hogs, 3 per cent. more feed per lb. of increase live weight.

In barley-meal and middlings mixture fed hogs, 21 per cent. more feed per lb. of increase live weight.

I consider that it is possible by a judicious mixture of grain in hog-feeding to obtain one pound of increase live weight up to 200 lb. for every four pounds of grain fed.

The floors of our feeding pens all have their fall towards the trough; that arrangement leaves the back part of the pen always dry for a sleeping place.

Hog manure is one of the best fertilisers; in feeding hogs, little is taken off the farm, much is left on it of manurial value, and satisfactory money returns may be realized in addition. For these reasons, I believe the hogs of this Dominion are an unrecognised and undeveloped source of wealth for the men who endeavor to understand and use them well."

As to the breed of hogs, I will tell you a story, but—first how often to feed them. Three times a day is not too often. The hog does not take any harm from having food before it all the time. It is not like a horse or a cow in that respect.

I was going to speak of the kind you should keep. Some say a hog with a long back is best; others speak of the breadth of the pig, and there are some people with whom length of the body in front of the ears is the favourite point; but that is not a good kind.

An American—a typical Yankee—went down to South Carolina to see an exhibition there, and he was very much disgusted to see this latter kind of hog getting the prizes. He had hogs himself and chuckled within himself that he would carry off all the prizes next year. When he returned home, he went on to tell the neighbours what those long-nosed animals were like, and said, "Down in South Carolina they have but one way to tell when pigs are fit to kill; they take them up by their ears and when their hams will balance their snout, they kill them, they are fat." So the Yankee thought at the next exhibition he would take down his pigs. He did so and had them entered. Presently the judges came up. One glance at his round pigs was enough; they passed by on the other side. He went up to them to remonstrate and remarked: "Did you see my pigs,—them short-legged, broad-backed pigs?" "Oh yes! we looked at them." "Then why in thunder didn't you give them a prize. They are broad-backed, round-hamed, short-legged, fine-boned"——— And so he was rattling on in the usual American modest style, to enumerate their excellencies, without a word about their defects, when he was interrupted by a slow-speaking Southern judge who said, compassionately: "Stranger, you don't seem to just understand and catch on to the needs of these 'ere parts. Your pigs ain't quite adapted to the wants of this community. They ain't built to suit our circumstances altogether, because you see a pig that can't run twice as fast 's a nigger 's no good to us; he's a gone hoss."

THIRD ADDRESS—AGRICULTURAL EDUCATION.

I have no intention of discussing this subject with you to-night in any exhaustive way, or as I should like, and will at this hour have to content myself by referring to a few lines whereon I think the education of farmers could be improved. It would be a good thing for the farmers of this country in some respects, if a practice which exists in the older countries was in vogue here, namely, that of having men educated in agricultural schools on agricultural subjects. In Germany, England, Scotland and Ireland, men are specially instructed and trained how to have farming done in the best way, and then they apply their skill and knowledge through other men's hands, often those of their tenants. The men there who have the agricultural education do not perform the farming work, but they do the thinking and the other men do the tilling.

In our own country we have a happier state of things in opportunity. Here we have, or try to have, the one man competent for both spheres of action; and the man whose own head rules his own hands needs a better education, that he may rule wisely and well. Farmers ought to be taught that they rule their farms and their bodies for themselves and other people. That truly needs education. I can say but a few things about it to-night. Skill is always the product of education. The man

who is unskilful does not do as much in the world as the man who is skilful. Skill is not often understood as being the product of education. When a man learns to fell trees well, he is educated in felling trees. That is, he has power to apply his knowledge; but acquiring knowledge with a mere facility to remember things is not education.

I find some men who have so laden themselves with information that they go about in the world burdened with the load of their lore and learning, and they are tired all the while—too tired to do anything useful and too tiresome to encourage others to do anything. Education has in itself the quality of enabling a man to put his knowledge under his feet that he may be uplifted thereby, with his hands free and head clear to lay hold of life's tasks and perform them well. A man with his footing sure, will be safer than the other man who has not that advantage by his education.

A man educated in felling trees knows how to use an axe and does it. I learned to fell trees. I could read a good deal about it, but my reading could not help me to fell trees. The man who could not read at all, would readily bring energy and a knowledge of his tools to his work and apply acquired skill to the doing of it. Though I might be rather more learned, yet for his purpose he would be better educated than I. In all educational efforts, I think every man who wishes his race well should remember that education is intended for the purpose of enabling a man to bring things to pass because of his being and his doing.

The farmer needs that kind of education for his calling and business. He requires a knowledge of the transactions into which he enters, so that he may see wherein his profit will lie between the cost and the price he can obtain or realize. Many a boy makes a failure of farming because his father never gave him a chance to work and solve out the real problems for himself until he was thrown wholly on his own resources, and then he was unequal to the difficulties from lack of a practical business education. A knowledge of how to buy and sell well and have a profit, how to raise crops and animals, how to reduce the cost of raising them and then how to sell well and have so much profit the more, are branches of a farmer's boy's education that should not be neglected.

Farming is not only a business, it is a trade; and the farmer needs skill in workmanship, as much as does the carpenter or other workmen. You would not think a carpenter educated until he could lay his boards close and make good joints. I do not think a farmer is educated to plough until he can plough straight and even. The boys must be encouraged to plough well, to tend the cattle well and they will take a pride in their work, because as a man finds scope for his own thought he recognises he is doing a man's work and then it is never drudgery. So a man will express himself through his work. There are people who think it is ennobling only to give expression through the voice and pen, and this thought is bolstered up by men who ought to know better. I will give you illustrations.

I once had a chance when a younger man of hearing General Grant speak. It was after his second term in the Presidential chair. He did not speak more than five minutes. I sat and listened, rather amazed. I did not think much of his speech. He blundered and stammered a little, and at last sat down, apparently covered by confusion. Would I be justified in saying he had no power of expression? You see the man's genius and will could express themselves in a far stronger way than by a few words. He was the instrument that hammered the two dividing parts of a great nation into unity.

A painter cannot perhaps talk much, but yet he can give expression on canvas through his brush. You have a sculptor who cannot thrill you with eloquence, but he can put into his statuary a more durable idea than can the finest speaker that ever lifted his voice. And the farmer should learn to express himself through his work, so that his farm will represent his idea and thus as he expresses himself in his work and addresses himself to his work, he finds scope for himself. Such exercise is education. He wants and needs some knowledge to begin with; and education will lead it up to doing something and him to being somebody.

Agriculture is also a profession. It is the general opinion that the men who have the highest class work to perform are the ones who perform professional duties. When this country was first settled, men had to remove natural obstacles,—physical obstructions,—apply the fire brand and so become devastators. Trees had to be felled, and it required education of a sort to swing the axe efficiently. Then we came to a stage when men's occupations were more constructive. Farmers had to replace on the surface, plants more serviceable than those which had been destroyed. Constructive work demands knowledge and education; and the conditions have changed so much that farmers need to apply themselves with skill to the new work.

If a man sells statuary he does not sell it at so much a ton, but when he sells statuary he sells himself, he has driven his chisel and used his mallet and transferred himself. He sells himself in the expression of the marble that he has made to look beautiful out of the dead block. It is the same with the man who sells a horse; he can embody his skill in the animal and thus by the exercise of his skill in the production of a superior horse, he secures a bigger price for it.

We have done some things in the past through the school house but man wants to know more of his work. The farmer's boys will by knowing more of their work and of their calling, be the better enabled to make it more productive. The school-house does not furnish the information as yet. While a boy is learning to read, why should he not learn how plants grow and how agriculture should be prosecuted. He learns to read, sometimes in studying a narrative, of how some illustrious villain a thousand years, or less ago, cut off the heads of several of his wives and made himself as useless as he could be. Instead of that, why could he not read something that would be helpful and useful in his life? When we teach our boys and girls to read and write and give them something good and noble to read about, then will they become better boys and girls. I would not rob the school boys of their heroes and great men, but I would have it, so that the boys could learn the history of their country from books which teach them something of the great men of the past,—the men who helped to make homes comfortable, clothing good and cheap, and who showed how food could be procured more readily and abundantly,—the men who lifted the people up with noble thoughts and the example of useful well-spent lives.

We are going to have in Ontario very soon, a book on agriculture for boys and girls to read in the schools. A boy is in need of information when he goes to school, but an old man cannot hope to go successfully back to school days again. However, a Farmers' Institute is a school-house for grown up boys and girls who live on farms, and that is the place to get information, stimulation, inspiration and direction. An agricultural paper is an additional aid to widen out a man's knowledge and thought and give him an acquaintance with things he would not otherwise probably hear about.

An organised Farmers' Institute or club is a sort of College in which farmers are led up to newer phases of their calling; they discuss the topics relating to agricultural improvements and all become benefited by them. Then we have Experimental Farms in nearly all of the Provinces. Those of the Dominion Government are the key-stone of the arch of our educational institutions for farmers. Through them the people are informed of the results of experiments, and their work sheds out the kindly light of knowledge to the poorest and humblest farmer in the realm, as well as to his richer brother of wider opportunities.

Therefore an Agricultural Experimental Station where a man can go and see fine fields and buildings is merely a school-house, is a place to which three millions of non-resident pupils should look for information; and if anything more than another makes diligent, earnest men of the officers of these stations, it is to think that 3,000,000 of people are looking up to them as those from whom they can learn something of value. They are educational institutions intended to help those non-resident pupils to do their work better, and if they do that well, they will fill the bill; but as soon as they try to make money direct they should be abolished outright.

I will not speak of the Central Experimental Farm at Ottawa. But of such in general, I would say that their object is to inform, stimulate, direct and inspire the

farmers with enthusiasm, and as they do these things, they become educational institutions of the best kind to help even men who do not want information.

Education teaches the farmer the cost of his products and his prospects of gain. Too much stress cannot be laid upon the importance of co-operation and education. We must co-operate if we are to hold our positions in the agricultural world. Men sometimes say, "One farmer cannot do anything, and therefore one farmer won't do anything." When a man says "I won't," he is a great deal worse off than when a man says "I can't." When we say "we want to do better in this business," and if we say "we can" and "we will," we will have waked ourselves up to the prospect of prosperity in agriculture. We can do that by co-operation. Some men want division. They may be right, but co-operation is always good and always successful, when it operates towards a good end. They say the farmers have no cohesiveness, and therefore they will stand apart. When farmers learn to co-operate, all the manufacturing combines and all the commercial combines that injure their interests, and make our men complain of hard times will be broken up, and they will have liberty and wealth because they have skill. When a man sells anything that he farms, he sells a threefold commodity—material, labor, skill and the strength of the old sun. When a man sells wheat to the amount of 200 bushels, he sells away $48 worth of material from his farm that is taken from his soil. When he sells at $1.00 per bushel, he has $152 left for labor and skill. When he grows 10 bushels of wheat to the acre he has to cultivate 20 acres. He has $152 for the rent, the taxes, seed and other expenses; and the balance is for labor and skill. Figure it out and you will find he has 30 cents a day for himself. That is not the price of skilled labour. If he puts skill into the soil by having his manure put there, and cultivates properly, he may have 30 bushels to the acre. I know a man who in 1888, had 32 bushels to the acre, weighing 66 lb., whereas his neighbor had 19 on better land, and this vast difference is traceable to the fact that his neighbor did not put skill into the soil. When a man sells hogs that weigh 250 lb. at 12 months of age, he is not putting skill into the business. The hogs have boarded on him too long. If a man keeps the wrong kind of hog, whose main occupation is to move around the front yard and furnish music for the family at dinner time, he is not selling skill that way; he is trying to sell squeal, and squeal is unmarketable. It is very much harder to sell skill than to sell material, but the things that are hard to do are worth the doing. Every man in dairy farming who sells skill through these avenues, will not only benefit his land and enrich his pocket, but he will make himself a more skilful man, and the man who does that has the highest reward. Let the young farmers in our Dominion be encouraged and trained to sell skill, and in selling skill they will become a prosperous, contented and powerful people, *such* a powerful people that our American cousins will want to link their fortunes to ours, and put themselves under our protection. Don't think that skill can be legislated into a people; it is a product of self-reliant education.

The men who above all others are supposed to sell skill without physical labor are lawyers. That is the nature of their occupation and that is one reason why I honor a man who follows law honorably. To advise well requires skill. A lawyer may get up and speak for hours in favor of his client's case; he labors for his client; he does not perhaps bring to his work any skill and so is only worth so much by the hour—sometimes 200 times less than nothing is about the value I would put on it. But a skilful lawyer thinks out his case. He sells skill and may not talk for half an hour, but in that time he shows his skill and labors less. Such a man is worth far more by reason of his skill than the lawyer who talks without skill. So in the production of cheese, the raising of beef and pork, skill is needed. It is skill that pays best in all things, and skill is the product of education.

I must now close my talk as the hour is late. But I would have the boys in this land believe that those living on farms and coming from farm homes have the best chance of *being somebody*, and of having everything that the heart of man can honestly desire. I would not have them thinking that these could only be attained

by those born into or coming from the homes of the rich. As a rule the boys who come from the farm can best afford to render the world rich service; they have been trained to exert themselves.

I go into the field and walk along a nice attractive place by the bank of a beautiful stream. I see some lovely shrubs overhanging. I look for a bird's nest and I see one snugly and cosily hanging to a bush. It is very pretty and soft, lined with all the dainty stuffs the parent birds could find. The moss, feathers and everything in it are luxurious. I wait and see where the birds go. They flit and go twittering along that stream bank in search of food. They only twitter along that stream. I then go across the field and find another nest in an exposed hole in the ground; nothing there is luxurious. I wait to see the young leave that nest. They soar away singing, and delight every ear, though they come from the plain nest of straw. Then I go away further and find another nest at the top of a rude crag. I see a little heap of sticks—no luxurious comfort there. But from the eyrie, by and by the young eagles rise and dare the very sun in their circling flight until they leave the gaze of man. The birds of song and strength come from plain nests. The farm home, when the hard work is mixed up with love, and the home has heaps of that in it, is the best place on earth from which to start in life. I would have the homes of farmers such, so that the boys would stay on the farm, become educated to love and follow the noble calling and thus have the best chance of making the most *of* themselves and a sure competence *for* themselves and those dependent on them.

III.—THE WORK OF TRAVELLING DAIRY INSPECTORS AND INSTRUCTORS.

The rapid and steady growth of the cheese-making industry of Canada, both in regard to the volume of business and the area occupied, prove satisfactorily that it is well adapted to the conditions of our farmers, and is competent to increase the profits of those who follow it intelligently. Cheese factories are a comparatively new feature in agricultural work. The first one on this continent was established near Rome, N. Y., in 1851, by Mr. Jesse Williams. Mr. James Burnett, of Farnham Centre, Que., erected a building and started a co-operative cheese factory in 1863. The late and deeply lamented H. Farrington, of Norwich, Ont., introduced the factory system into Ontario. His factory was erected near his home and began operations in 1864. From these small beginnings, the manufacture and exportation of cheese have grown until it now furnishes the largest value in products of any single fruit of the farmer's enterprise. But for the occasional help which the industry received in its infancy from the Dairymen's Associations, the holding of Conventions and the dissemination of useful information by enterprising and public spirited individuals, it might have languished and probably would have died, as indeed it did in a few districts quite as well adapted in natural resources to its successful prosecution as those wherein it has succeeded. The value of the assistance through these educational organisations of dairymen which has been given in the past, has been generally recognised; and from a business point of view can hardly be over-rated by those engaged in the business. Dairymen in other countries who are now our keen competitors, are employing the services of trained and skilled *travelling instructors*, some of whom have gone from our own young Dominion to the strongholds of dairying in the British Isles, and that in order to improve the quality of their products. It becomes our necessity, as well as our duty, if we would maintain our reputation and the foremost place in the English markets which we have won, to give our makers at least equal assistance in the prosecution of their work, that they may be enabled to cope with the new and increasing difficulties that beset them. The dairymen in Ontario were the first to engage the services of a travelling instructor in the person of the late Professor L. B. Arnold. Since then that useful work has been improved upon and enlarged in Ontario and Quebec, and also to a limited extent in the Province of Manitoba.

As every pound of inferior cheese and butter, which find their way to any consumer's table, hinder consumption and curtail demand, so their manufacture inflicts an injury on every producer of dairy goods. The reputation of Canadian cheese, as a whole, modifies in some measure the relative prices received by every factory. To a slight extent, the same holds good in the creamery business. Our reputation is maintained, not at the standard of our very best factories, but by the average quality of all the goods we make and export. A few of the very best factories won for us at first, our now undisputed reputation for superiority, especially in the quality of our cheese; and that came mainly as a consequence of the frequent visits of a few individuals who were competent to instruct, to advise and to guide makers into the carrying out of the best practices. The factories with the very best reputation may expect as much benefit to accrue to their patrons, from the efficiently performed work of inspectors and instructors as may those with reputations not so high or so well known. Whenever a substantial advantage can be made to accrue to the dairy business as a whole, every patron of every factory is benefited to a more or less degree.

I desire to point out here, a few of the respects in which more thorough and more general inspection of factories, examination of milk, and instruction of cheese-makers will be profitable.

1. There is a growing impression, partially justified by the facts, that at many factories a few patrons tamper with the milk to a greater or less extent. Nothing will sooner damage a factory seriously, than a well-founded suspicion in the minds of some of its patrons, that some of the other patrons are getting more than their just due through the furnishing of adulterated or inferior milk, which is pooled at the common value per hundredweight with their own, which is honest as from the cows and in good condition. Adequate legislation now provides for the certain punishment of any patron who is guilty of furnishing milk to a cheese factory, creamery, or condensed milk factory, from which any cream has been removed, any strippings held back, or to which any water has been added. The matter of legislation on this subject is treated of more fully under the next following head of this report.

The official instructors should be provided always with instruments equal to and suitable for use in the detection of such frauds. The latest of the milk-testing apparatus, which has been devised by Dr. Babcock, of the Agricultural Experiment Station of Wisconsin, provides for a rapid, easy, effective and cheap method of determining the per cent. of fat in milk. Two dozen or more samples can be tested accurately in the brief space of 15 minutes.

2. The benefits to cheese-makers would arise mainly from the instruction which they would receive from the visits of these travelling instructors. The opportunities afforded to these instructors by visiting a different factory every day, equips them for giving many useful hints and suggestions to even the most advanced and successful makers whose factories they may visit officially. Then a cheese-maker's work is such a tax upon his time, that little chance is left for him to visit neighboring factories for the comparing of notes with his fellow-workers. He may fall easily into some wrong method or treatment, without discovering his mistake until a great deal of damage and loss have been sustained. Milk is a commodity so susceptible and perishable in its nature, that a little variation in the treatments at any stage of the process of its manufacture, may change very seriously the quality of the cheese made from it. Another gain to the patrons and to the cheese-makers would arise from the supervision which should be exercised by these travelling instructors who might be *expected* to drop into the factory at an *unexpected* time. Such an uncertainty as to when a competent outside individual would examine the condition of a factory and its utensils, would exercise a wholesome and stimulating influence upon the cheese-maker, towards the keeping of his factory in the very best of condition all the time. Then such instructors and inspectors would be available for consultation when cases of unusual difficulty arose in a factory or neighborhood.

CONTRIBUTIONS TOWARDS EXPENSES.

To meet the expenses incurred by the engagement of the services of travelling instructors and inspectors, each factory should agree to contribute a small sum annually. It has been urged that since the patrons and cheese-makers directly derive a benefit from the work of these travelling dairy teachers, they should pay for them wholly themselves. While that appears to be fair, in a theoretical statement of the question, a practical difficulty arises to the effect that the farmers who most need the help, if left to provide it wholly for themselves, would not avail themselves of it. The Governments of the several provinces in the past have indicated by their acts that they were disposed to render some financial assistance towards securing the employment of these instructors ; and the additional gains in direct receipts by the farmers, and the better reputation won for the products which have been exported, have justified abundantly the expenditure of the small sums that have been given for that object.

FORMS OF APPLICATION.

The plans that have been adopted in the several Provinces for the engagement and payment of these inspectors are slightly different. The following form will show the rule which was followed in the western part of Ontario in 1889 :—

Return this Form when Properly Filled Up to

PROF. JAS. W. ROBERTSON.

ON BEHALF OF THE ..... Cheese Factory Situate on Concession ..... Township of ..... County of ....., I intimate to you that this factory will contribute to the fund for the Employment of Cheese Making Instructors and Milk Inspectors, the fees as fixed by the Executive Committee of the Dairymen's Association of Western Ontario, that is to say :—For every Factory making up to and under sixty tons of cheese, $8 ; for every factory making over sixty and up to eighty tons of cheese, $10 ; and for every factory making over eighty tons of cheese, $12 ; as based upon last year's production. This factory last year made ..... tons of cheese, and I agree to pay ..... dollars, to be paid by the 1st of August, 1889, to the Secretary of the Dairymen's Association at ..... Ont.

(Sign here.) .....

..... P.O.

Please send to .....

..... P. O., Ont., ... Copies of Bulletin on Milk for Cheese factories, for free distribution among the patrons of ..... Factory.

N.B.—Write address very distinctly, and ask for only as many copies as there are patrons.

In Eastern Ontario a rule was adopted which required each factory which desired the services of the travelling Instructor and Inspector to contribute $5.00 per visit.

In the District of Bedford, in Quebec, the following form was used by applicants for the services of the Inspector engaged by that Association:—

To the Secretary, Dairymen's Association for the District of Bedford.

Cowansville, Que.

The.....Cheese Factory, situated on Lot....., in the Township of....., in the County of..... hereby makes application for the services of an inspector and instructor, to be employed by the Dairymen's Association for the District of Bedford, for the season of 1890; and it is hereby agreed on behalf of the patrons or manufacturer at said cheese factory, that a sum equal to fifty cents per ton of cheese manufactured during the season of 1890 will be paid to the Secretary-Treasurer of the Association on or before 1st August, 1890, in consideration of the services of such Inspector and Instructor, whose duty it will be to visit each factory, which subscribes to the fund, as frequently as possible, to inspect the quality of the milk, and to advise, instruct and assist the cheese-maker in turning out cheese uniformly fine by the latest and most approved methods.

.....Que., ...

.....1890. .....Post Office.

SYNDICATES.

In other parts of the Province of Quebec, provisions were made for the formation of syndicates of manufacturers of cheese and butter. These, by a common agreement, consented to have the special services during the season of a travelling inspector and instructor, who had to be duly qualified for his work in the superintendence of the factories placed under his charge. The syndicates, according to the regulations issued, should not number less than 10 or more than 30 factories; and when a syndicate had subscribed a sum of not less than $150 towards meeting the cost of the services of inspection and instruction, the Department of Agriculture and Colonization for the Province of Quebec agreed to grant a sum equal to the amount which the members of the syndicate had subscribed among themselves, up to the sum of $250 per syndicate.

Certain regulations were framed by the Department, and it was required that these should be conformed to and complied with, in order to entitle the syndicates to receive the Government grant. The main rules for the procedure of each inspector, required that he should visit each factory in the syndicate regularly in such a way that there would be no interval of more than one month between any two visits. It was expected that each factory would be visited at least six times during the course of the manufacturing season. The object of the inspector's work is set forth in the following regulations:—

"The Inspector by his advice and superintendence will do his utmost to obtain from the factories of his syndicate: (*a*) A uniform and good quality of produce; (*b*) scrupulous attention to cleanliness; (*c*) constant attention to the testing of the milk furnished by his patrons; (*d*) a sufficiently good method of keeping records, in order to prove the exactitude and truthfulness of the yearly report of operations, which each factory will furnish to the Department."

Each factory included in any syndicate, was required to pay an annual subscription for membership in the Dairymen's Association, of the Province of Quebec, or any one of the District Dairymen's Associations. Each syndicate was requested to appoint a President, Vice-President and a Secretary-Treasurer, that through these officials, communications might be carried on with the Department of Agriculture and Colonization.

The following is a copy of the declaration made by the several factories composing a syndicate:

"We, the undersigned, representing the factory of..... hereafter men-
"tioned, declare that we organise as a syndicate according to the programme fur-
"nished us by the Department of Agriculture and Colonization and declare that we
"promise to pay and subscribe towards the requirement of our inspection service a
"total sum of.....to be divided as agreed upon by the manufacturers."

INSPECTION OF CREAMERIES.

The regulations of the Ontario Creameries' Association for their work of inspection during 1890 were to the effect:—(1) That every creamery in Ontario should be entitled to two visits from the instructor during the season, free; (2) Any creamery might secure his services after these two visits or between them, by paying the Association $5 per day and the travelling expenses of the inspector, that being the net cost to the Association; (3) Every creamery was expected to send to the Treasurer $5 for the annual subscriptions of five members of the Association, who should each be entitled to a report of the annual conventions of the three Dairy Associations of Ontario; (4) Each creamery was expected to co-operate with the Association in the effort to make butter uniform as to quality and style of package, both for home consumption and export; these are essential for us to secure the same enviable reputation for our butter that our cheese has attained.

It seems to me that the butter-making and the butter-making interests of the Dominion are quite as needful of help from travelling instructors as the sister business of cheese-making, and I would suggest to the Provincial Dairy Associations the advisability and the desirability of organising this work of inspection and instruction in still more effective ways upon some uniform plan which may be slightly modified to serve the particular needs of the different districts. A provincial inspector and instructor to supervise the work in each Province would seem to be required, in order to give unity and efficiency to the work in the several districts. Travelling instructors, fitted out with a complete set of utensils for the making of butter, could also be very usefully employed in spending a few days in each of the townships or parishes in the several provinces, demonstrating to the farmers and others who might attend, the best methods of carrying on home or dairy butter-making.

To all these instructors, to the cheese-makers and butter-makers whose factories they visit, to the persons who might attend the butter-making demonstrations in these townships and parishes, we will be glad to furnish from the office of the Dairy Commissioner, Ottawa, bulletins for instruction and reference in all the particulars of these two arts of making butter and cheese.

NOTES FOR THE GUIDANCE OF DAIRY INSPECTORS.

I have put together the following notes for the guidance of dairy inspectors and instructors in visiting factories. The authorities of the several Provincial Associations, District Associations, or syndicates, which control the inspectors, may use them, with or without modification, according to the needs of their own district.

1. Call at every factory and invite the representative to subscribe to the fund of the Association for the engagement of your services.

2. When you visit a factory, be sure to invite the co-operation of the cheese-maker in the examination and testing of milk.

3. Leave one of the records showing the quality of the milk with the representative at every factory where you test samples.

4. Instruct the cheese-maker as far as possible in the methods of testing milk, that he may be able to apply them successfully in your absence.

5. Advise with the cheese-maker about the ripening of milk and the whole process of manufacturing the cheese.

6. Try to impress upon every maker that a great advantage arises from keeping all parts of the factory and factory utensils perfectly clean.

7. Urge upon the maker, the need for pressing the cheese 20 hours, and highly recommend them to turn every cheese in the hoops in the morning. Condemn the carelessness that leaves projecting shoulders or edges upon the cheese. Encourage neatness and cleanliness.

8. Advise every maker to keep his curing room tidy and well ventilated. The cheese should stand in straight rows upon the shelves, and be so placed that their tops shall look level.

9. You are requested to prosecute any case of adulterated milk, only when requested to do so by the proper factory representative. The half of the fine which comes to the informer is to be remitted by you, for the funds of the Association.

10. Report once a week to....., and mention the P. O. address or addresses that will find you during the following week.

11. You are expected to refrain from giving any expression of opinion or *private* information to any cheese buyer, about the quality of the cheese in the several factories which you may visit.

INSTRUCTORS' REPORTS.

Of the several reports of the travelling instructors, that have been submitted to the respective Associations for the work of the past year, I have selected the following as indicating the nature of the work which should be done :—

COWANSVILLE, QUE., 30th Oct., 1890.

To H. SEWELL FOSTER, ESQ.,

President, District of Bedford Dairymen's Association.

DEAR SIR,—I beg to submit to you my first annual report as cheese-making Instructor and milk Inspector for the District of Bedford Dairymen's Association.

In compliance with the instructions which I received, I visited the cheese factories in the counties of Shefford, Missisquoi, and Brome, which agreed to contribute to the funds of the Association, as far and as often as time would permit.

The object I had in view when I visited the factories was to assist the cheese-makers to turn out the finest quality of cheese, uniform in make, neat in appearance and with good keeping properties.

My mode of procedure was to examine the condition and test the quality of the milk which the patrons supplied, in order to advise the cheese-maker and patrons,

how pure, clean milk of honest quality and in good condition could be provided; then, by examination of the cheese, conversation with the cheese-maker and careful observation of the factory, its equipment, utensils and surroundings, I tried to discover the cause of any defects in the cheese; then by advice, by practical illustration, and general instruction, I endeavoured to help the cheese-maker to so change and improve on his practices as to remedy the defects and to remove the causes for the same.

As suggested to me by the Dairy Commissioner at Ottawa—Prof. Robertson—I filled up a report on the particular condition in which I found every factory, its utensils and also its cheese. These I sent to you weekly during the season; and I will now supplement the information which they contained by a summary of the season's work and a few general conclusions which I have reached from the season's experience.

I had on my list 30 cheese factories. These were supported and patronized by 750 farmers.

I made cheese and instructed the makers on 130 days; I also made 42 short visits and gave instructions.

I made 3,030 examinations of milk by the use of the lactometer, pioscope, and cream tubes. I also made 2,020 tests of milk by the lactoscope.

I wrote 205 letters to patrons of the factories in regard to milk of doubtful quality, which had been furnished in their cans. I found 125 cases of milk which had been adulterated or tampered with by the removal of cream or the keeping back of strippings. Of these, 25 of the worst cases were settled to the satisfaction of the committees of the factories to which the defaulters belonged; most of the others were let off with a warning against a continuance of the wrong practice.

I attended six meetings in the evenings, to discuss with patrons the best way to take care of milk and prepare it for cheese-making.

In the course of my work, I travelled about 1,000 miles and frequently was occupied from four o'clock in the morning until eight at night.

I observed an improvement in the condition of the factories or in the quality of the cheese in all except three cases.

By the farmers and cheese-makers, I have been treated with kindness and fairness in nearly every case, although at first the work was rather discouraging, because of the indifference of some of the cheese-makers and the opposition of a few of the cheese buyers.

I learned that many farmers paid no attention to the straining of the milk, or to the aërating of it by dipping, pouring or stirring, or by the use of a suitable aërator. In many instances, also, no regard was had to keeping the milk in a place where the air was free from bad smells. Too little heed was paid to cows in the matters of pure water and wholesome food. Sometimes they were allowed to drink filthy, stagnant water, because they could not obtain anything else.

Then, I think the milk in the Bedford District is richer in fat than the average milk in Ontario, and the method of cheese making has to be slightly modified to yield the best results. I think the milk should be set in a rather sweeter condition, the curd should be cut a little finer, the curd while in the whey should be stirred continuously after it is cut, the temperature should be raised a little higher—(say to 99 or 100 degrees in summer and to 100 or 102 in the fall):—the curd should also be stirred very thoroughly, and carefully after the whey has been removed.

I found the curd and the cheese a shade whiter or more of a chalk colour than they are in Ontario; but the cheese are not so liable to be porous. The moisture appears to be more difficult to expel; consequently, I have recommended the foregoing treatments.

Many of the makers by adopting my suggestions seemed to make marked improvement, so did also the patrons by following the instructions in the Bulletins, which were distributed from the office of the Dairy Commissioner.

In many cases, there was also a decided improvement in the appearance of the factories and the cleanliness and neatness of the utensils and apparatus in use.

Some factories were turning out cheese just as fine as the best from Ontario, and what a few factories have done, I believe all can do, if the patrons and makers will do their best. I regret, however, to say that in some cases as yet not much effort has been made to excel.

The work is only beginning to show its results, and honest farmers are perceiving the benefit of keeping any who may be dishonestly disposed, from getting or taking an unfair advantage over their neighbors, by tampering with the milk which is supplied.

I think a large number of factories will seek to avail themselves of the benefits of instruction and inspection next season. It has been told to me that some makers have gone to the factories where I have been giving instructions to get the pointers second hand; and I think they will come out manfully and fairly next season and pay their share of the expense.

I cannot speak too gratefully of the help and encouragement I have received from the officers of the Association. They did everything that could be done to aid me in my work. The President, Mr. H. S. Foster, was particularly kind; and I think he is doing for the farmers of the Eastern Townships a work similar in worthiness and importance to that which Mr. Thomas Ballantyne of Stratford did for the farmers of Western Ontario at the commencement of the cheese business there, namely, giving them the opportunity for instruction and encouragement to make a success of it.

On the whole, I consider the progress of the past season has been fairly satisfactory; and the work of instruction and inspection should be kept pushing on until the greatest possible improvement has been accomplished and the cheese from the Eastern Townships stands second to none in Canada.

All of which is respectfully submitted.

(Signed)

ROBERT WHERRY.

The reports of the other inspectors in Ontario and Quebec will mainly be found in the printed reports of the proceedings of the several Associations, under whose auspices they were employed.

The following sheet is a form which can be used with advantage for the report by the inspector of each visit he pays to every factory on his list :—

REPORT ON.....FACTORY.

.....189

Cheesemaker's name.....

P. O.....

Representative's Name.....

P. O.....County.....

Number of Samples of Milk found unsatisfactory.....

Number of cases investigated by me.....

Number of cases recommended for prosecution.....

Number of cases where patron has been visited or written to.....

I found factory drainage.....

I recommended.....

Factory building.....

I recommended.....

.....

Condition of vats, sinks, curd cutter, weighing can, conductor, strainer, thermometers and small utensils.....

.....

.....

I recommended.....

.....

I found the practice and system of the Cheesemaker.....

.....

I recommended.....

.....

REPORT ON CHEESE.

Make per day.....Coloured.....White.....

Make per day at last visit.....; on.....of.....189...

Flavour.....

Body.....

Texture.....

Colour.....

Appearance.....

REMARKS:—.....

.....

.....

.....*Inspector.*

IV.—SECOND VISIT TO LECTURE IN THE MARITIME PROVINCES.

On the 24th of June I left Quebec by the S.S. "Union," accompanied by Mr. J. C. Chapais, Assistant Dairy Commissioner. The object of the visit was, first to give instruction in the practical part of cheese making to those who had charge of factories in the Saguenay district of Quebec, and afterwards to address gatherings of farmers in New Brunswick, Nova Scotia and Prince Edward Island on dairy farming and kindred branches of agriculture.

To make the account more readable and more serviceable to those who may be seeking information from it, about the nature of the farming carried on in these provinces, and their adaptation for mixed farming with a larger development of animal husbandry, I will put it in the narrative form, as condensed from notes which were made daily during the journey.

DOWN THE ST. LAWRENCE.

Below Quebec the noble old St. Lawrence has acquired a demeanor of tameness quite in keeping with his responsibilities in carrying the commerce of Canada to and from the nations of the Old World. The boisterous and turbulent behaviour of his early course has been changed to the even flow of old age. Still, enough of ripples and rapid movement near its edges, indicate that the water is yet in sympathy with all the frolicsome conduct of its early career.

Cape Tourmente is grand and somewhat awesome looking. Doubtless its solemn severity of countenance was what provoked the Indians to blame it for starting all the disastrous storms that blew from behind its shoulders.

The Bay of St. Paul is a quiet looking cove with an island pier quite a mile from the firm ground of its shore. The unstable ground in the shape of mud, extends quite half that distance. Murray Bay is a peaceful place, surrounded by soil light and sandy in its character, more adapted for recreation and pleasure than for profitable agriculture.

UP THE SAGUENAY.

The scenery up the Saguenay is unique and weirdly beautiful. The bed of the river doubtless had its origin in some volcanic tumult of bygone ages. Its seal brown waters glide along in a most insidious way, and in parts they seem to gurgle without making any noise. Here and there the banks are faced with a rugged and bare escarpment of rock. At other places the mountains on both sides are finished and rounded into a smooth and quiet self-possession, which has not been startled of recent years by many of the strange changes which modern civilization and industrial development have effected elsewhere in Canada. Between the hillsides, cosy farms appear to have been tucked in, as though blown there off the bare steep faces of other cliffs, when the hurricanes of water and wind were busy making the surface of farms for the after-sustenance of human inhabitants. The tide makes its influence felt for fifteen miles above Chicoutimi. At Chicoutimi we first caught a glimpse of the wild tumbling falls of the Rivière du Moulin, as we wended our way over the hillside to examine the adaptation of the country for grazing and supporting cattle. The district seemed to be admirably suited for keeping stock in the best of health. Though the season is somewhat short, the growth is rapid, and mixed and dairy farming could be developed with advantage in that locality. Chicoutimi is but a lumbering town, in regard to its industrial enterprises. A large cathedral occupies a prominent site; it with the Bishop's palace, a convent, a college, and a hospital make an imposing group of buildings on the brow and site of the hill opposite the pier. The inside of the cathedral is still unfinished, and the coarse dull plaster looks timidly conscious of too much exposure.

DAIRYING IN CHICOUTIMI.

At Ha Ha Bay, which seems more like the main stream than an arm of the river, we stayed off for three days. One object of our stay there was to visit the

creamery of Mr. Couture, M. P. at Laterriere. The business basis upon which the creamery is conducted, is of the nature that the proprietor gets 20 per cent. of the price for which the butter is sold, in consideration of his manufacturing the butter and providing all the appliances which are required. The patrons deliver the milk at the creamery and receive back on the average 90 pounds of skim milk per 100 pounds of whole milk delivered. The milch cows in the neighbourhood are partly of the Quebec Jerseys and partly of the Ayrshire breed. As a typical instance, I saw the herd of one farmer who had 7 Quebec cows yielding an average of 22 pounds of milk each per day. That was counted in the neighborhood to be very good. The barns of the farmers are neatly whitewashed and kept very tidy in their outward appearance.

At St. Alphonse, Ha Ha Bay a day was spent in the cheese factory, giving instruction and practical demonstration in the art of making cheese to cheese makers from the surrounding district who had assembled to the number of twenty. A meeting was held at both Laterriere and St. Alphonse, when Mr. Chapais gave some useful instruction in the economical methods of feeding and caring for cattle.

COAST OF BONAVENTURE AND GASPÉ.

From Ha Ha Bay the journey was made by way of Rivière-du-Loup and the Intercolonial Railway to Dalhousie. From Dalhousie by the steamer "Admiral," I went up to Gaspé Bay. The coast is settled back for a distance of about a mile. At a few places, which have grown to be commercial centres for receiving the farmers' produce and distributing to them goods which they require, the settlement extends three or four times that distance from the shore. The people are mainly in their origin from Jersey, the North of Ireland, and Scotland. Petroleum has been found, and a vein of lead near Gaspé is said to be over a foot thick. Salmon are caught in large numbers during the summer season, are packed whole in boxes into which snow has been pounded, and thus encased are shipped direct to the markets. The main farm products from the coast, take the form of oats and butter.

A large number of Bulletins of instruction have been sent into the neighborhood since. A more general development of cattle keeping and butter making would enable the settlers to realise much more from their farms by the shipment of dairy products, which can be carried to market with the smallest proportion of their own value being absorbed in transportation charges.

MEETINGS IN NEW BRUNSWICK.

Sussex in New Brunswick was the next point visited. Two meetings were held, which were not very largely attended. In the village there is a cheese factory doing a small business and turning out a creditable quality of goods. The fertile valleys and beautiful hills that alternate with each other in that part of New Brunswick, make a rare combination of grand scenery and productive farms. Much larger numbers of cattle could be kept to advantage in that well watered district, and by their earning power they would offer inducements for the farmers and other dwellers, to stay there and develop the resources of their own province.

From Sussex the route to *Gagetown* on the St. John River was followed by way of the Canadian Pacific Railway to St. John City, and the S.S. "May Queen" up the river. *Gagetown* as a village is a veritable "sleepy slope." It lies straggled for half a mile or more along the Gagetown Creek. Its aspirations after greatness were altogether discouraged when the route of regular travel to St. John City was changed from the river to the railroad, some 20 miles distant. Some excellent cattle are kept in the neighborhood, but dairying upon the co-operative method must beintroduced to enable the farmers to prosecute that branch of the business with profit.

The semi-annual meeting of the Provincial Farmers' Association of New Brunswick, at *Woodstock*, was the next destination. On the way thither by way of the New Brunswick Railway, out of Fredericton, a boom containing not less than

twenty-three millions of feet of logs was passed. If the parts of New Brunswick are ill-adapted for the yielding of large crops in respect to the husbandman's toil, they do yield a harvest,—not less valuable to the workers there—in the form of logs and lumber. The resources of the Dominion are so varied and different, that only those who know it well in more than one aspect of its greatness, will do justice in judgment to its several sections. Farmers who have been accustomed to the comparatively level and rich fields in the garden of Ontario, speak with disparagement of the rough and wilderness-looking regions of New Brunswick; but when one sees the magnificent crops of timber which are harvested from its hill-sides, he is convinced that though the crop be widely different in nature, it is not of any less value per square mile. Around *Woodstock* the country grows excellent crops of hay, and a correspondence with some experienced cheese manufacturers in the Province of Quebec since my return, has resulted in their planning to visit that neighbourhood and endeavour to start co-operative dairying with cheese factories or creameries.

MEETINGS IN NOVA SCOTIA.

From Woodstock by way of St. John, a crossing was made to the far-famed *Annapolis* valley. The Bay of Fundy, which has been berated by those who begrudge St. John its prosperity as a sea port, was very smooth and quiet. Meetings in the Annapolis valley were held at *Bridgetown*, *Middleton*, and *Kentville*. The farmers in the valley have gone into fruit growing on a large scale. Success in that enterprise has followed their efforts, and I do not think that co-operative dairying would make much headway in that region; though the dissemination of instruction on the best methods of carrying on home butter-making would be appreciated by the people and would bear good fruit.

Amherst, N. S., was the next place for which a meeting had been appointed. The dyke lands afford such excellent crops of grass for pasturing and hay, that large numbers of cattle are kept in the neighbourhood. However, I learned by enquiry that the number of cattle is now considerably less than it was twelve or fifteen years ago. The quality also was said by the farmers in the locality, to have deteriorated. Too much attention has been given to the cutting and selling of hay and too little to the feeding of stock whereby the uplands of the farms could be kept in better heart for crop growing.

The branch *Experimental Farm* for the Maritime Provinces, at *Nappan*, is about seven miles distant from Amherst. A day was spent in company with the Superintendent, Col. Blair, in going over it.

From *Nappan* the journey was taken to *Truro*, where there is a large and well managed condensed milk factory. An examination of the quality of its product has been made since my return to Ottawa. It has also been compared with the quality of the condensed milk such as is sold in large quantities in England, and my opinion is that the product of the Truro establishment is quite equal to the best that I have obtained from England, and is superior to very many of those brands.

The *Antigonish valley*, where Mr. L. C. Archibald conducts several cheese factories, was the next district visited. In the town of *Antigonish* two large meetings were held; and the farmers in that neighbourhood appear to be well satisfied with the results of their past three years' experience in supporting cheese factories. A local committee had been appointed to make all the preliminary arrangements for the meetings, and they had advertised a pic-nic for Lochaber, some 20 miles distant. The pic-nic was held upon a small island on that beautiful inland sheet of water. Enough interest had been taken by those in the vicinity to cause them to erect a bridge for the occasion. Many of the farmers with their families were in attendance; and addresses upon agricultural topics were made by Mr. Justice Lynch, of Quebec; Mr. H. S. Foster, of Knowlton; Col. Ora P. Patten, of Montreal; and the Dairy Commissioner. It is expected that several new factories will be started in the Antigonish valley and the surrounding portions of Nova Scotia during the current year.

From Antigonish I passed over to *Cape Breton*. Meetings were held at *Mabou* and at a temperance hall a few miles distant. The well watered valleys and rich hillsides of *Inverness County* point it out as a section well adapted for profitable dairy enterprises. A few features of life,—or the want of it,—in that neighbourhood, struck me as being peculiar. The brackets which had been used for the shingling of barns and dwelling houses twenty years ago, are still left undisturbed on the roofs. Whether they are left for ornamental or useful purposes I was unable to discover. The leaving of things not quite well done, is a weakness on the part of the people, which has induced them to belittle the country in which their lot has been cast. The lack of energy wisely directed, on the part of those whose right and privilege it is to make the most of their own inheritance, is the cause of the backward condition of agriculture in Cape Breton, rather than any inherent drawback in soil or climate or even marketing facility.

PRINCE EDWARD ISLAND.

From Cape Breton I went by way of Point du Chene to *Prince Edward Island*, that gem of our Provinces on the Atlantic coast. The beautiful green of its fields and trees, the bright red of its soil, and the deep blue of its many bays, give it a landscape wonderfully pleasant in its insular beauty. Meetings were held at *Kensington*, *Eldon*, *New Perth*, *St. Peter's*, *Tignish* and *Charlottetown*. The agricultural capabilities of the Island are very great. It has a much smaller percentage of waste land than any of the other provinces. Cheese factories were started in several sections twelve or fourteen years ago. As a consequence of some unexplained misfortunes in management, the business has been abandoned almost entirely. During the course of my meetings I took occasion to mention that if young men from the Province would apply to me for situations in cheese factories in Ontario, I would be very glad to do what I could, to have them placed in factories where they would be instructed in the very best methods, in order that they might return to their own neighbourhoods and re-establish the dairy business upon a firm and secure basis. I have received several applications from young men with that object in view.

V.—MANITOBA, THE NORTH-WEST TERRITORIES AND BRITISH COLUMBIA.

A trip through the western provinces of Canada had been arranged, in order to create a greater interest in dairy farming in that part of the Dominion, and at the same time to learn from personal observation and inquiry how the work of this office could be shapen and directed so as to render the best of service to the citizens of Manitoba, the North-West Territories, and British Columbia. The following report of an address which I delivered at Shoal Lake, Man., on 21st August, 1890, sets forth the object of my journeyings and also the nature of the subjects which were discussed at the meetings of farmers. Its introduction here will save a repitition in some measure.

AN ADDRESS AT SHOAL LAKE, MANITOBA.

August 21st 1890.

MR. CHAIRMAN, LADIES AND GENTLEMEN,—

I count myself happy in being able to visit and travel through the Province of Manitoba at this season of the year, when its fields are rich in aspect and in reality with the magnificent crop now being harvested. Perhaps nowhere else in all the world could there be seen in the beauty of excellence and uniformity such vast areas

of waving, ripening, ripened and partially reaped wheat as are to be found this year in this Western and the other North-Western Provinces of Canada. I was well aware before leaving Ottawa, in fact before the plans and programme for this trip through Manitoba and the North-West Territories were arranged, that the present would be an unsuitable time of the year in which to visit this part of the Dominion, if the main object of my visit were to address large audiences of farmers. The urgency of harvest work demands the whole time of most farmers at this season. I well understand that from daylight to dark the click of the self-binder is to be heard, and that public meetings or addresses are not accounted by the farmers as either luxuries or necessities during the continuance of harvest work. Still, I am glad to have the opportunity of meeting with a number of the farmers at the places I visit, to discuss with them some aspects of mixed and dairy farming and the adapation of Manitoba to such a sort of agriculture. The purpose of my visit is more to learn the conditions and possibilities of farming in the west than at present to teach anything new in either system or practice. I am more eager to observe than to advise, and more anxious to gain information than to express opinions.

WORK OF THE DAIRY COMMISSIONER.

My instructions, from the Hon. John Carling, Minister of Agriculture for the Dominion, are to the effect that I should make the office and work of the Dairy Commissioner as practically useful and helpful to the farmers in all parts of the Dominion as possible. With that object in view he suggested to me the advisability of seeing Manitoba and the North-West for myself, in order that after discussing the situation, the adaptations and resources of the country, with as many of the leading farmers as I could meet, I might try to assist them in the development of the dairy industry in connection with the breeding, feeding and keeping of larger numbers of cattle and other live stock. The holding and addressing of meetings, the distribution of literature, and experimental investigation will be continued with that end in view. Of the good and far-reaching work that is being carried on, on the Dominion Experimental Farms, under the direction of Prof. Wm. Saunders, I will speak briefly later on. It is my good fortune to be associated with him at the Central Experimental Farm at Ottawa, and by every one who knows him, Prof. Saunders, the Director of the Dominion Experimental Farms, is recognised as a gentleman of unique ability, devotedly and successfully laboring to improve the condition of farming and farmers in Canada, by means of scientific investigations, the origination of new varieties of cereals roots and fruits, the distribution of approved new varieties of seeds, seed testing and other branches of the work which he directs. I had the pleasure of his company through the southern part of Manitoba, where we drove some 150 miles, besides the journeying undertaken by railway. When I return to the eastern part of the Dominion I will be furnished with such a knowledge of this country as will enable me to answer the enquiries of some young farmers and others who are bound to come or "go west," even if they have in some respects a good land where they presently reside. Incidentally I may be able to serve you and the Dominion by directing the attention of those who, from one cause or another, desire to change their place of residence from the staid-going east to the inviting opportunities and undefined resources of Manitoba and the North-West. Some farmers and their sons in eastern Canada, from not knowing the true condition of soil, climate and farming in our own West, are induced to go to the States, probably afterwards to lament the haste which led them to accept, without further inquiry, the extravagant statements of railway-lands advertising-circulars and agents from the other side.

MISLEADING RUMORS.

The reports—the current conversational talk of Manitoba that one hears about it in the east, and also in the old country and northern Europe—do it scant justice, though they exaggerate in some respects with a good deal of recklessness. The waving prairie grass, six feet or more high, I find to be like Jack the Giant Killer's

bean stalk, a myth of fiction. With the exception of the sedge grass by the river bottoms or in wet places, I have not observed grass growing wild, more than an average of two-thirds the height of common timothy hay. Of course odd stalks of pony grass and other species stand taller, but the average grass-growth on the prairie does not wave like a jungle or a young forest. The surface aspect of the country is more pleasing than I had expected to find it; and I have seen but little of that tiresome sameness of prairie level, about which too much has been written and said. To me there has been a pleasant landscape of undulating contour, with clumps of woods or bushes always in view. Its appearance makes one think that it had been smoothed like the pasture fields and cropped lands of England, by centuries of good tillage, and had been left with its face but slightly changed during all those ages, when it was the home of only the buffalo and the Indian. "The noble Red Man of the West" is pretty much another myth of a writer of fiction. He seems to be improving in some respects, and the noblest types I saw, as well as the most nobly occupied, were those who were "stooking" grain at a dollar a day.

THE SOIL AND SETTLERS.

The soil seems to be generally fertile, though it varies in quality and nature in different localities. To the foot on the harvest fields, it has a peculiar spongy or cushioney quality, which I suppose is due to its large proportion of decayed vegetable matter. Its capabilities for grain-growing are unquestionably great, but too much has been said in praise of that feature, to the neglect of its adaptations for growing feed for cattle in profitable abundance. The reputation of Manitoba for its excellent, its superior wheat, has, I think, told against the Province, instead of in its favor. The wheat-growing of Manitoba has been "cracked up" so much, that many people have been led to believe that it is good for nothing else. People who purpose to emigrate from northern Europe generally prefer to go to a place where they can fall into lines and branches of agriculture somewhat similar to those to which they have been accustomed. They ordinarily have a fondness for keeping cattle and following mixed farming. Admirably do they succeed in that in many parts of Manitoba. I was greatly pleased when visiting the Icelandic settlement, south of Glenboro', in company with Prof. Saunders and Mr. Fredericksen, to observe the well-fed thrifty cattle which were kept by the farmers there. One buyer picked up some 70 head of steers, from two to three years old, in two days' buying. They have a cheese factory turning out some 300 pounds of cheese per day, and while they have the prospect of excellent crops of wheat this year, they are fortifying their position by multiplying their sources of revenue.

WATER SUPPLY.

In most districts there is evidently an abundant supply of water for house use and the keeping of stock. The rainfall this year has been heavier than usual, but the digging of wells and the building of cisterns to store the rains from roofs, etc., may provide an adequate supply everywhere all the time. Of that feature of climatic condition I can speak only from the opinions which others have expressed.

THE CLIMATE.

The activity and energy displayed by the people everywhere are satisfactory evidences of the healthful climate that is enjoyed during the winter, as well as in the summer. The reported abundance of ozone may account for the intensified and amplified mode of expression and ways of speaking about things that obtain up here, to the surprise and amusement of the new-comers. As a typical one let me repeat: "It is cold up here in the winter, mighty cold, the thermometer goes away down to 40 below zero; but then you don't feel it, no sir! you don't feel it at all." Well, I hope I won't, although I intend to come back to Manitoba sometime to meet the farmers during the winter, when they have leisure.

The place that has been the home of countless herds of buffalo, cannot fail to support thousands and thousands of cattle in health and comfort. Canada is especially the country for rearing and feeding the best quality of cattle for the great centres of consumers who live in countries whose mainstays are manufacturing and mining rather than agriculture. Cattle here are remarkably free from disease, and the climate promotes the development of vigorous constitutions. Cereals reach their best as they near the northern limit within which they can be ripened to advantage. The same may be predicated of cattle when good management prevails.

The sun is the master-workman on the farm; he does all the work, and the man's business is to do the chores. Did you ever think of the sun's power in agriculture? There are men who never think of the virtue or value of sunshine in farming operations. The sun is doing the work of changing the dead plant-food into the structure and substance of the living plant. When the sun shines on a man's field, he is seeking something to roll himself into, that he may leave his own strength there for the service of man hereafter; and if a man leaves no substance in his field into which the sun can roll and store himself, the sun leaves nothing behind him. He has shone there all day long, and that man is so much the poorer by having lost a whole day's work of the sun which he might have had to sell afterward. I wind a watch. I thus wind my own strength into the spring in a half minute or less. My strength remains there to move the hands of the watch all day long. But if there be no spring in the watch, I can leave no power there. I can transfer none of my energy to the watch, unless there be a spring or other device into which I can accumulate my strength. But if there be a good spring, the spring stores my strength for a day or a week or a year. It can be expended to drive the mechanism of the watch steadily at any time. The spring in my watch is merely what the plant food is in the soil. The spring is a contrivance into which I store my own strength; the plant-food is a convenience into which the sun can store his strength and his energy. And then, when a horse eats a bundle of hay he is merely transferring into horse power, the power which the sun rolled into that peculiar plant-spring. In that way the sun is doing all the work of the world. A long time ago the sun was shining down on the earth hotly, vigorously, and continuously. He was rolling himself up year by year and century by century into plants—plants that stored his strength with avidity. Then there came great changes in nature; and those great trees and other plants, full of the sun's energy, were buried away down deep in the bowels of the earth, but still they held the strength of the sun mysteriously stored in their structure. Now men open mines, they dig up concrete sunshine and energy in the form of coal, they fill the furnaces, they apply the magic-liberator fire, and as the mighty engine moves, wheels are turned to-day by the energy which the sun wound up in the vegetable kingdom on the earth ages and ages ago. But to go back to the watch illustration used a moment ago, if the chain between the mechanism of my watch and the spring-drum be weak at one end, I will be better served by a shorter chain of sufficient strength throughout, even if I am thereby required to wind it up oftener. The growing season in Manitoba and the North-West is apt to bring with it a wheat-damaging frost before the late grain has ripened. It will be better for the farmers to sow the earlier ripening varieties than run too much risk of the weak link or two in the weather, when the common variety is hardly ripe.

EVIDENCE OF PROGRESS.

The enterprise and push of the people of the west have become proverbial. A little of the cautious slowness of older communities would not be a weakening element or a useless brake on the progress of these newer settlements. There may be a recklessness that is not safe enterprise and a desire to engage in big things that often leads to loss, if not disaster. When a man hastens to break up all his holding to get in an immense acreage of wheat, he is playing for big stakes or aiming for enormous profits; but the man who keeps gradually and constantly multiplying the means and sources of his revenue, is the man who has ensured lasting success. If a

dry season should come or an early frost blight the wheat, the speculative farmer has only words of blame and disparagement for the country, whereas the man who has not put all his chances on one crop or product, will do fairly well every year.

The substantial buildings which I have seen completed or in course of erection in cities, towns, villages and country, convince me that the people of Manitoba themselves have faith in the future of their Province and in the increasing prosperity of the Dominion of Canada. The public buildings of Winnipeg are a credit to the metropolis of the West. Brandon seems to have been struck by a building boom, in the wake of the example and impetus given by the erection of a splendid new Post Office building there. The commodious and fine-looking structures which accommodate the educational institutions and activities of Portage-la-Prairie, are a credit to the people of the place and the Province. As the glory and strength of a nation truly inhere in and rise from its educational institutions, Manitoba is not neglecting this important interest School houses, commodious and even elegant in design and finish, are not so much more costly than they are in the East, as I had expected to find them. A plain neat comfortable-looking school of four rooms, with internal equipment equal to the needs of teachers and pupils in these days of modern appliances and aids, had been erected lately at Manitou, at a total cost, I understand, of $2,900. At the same place a prosperous cheese factory, receiving about 3,000 pounds of milk per day, is helping to carry on the education of the farmers into keeping more cows and stock of all kinds. The risk and uncertainty always incident to exclusive grain growing may thus be eliminated from the farming of the people of this Province.

That Manitoba should have a cultivated acreage of about one million of acres is a tribute to the industry of its farmers. The unequalled quality of wheat that has been marketed in past years has won the western part of Canada a primacy of reputation in the production of that cereal.

LIVE STOCK.

The numbers of excellent horses that have been imported into the Province have provided good foundation stock from which to breed horses for provincial uses and later on for export. The large number of young colts seen in paddocks and yards adjoining the houses in the country prove that this branch of stock is not being neglected. The proportion of poor inferior horses to the number of good ones, is less than in any of the other provinces where I have travelled. The same is true of cattle, from the stand-point of looks in both cases. Evidently the knowledge that the freight-charge on an inferior horse and cow would be just as high as on an animal of superior merit, induced those who brought them in to select the best they could find.

MIXED FARMING.

With cattle of such excellent quality, I think, the farmers here would be safe in going more extensively into mixed farming, or into stock-keeping and dairying. That system of agriculture has many advantages over exclusive grain-growing. I will make a few observations on the gains which, I think, would accrue to the people of Manitoba from going more and more into it. The primary object of farming is to find food for the people ; but a three-fold line of endeavour characterises all skilful agriculture. It is needful to provide food by farming, but it is also necessary to maintain the fertility of the soil and give occupation at remunerative rates to as large a population on the farms as possible.

FOOD FROM THE FARM.

Under the first head—that of finding food—I will say but a few words. When a farmer grows a crop of wheat, he provides for the bread of the people, and in exchange for what he has to dispose of, he gets the other comforts and necessaries of life which he desires. But the life-sustaining value of the wheat does not all reside

in the flour. When a milking cow eats the bran, the chaff and even the wheat straw, he can procure from these by-products, butter for his bread. Then many crops can be conveniently grown upon land, which can be marketed to most advantage in the form of animals and their products. The prairie grass, so plentiful yet in parts of the country, can thus be turned to food account. Then the surplus farm products of Manitoba must, for many years to come, find their market in distant places. The expense incident to the carrying of a tub of butter or a box of cheese from here to Liverpool is not much greater, than the expense of transporting a bushel of wheat. The former would bring from ten to five times as much value to the farmer as the latter. Happily, the admirable and efficient transportation facilities, afforded by the Canadian Pacific Railway, put Manitoba on a favorable footing with competing countries in her marketing conveniences.

MAINTAINING FERTILITY.

Some men may be disposed to pooh-pooh my advice, when I say that the farmers of Manitoba ought to give heed to their way of farming lest they exhaust even the bountiful store of fertility which nature has left in their soil. It is an incredibly large bank account which cannot in time be exhausted by the repeated and frequent "chequing" of a prodigal who never makes a deposit. Meanwhile many fields begin to evidence the need of a dressing of barn-yard manure, and when they receive it, give a profitable account of the treatment. At a meeting in Portage la Prairie the other evening, Mr. Glennie, from the Portage Plains, which are not reported to be the least fertile of all the lands in Manitoba, said he had put a heavy dressing of barn-yard manure on one of his fields last winter. He is a careful, observant man, a farmer with practical experience in Ontario, and is doing well on his farm. He said that the wheat on that field ripened some eight days earlier than the other wheat on his farm. All risk of damage by frost was avoided and a heavier and better crop was harvested. It will pay the farmers of Manitoba to begin in good time to conserve the wonderfully productive power of their land, by keeping large numbers of stock and putting back upon the fields the barn-yard manure. As it is better in old age to have a character and constitution that have not been wrecked or wasted by the dissipations of early folly and vice, so is it better in maturer years of a country's agriculture to have soil that has never been "broken-hearted" by continuous grain-growing and grain-selling, than to have it robbed of its elements of fertility without any effort at restoration.

WORK FOR A LARGE POPULATION.

Then the number of workers who can be employed with advantage on a farm, where exclusive grain-growing prevails, is small, compared with those who may find remunerative occupation at mixed and dairy farming Population is the main element that gives value to property. A section of land where the population is sparse has but little value compared with an acre or two in the centre of Toronto or Montreal where the population is dense. The kind of farming that occupies the largest population at paying wages, is the best for the whole country. Of course a people or a country cannot successfully contend against their natural adaptations. But I think these for Manitoba, in the main, are mixed farming with special attention to dairying, horse-breeding, and sheep husbandry. When cattle are more numerously kept, employment can be given to the farm-hands the year round. The men must eat for twelve months, even if they obtain employment for only six. Thus the expense and income of the average farm would be equalised over the whole year with more certainty of profit.

WINTER FEED FOR CATTLE.

I am not ignorant of the fact that there are difficulties in the way of successful dairying and stock keeping in Manitoba. But they are not insuperable. The finding of suitable and cheap winter feed has appeared like an insurmountable obstacle

When the crop of wild hay has not been abundant, feed has been scarce. However, a mixed crop obtained by sowing oats, barley, pease or vetches together, will provide suitable fodder, and that too quite cheap. On the Brandon Experimental Farm there were grown, Superintendent Bedford informs me, four tons of such a mixed crop to the acre. I dare say every ton of it has an equal or greater feeding value than a ton of well-cured hay. Again, Hungarian grass and millets grow luxuriantly here. A few varieties of fodder corn grow to a stage of maturity at the best for ensilage. By and by, many of the native grasses may be cultivated with advantage, when they have been sufficiently tested and a supply of seed has been collected. When I speak of the work of the Experimental Farms, I will mention what is being done in that matter.

DAIRY PRODUCTS.

The cool nights of summer and the cold weather of winter are both favourable to the production of excellent butter and cheese. Some years ago, when the Ontario Provincial Exhibition was held in the City of Ottawa, I had the pleasure and satisfaction, as one of the judges on butter, of awarding to butter from Manitoba, first prize, because of its superior excellence. That co-operative dairying can be successfully carried on, needs no argumentative demonstration here in Shoal Lake, where you have a creamery with an average turn out, so far this season, of 475 pounds of excellent butter daily. Its enterprising proprietor, Mr. Scott, is even preparing to can some butter for the foreign markets to the far west of you. The enterprise of the Canadian Pacific Railway Company, which is giving us the Pacific Ocean steamship service, promises to enable us to capture new and valuable markets in China, Japan, etc.

Then the Manitoba Dairymen's Association is an organisation which may render the Province very valuable service indeed. We are fortunate in having here to-night Mr. Wagner, who is an ex-president and the veritable and venerable father of the Association. Its existence and usefulness are of far more consequence to the Province than many more-pretentiously named organisations. The Dairymen's Associations of Ontario have done great things for that premier province, and the opportunities and needs for the work of a similar association up here are no less great and urgent. The benefactors of the people often work in unostentatious ways.

DOMINION EXPERIMENTAL FARMS.

I now desire to speak a short time on the work of the Experimental Farms which have been established under the Dominion Government, to promote the agriculture of every part of Canada. A few years ago the Minister of Agriculture, the Hon. Mr. Carling, planned the system of Dominion Experimental Farms. Their establishment marks an era of increased interest in intelligent and skilful farming in Canada. Their work in the main is to do for the farmers of the Dominion what they could not singly and by private means do for themselves. Prof. Wm. Saunders is the Director, and those who know him best are best aware of the eager and pains-taking devotion with which he has applied his remarkable abilities to their establishment and the making of their work practically and, as far as possible, immediately useful to the farmers of the several provinces of our vast Dominion.

The Central Experimental Farm is situated near Ottawa. The varied climatic and other conditions, which prevail in different parts of Canada within her width of 3,500 miles, necessitated the selection of branch farms. The farm for the Maritime provinces is near Nappan, in Nova Scotia, within a few miles of the borders of New Brunswick. The Manitoba Farm is within a mile of Brandon in your Province. At Indian Head a section has been secured to specially serve the interests of the farmers of the North-West Territories; and British Columbia may look for information and guidance to the one at Agassiz, B C.

CENTRAL EXPERIMENTAL FARM.

At the Central Experimental Farm, Ottawa, there is an experienced staff of scientists and practical men. It may interest you to learn of a few of the features of the work which is now being carried on. In the division of agriculture proper, there are being grown under test over 300 varieties of cereals, over 200 varieties of potatoes, and all the common and many other varieties of turnips, carrots, mangels, etc. One series of six ranges of six plots each, is used for investigating the effects of early and late sowing. On the first range, wheat, barley and oats, on separate plots, are sown as early as the land can be worked upon. One week later the next range is sown with the same sorts of grain, and so on until the sixth range is sown. Another range of plots provides for testing the effects of thin *versus* thick seeding. Provision has also been made for testing the effect of cutting the different grains at different stages of growth or maturity. Five breeds of cattle are kept. The feed of each animal is weighed and an exact record of the yield or gain in weight is recorded. The comparative value of ensilage and other feeds will be fully tested; and results made known. This year a dairy building and large piggery are being erected. As soon as they are completed, investigations into the most economical methods for the production and handling of milk, butter, cheese, etc., will be undertaken.

Then, under the care of Mr. Fletcher, who is Botanist and Entomologist, investigations are being carried on to discover the comparative values of some 100 grasses, —many of them native to your own country and not before brought under cultivation. A few of them, especially those from Manitoba and the North-West, promise to render excellent service for the seeding down of meadows, where the commonly cultivated grasses, like timothy and meadow fescue, will not stand the winter. Mr. Craig, the Horticulturist, has over 200 varieties of Russian apple trees growng, from which it is hoped a few may be obtained that will do well in Manitoba and the North-West, and thus permit of the cultivation ot the larger as well as the smaller fruits up here. Then Mr. Shutt, who is Chief Chemist of the Station, carries on analytical investigations in soils, plants, fertilisers, animal products, etc. In the poultry department, Mr. Gilbert is doing, with his feathered pets, work similar to that being carried on in the other branches with the larger sorts of live stock on the farm. His is not the least interesting or least important work.

In the seed-testing branch, over 1100 samples of seeds were tested for farmers, and reports made to them thereon, setting forth the per cent: of vitality and the vigor of growth ot the plants. Any farmer may send a small package of seed free by mail, and have it tested in that way. From the seed distribution department are sent out a large number of 3 pound bags of wheat, barley, and oats of promising varieties. Over 12,000 bags were sent out during the Spring of this year. Everyone who receives a bag is expected to return not less than one pound of the grain grown from it, together with a filled-up report stating the date of sowing, the time of ripening, the yield of grain, etc. Time will not permit me to go into any further details or description of the Central Farm, but a brief statement of what I observed on the branch farm at Brandon, in your own Province on the occasion of my visit the e this week, may have particular interest for Manitobans.

BRANDON EXPERIMENTAL FARM.

The Superintendent, Mr. Bedford, is a gentleman of wide, varied and long experience in agricultural matters in this Province, and seems to have the combined and happy knack of imparting information to visiting farmers and communicating to them a measure of his own enthusiasm in testing native grasses and planting trees for fruit, as well as those for wind breaks and ornamental purposes. Every farmer in Manitoba who can make it at all convenient to do so, should pay a visit to the Experimental Farm and see for himself the nature and extent of the work that is being carried on. One day spent in observation of the different plots of grain, grasses, corn, roots and trees, will be more serviceable than the reading of a fifty page report. There are being tested the following numbers of varieties of grain, etc.

Wheat, 123 varieties; oats, 83 varieties; barley, 65 varieties; Indian corn, 33 varieties; grasses, 24 varieties of cultivated sorts; grasses, 25 varieties of prairie grasses; turnips, 7 varieties; carrots, 8 varieties; potatoes, 100 varieties, (fifty new seedlings originated on the farm); pease, 18 varieties; beans, 22 varieties; beets, 5 varieties; mangels, 5 varieties.

Investigations are being carefully made in the effects of different methods of cultivation. Seeding by the press drill, the drill, and broadcast are being compared. Fall sowing on November 3rd is being compared with spring seeding on April 5th. Different methods of summer fallowing have been put to the test on the same sort of land. In short, every effort is being made to discover the methods of cultivation and varieties of seed, that are likely to give the best returns to the farmers of Manitoba. Mixed crops of various cereals have been grown with gratifying success, as a means of providing winter fodder in a convenient and controllable way. As much as four tons to the acre of cured fodder has been obtained from oats and pease. The crop of Hungarian grass is one that could hardly be excelled in any part of the Dominion; and not a few of the native grasses promise to meet the already felt want of Manitoba farms for a mixture of grasses with which to seed down for cultivated hay. Of the 33 varieties of corn being grown, some half dozen varieties promise to reach the glazed stage of ear or the condition when the plants are at their best for use as ensilage.

Of the many other things of interest which I observed, I will mention but a few more. The common garden vegetables were healthy looking and large. Tomatoes do not ripen there, but a fair crop can be obtained in the green state, fit for pickling. The gorgeous masses of flowers in the garden is a standing rebuke to the impression of those who have talked about it being impossible to have out-door flower gardens in Manitoba. Petunias were there in profusion; the sturdy portulaca vied in beauty with the clustered balsams; the luxuriant border of wild flax hedged in asters, verbenas, stocks and many other gay colored dandies; caliopsis phlox, dianthus, and modest pansies were plentiful; and the zinnias held their numerous heads up rather saucily, as they looked down on sweet alyssum and across at pompous double poppies. I counted over thirty varieties of flowers which all seemed to be doing well.

Among others of the small fruits, raspberries, blackerries, black, white and red currants and gooseberries seem to do well

Some of the ornamental shrubs have stood the winter without injury and have made vigorous growth during the summer. The white lilacs are doing better than the other varieties of that favourite shrub. A growthy hedge for a wind break has been planted of Manitoba maples, about two feet apart. They are doing well and are four feet high at three years from seed. The mountain ash in some cases has made a growth of three feet this season; the native elm, the Ontario soft maple, the birches and poplars are hardy and growing well. A cut-leaf birch, one of the most beautiful of ornamental trees, is growing with wonderful vigor. I advise you to look out for Mr. Bedford's annual report and to read it carefully.

INCREASING THE NUMBER OF CATTLE.

Before I pass on to say a word of dairy work and methods, let me urge upon you and the people of Manitoba, the need for paying earnest heed to increasing the number of cattle. Still it is better to have a small number of excellent and profitable cattle than a large herd which yields no fair return. Too much care cannot be given to the selection of the males. It will pay the community for agricultural societies to introduce thoroughbred bulls from milking strains of cattle, where private enterprise has not already done so or is not likely to do so. The value of inherited good qualities is so great that no farmer should use a sire which has not both good points and good breeding.

The raising of calves can be profitably carried on in conjunction with butter-making. Early calves, as a rule, make the most thrifty animals. Besides, a cow that calves early in the season will give more milk during the year than one that

calves at the beginning of summer. Calves can be reared in good form by the feeding of whole milk for ten days. Skim milk fed warm and sweet may be gradually added, until at the end of another week the calf will be drinking skim milk only. A mixture of oats and bran should be fed to replace the cream which has been removed. The grain or meal should be fed dry after the calf has finished drinking. That will induce the swallowing of saliva and thus aid in the digestion of the milk. Scouring is frequently caused by the feeding of raw meal in milk, but never by the feeding of it dry after the milk.

WINTER FEEDING.

In the feeding of cattle during the winter, due regard should be paid to their comfort. Tha stables need not be large, but they should be warm and comfortable. In proportion as animals are kept comfortable are they able to do well for their owners. A very cold stable causes the consumption of more feed and leaves the cattle weak in the spring. The cows especially should be fortified for a long season's milking by being well fed in warm stables during the winter. The abundance of straw should enable farmers to construct stables, where the temperature will not go much below freezing point.

FAT GLOBULES IN MILK.

While her milk is being elaborated by a cow, the ends of the cells which line the inside of the milk-ducts and vesicles in her udder, seem to enlarge. Each one forms a small globule, and when that is perfected it drops into the serum of the milk. Each bud or globule, so formed, is a globule of fat; from them is made all the butter from cow's milk. These tiny buds of fat seem to grow on the surface of the cells, partly by the destruction of the cells, and partly by conversion of some of the substance of the blood into fat. They trickle down in and with the milk, and are held in suspension, not in solution, as are the other solids in it. They mostly come during the latter part of the milking, probably because they do not move so quickly or easily as the liquid part of the milk. The fore-milk is thinner than the strippings, because the globules of fat do not free themselves from the internal linings of the milk ducts so quickly as the liquid of the milk. The condition of the cow's blood and her nervous system very largely affect the quality of the milk she gives. Bad feeding, foul water or the absence of salt will induce in the cow a condition in which she will not yield good milk; a similar condition with its consequent effects may be caused by neglect, exposure, abuse or excitement. A cow has a peculiarly delicate organisation and must be handled with kindness; and any man who abuses a cow beats out the profit, for she will pay him back by giving less milk, and that of a poorer quality. The globules of fat before mentioned, are so numerous that in a thimbleful of milk there will be found millions of them. It is estimated that there are at least one thousand millions of them in every cubic inch of milk. From these specks of fat the butter is made.

CREAM SEPARATION

To get them out of the milk is the task of the butter-maker; they are too small to be strained out with the finest sieve; fifteen hundred of the largest of them placed side by side, like a row of marbles, would not measure more than one inch. If milk be left at rest, they will rise to the top because they are lighter than the liquid in which they float. The heavier parts of the milk are drawn down by the force of gravitation, and as the serum of the milk, composed of water, casein, sugar, albumen, etc., moves downward, it displaces the cream globules and forces them towards the top. There are two methods of separating these fat globules from the milk; a natural method and a mechanical method. In the natural method, the power of gravitation is used to pull the heavier portion of the milk down, with the effect that the lighter parts, the fat globules, are pushed upward. In the mechanical method, centrifugal force is applied to attain a like result. When a quantity of milk is put into a rapidly revolving vessel or cylinder, the heavier parts will be forced

outwards against its resisting side or inner surface with sufficient pressure to push the lighter particles, the globules of fat, towards the centre of revolution. In that way the water, casein, albumen and the other heavier constituents of milk, find their way to the outside of the quantity being treated in a revolving cylinder, while the globules of fat are collected in concentric form on the inside surface of the quantity being treated. This is the law, that the cream, mainly composed of fat globules, travels in a direction opposite to that of the force exerted upon the milk, whether the force be centrifugal or centripetal.

EFFECT OF TEMPERATURE.

If ordinary milk in a deep-setting pail, be left at a temperature of 60° Fahr., it would take these small specks from three to six days to get to the top at the rate at which they would move. They can be helped to move faster. The milk at a temperature between 90° and 98° is slightly enlarged in bulk, and by putting it into deep-setting pails at a higher temperature (90° to 98°), the advantage of a falling temperature from above 90° to 48° or 45° may be gained. That treatment will expedite and facilitate the upward movement of the globules of fat. The rapid cooling of the milk is also believed to prevent the formation of a delicate mesh of lacto-fibrin in the milk, which would hinder the globules from rising freely.

CREAM.

The cream itself is only that part of the milk into which the globules of fat have been gathered in large numbers. Cream has no regular or constant per cent. of fat; the range is from 8 per cent. to 75 per cent. In one hundred pounds of cream there may be only eight pounds of butter, or there may be seventy-five pounds, according to its quality of richness. The globules of fat have no skin or organic coverings distinct in constitution from their own substance. Like drops of quicksilver that have separated from each other, they have no pellicle. But sometimes the serum of the milk becomes so viscous, that a quantity of it will adhere to the surface of the globules and, like a coating of gum, will prevent their movement upward when the milk is set, or the movement inward when the milk is treated in a centrifugal machine. If a quart of warm water be stirred into every pailful of milk when it reaches the dairy room from the stable, the separation of the cream will be facilitated. The water may be at a temperature anywhere between 150° and 10° Fahr., and should be warm enough to raise the temperature of the milk to above 90°.

CHURNING.

In the winter season especially, difficulty is experienced sometimes in churning the cream. The addition of water at a temperature of 70° to the cream, while it is still sweet, to the extent of 25 per cent. of its bulk, will cause it to yield its butter in less time and more completely. The water should be added before the cream is sour and at least 20 hours before the churning is commenced. The next treatment required is the development of lactic acid. If a quantity of *sweet cream* be churned, and an equal quantity of *sour cream* of the same quality as to composition be also churned, there will be obtained on the average from the sweet cream only 77 pounds of butter out of every possible 100 pounds, while there may be obtained from the sour cream 97 pounds of every possible 100 pounds. There are thousands of pounds of butter lost in the Dominion annually from the churning of two qualities of cream in the same churn at one churning. The only safe plan is to have all the cream for each churning thoroughly mixed from 12 to 20 hours before the operation begins. It should be kept at a temperature of from 60° to 70° Fahr. according to the season of the year, to permit it to become sour. The higher temperature is required during the winter season, and for cream from centrifugal separators during the summer season also. The churning is performed for the purpose of causing the globules of fat to strike on to each other and by impaction to unite. If two globules strike each other at a suitable temperature they will stick together; when large

numbers of them unite in that way, it is said that the butter has "come," and the particles may be washed and removed. All that is required in the churning of cream is that the serum or medium shall be properly treated: (1) by the addition of water if required, as already described, (2) by the development of acid, (3) by the temperature being kept at from 57° to 59° in the summer time or from 62° to 66° in winter. It is imperative that a thermometer should be used to reveal the temperature.

GRANULAR BUTTER.

When the butter particles are half as large as clover seed, 10 per cent. of cold water may be added to the contents of the churn. After they are gathered to be half as large as wheat grains, the churning may be stopped. The buttermilk may be removed and replaced by pure water at a temperature of from 50° to 55° Fahr. It may thus be washed in the granular state. When the water runs off free from a milky appearance, the granular butter should be left in the churn for half an hour to drain.

SALTING.

It may then be salted in the churn or removed to the butter worker for that purpose. Pure salt of fine velvety grain only should be used. The rate of salting should be regulated to suit the taste and requirements of the customers. From three quarters of an ounce to one ounce per pound will be found acceptable to most of those who purchase Canadian butter. The preparation for the market should be made with a view to giving the butter an attractive appearance, whether it be packed in tubs or firkins, or finished in prints or rolls.

CO-OPERATIVE DAIRYING.

As soon as possible more co-operative creameries and cheese factories should be established. Detailed information, sketches of plans for buildings, particulars of equipment and management will be furnished free on application to the Dairy Commissioner, Ottawa. When the butter is made in creameries, it will have a uniform quality and excellence which will enable it to become an article of commercial importance. The making of butter by skilled workmen in factories will solve the problem to some extent of keeping more cows, while domestic help is so scarce. Cheese factories should succeed well in localities where the settlements are close enough to permit the economical gathering of the milk.

SHEEP AND PIGS.

Then to dairy farming can be added sheep husbandry. I am told that sheep do well on your prairie grasses and in your climate. The feeding of a larger number of hogs would doubtless prove a paying branch of farm work. Sometimes grain that would not bring the highest market price by the bushel, can be marketed to more advantage in the form of pork than when sold in bulk.

CONCLUDING REMARKS.

In conclusion let me express the hope that the business men, the professional men, as well as the farmers of Manitoba, will aim to promote the prosperity of agriculture in your province by giving more attention to such branches of mixed and dairy farming as your country is adapted for. Every enterprise and occupation here is dependent directly or indirectly upon farming for its pay and its profits; and whatever will strengthen the hands of the farmer in his efforts to make his work pay and to give stability to his profits, will be for the benefit of every citizen. No new gospel need be proclaimed. In Manitoba, as elsewhere, something is not to be gotten for nothing, if gotten honestly. Skilful attention to their own affairs, good management, and diligent labors have brought comfort and competence to many of your farmers. Others who are here, or who may come, need expect no

better and no worse experience. I have faith in the future of this vast western part of the Dominion of Canada. It is destined to be the home of millions of energetic, sturdy, contented, and prosperous people, who may find here every essential condition for the maintenance of happy homes with the enjoyment of every institution dear to a loyal Canadian, British people.

MANITOBA.

I had left Owen Sound on Saturday, the 9th of August, by the S.S. "*Alberta.*" The *Alberta* and her sister ships are making a trip across the Great Lakes a favorite one for travellers whom inclination, business or other duty takes westward.

Winnipeg, the metropolis of the west, was the first place where a gathering of the farmers was met. From the *Capital of Manitoba* a journey was taken southward by way of Morris to *Manitou.*

Manitou has a cheese factory which was turning out six cheese per day, and these of good quality. The proprietor receives 2¾ cents per pound of cheese for collecting the milk, manufacturing the cheese and providing all necessary furnishings. He also retains the whey for the feeding of hogs at a convenient distance from the factory. The country is well-watered. Wells of a depth of from 18 to 20 feet afford adequate supplies for house and cattle use. Twenty-two carloads of live stock had been shipped from that district on one day, about a fortnight before the date of my visit. The farmers realized an average price of about 2¼ cents per pound live weight. Good land in that vicinity and in fact throughout most of the southern part of Manitoba can be bought for from $6 to $8 per acre. At a meeting in the Town Hall in the evening, a good deal of interest was manifested in the work of the Experimental Farms in connection with the distribution of grain, and particular inquiries were made and information given as to the possibility of growing suitable fodders and of erecting silos in that neighborhood, that the cattle might be fed to more advantage and at less cost during the winters.

A team and waggon were taken from Manitou by way of Pilot Mound to *Glenboro.* The first part of the journey was through a beautiful rolling country with occasional clusters of small poplar trees. The grain was rather short in the straw from drought in the early part of the season, but it promised to yield a more than average crop. The Pembina River was crossed twice. Between its banks and the quietly beautiful Tiger Hills, we passed through a country with a rolling surface. The Tiger Hills District carried excellent crops of uniform good quality, but the stage of growth was rather later than in the districts surrounding Morris, Manitou and Pilot Mound. Out from Glenboro we visited a few herds of cattle and then passed on to the very satisfactory settlements of the Icelanders, to which reference has been made in the foregoing address. Most of them settled in that locality from nine up to three years ago. Those who were first there, had from 150 to 200 acres under crop, and owned large numbers of cattle and good horses. Seventy head of two and three year old steers were purchased in that neighborhood a little earlier in the season, at an average price of $33 per head.

From Glenboro a drive was taken to *Wawanesa*, a new town on the bank of the Souris River and on the Northern Pacific Railway. It was barely six months old, but promised to rival in importance some of the older places on the line. From Wawanesa to *Brandon* the trail took us across an undulating country with every evidence of being suited for carrying a large population of farmers in the near future. From Brandon to *Portage la Prairie;* from Portage la Prairie to *Shoal Lake;* from Shoal Lake to *Minnedosa;* from Minnedosa to *Rapid City;* and from Rapid City to *Brandon* completed the round of my programme of meetings in Manitoba.

NORTH-WEST TERRITORIES.

Mossomin was the first stopping place in the Territories. A fine agricultural district surrounds it. By way of illustration, I may mention the fact that on the

farm of Mr. Bobier, some three miles out from the station, I saw a 14 acre field of fine even wheat of the Assinaboia variety, which was the harvest from *one grain* obtained by Mr. Bobier four years previously. The capabilities for an enormous production from the soil of the North-West, is almost beyond the possibility of exaggeration, when the right variety of grain is sown, good cultivation is given and favorable weather prevails.

At *Broadview* the farmers of the vicinity had brought to the town hall a display of roots and grains which was very creditable to their district and also to their enterprise. A drive across to the Weed Hills took me past several large areas of wheat, which were being harvested in fair condition and only slightly damaged from the frost of 22nd August. At this place, as elsewhere in the North-West, sleughs, ponds and streams seem to have dried up wonderfully within the last few years. Weed Lake, a basin about 8 miles long and less than a mile wide, is nearly 8 feet lower than it was 8 years ago. A tradition exists in the West to the effect, that the periods of drought and rainy weather alternate with each other every 7 years; and the abundant rains of 1890 are held to be the beginning of the rainy seasons and therefore of large crops. An uncontrollable obstacle to the success of farming operations in the West is that of insufficient rain, to fill the reservoir in the sub-soil for the sustenance of the crops during the summer. The selection of early-ripening varieties, and more careful preparation of the soil, will doubtless enable the farmers to overcome all the drawbacks that have existed in the past from summer or autumn frosts; and the combination of mixed and dairy farming with that of grain-growing, will be a protection and source of income to the farmers in any season when profitable crops of grain may not be secured.

From *Wolseley* I was conducted by Senator Perley to the Qu'Appelle Valley. The Qu'Appelle River which, within the memory of living settlers, was nearly a mile wide, has shrunk until it is only a tiny thread of water, crawling deviously along the wide deep valley which was its former bed. The southern banks only are wooded; and the strange bare hills, rounded and worn into ghastly shapes by rains and winds, make one think,—until he gets on the heights,—that all beyond must be desolate.

The Qu'Appelle Valley and the country between it and the main line of the railway is admirably adapted for cattle keeping. Senator Perley has erected a substantial stone dairy house; and the butter product from his farm is sent across to New Westminster, B.C.

From Wolseley the distance to *Indian Head*, where the branch Experimental Farm for the North-West Territories is located, is about 12 miles. When I first visited the farm on the 18th of August, the crops of wheat, barley and oats were as uniformly heavy and fine as had been seen anywhere on this continent or in Europe. A blighting frost had struck the harvest fields before all the grain was ripe, and in consequence, damage and loss were sustained. Mr. Angus Mackay, the experienced Superintendent of the farm, is most enthusiastic in his work in instructive and experimental agriculture. During the season there were tested no less than 31 varieties of *barley*, 16 of *oats*, 7 of *pease*, 30 of *Indian corn*, 8 of *turnips*, 5 of *mangels*, 5 of *carrots*, 15 of *cultivated grasses*, 8 of *native grasses*, 3 of *sugar beets*, and 102 of *potatoes*, besides *millets* and *mixed crops* for fodder purposes.

Back from the Experimental Farm at the homestead of Mr. Harvey, I found a unique and easily provided windbreak surrounding a garden in which were growing in hardy abundance, *rhubarb*, *potatoes*, *beans*, *celery*, *parsley*, *tomatoes*, *squash*, *chicory*, *black currants*, *wild gooseberries* and *citrons*, besides many *other vegetables* and *fruits*. The windbreak was made by the planting of slender poles close together and the growing of wild hops over them, which in their climbing bound the whole securely together.

Mr. Mackay accompanied me to *Regina*, where the local committee had arranged for the holding of two picnic gatherings, at which addresses on agriculture should be made. I take the following account of the preliminary proceedings at

Wascana, where the first meeting was held, from the columns of the *Regina Leader* :—

"Notwithstanding the busy time there was a large attendance at the old Cross-"ing. The North-West Mounted Police Band was in attendance under Sergeant Huntley "as Bandmaster. His Honour the Lieutenant-Governor attended by Capt. Allen "arrived in time for lunch, which had been provided with generous hospitality by "the ladies of the neighbourhood.

"Mr. Jelly, M. L. A., as Chairman of the Committee, said they were favoured "by the presence of the Lieutenant-Governor, who took a great interest in the progress "of the farmers of this country; and it was the desire of the Committee that His "Honour should preside. (Cheers.)

"Lieutenant Governor Royal expressed the pleasure with which he accepted "the invitation to attend the pic-nic which would be devoted to practical ends. He "congratulated the ladies on coming in such numbers, for in such a gathering the "men were ordinary vegetables while the ladies were the flowers. He dwelt on the "deep interest in agriculture which had been shown by the Dominion Government, "and referred to the fact that he himself had been the means of bringing up the first "centrifugal cream separator to Manitoba. Now there were no less than seven "cheese factories and six or seven creameries. Their parliamentary representative, "Mr. Nicholas Flood Davin, naturally took a great interest in the welfare of his "constituents and their general progress. He pointed to British Columbia as the "great future market for the North-West. He concluded amid cheers and then "called upon Professor Robertson.

"Professor Robertson:—Your Honour, ladies and gentlemen, the only business "in which our Queen engages is that of agriculture; and I am very glad indeed to "come to Regina, the Queen City and Capital of the North-West. It is widely "famed for its wealth of soil and affectionate mud. But still further, Regina is "known throughout the length and breadth of Canada as the residence of one of your "talented citizens, who has won for you a reputation not only in the Dominion but "abroad. Among all the men who meet at Ottawa every year to legislate for the "country and to discuss ways and means whereby the Government can promote the "development of its resources, there is none better known for the brilliancy of his "intellectual keenness and the light, graceful wit with which his arguments are "feathered and driven home than is your worthy representative. He takes a deep "interest in agriculture, doubtless because his constituency is essentially an agricul-"tural one. He is a man of keen perception who knows that all must live out of "the fruits of the soil.

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"That there are grave difficulties in the way of keeping large numbers of "cattle for dairying and beef production in the North-West Territories, I know very "well; but these are not insuperable. Pasturing facilities during the summers are "unsurpassed in any other part of the world. The prairie grasses are not only "plentiful but exceedingly nutritious. When the supply of wild hay becomes "insufficient for the needs of the herds, a cheap and suitable winter fodder can be "obtained by the growth of mixed crops of oats, barley and peas. Then Hungarian "grass and millets grow remarkably well. Comfortable quarters for the winter can

" be provided by the erection of turf stables with a liberal use of straw and poles " until lumber is well within the purchasing power of the farmers' purses.

" Canada is the country of the world where cattle are most free from diseases " and where animal vigor is capable of rendering the best service and yielding most " profit to the people. The North-West is a long distance from the great centres of " population where the consumers of her products live. Hence it will pay the peo- " ple to concentrate, as far as possible, the quality of the farm products, so that the " smallest per cent. of their value may be absorbed by transportation charges. It " need not cost much more to carry a tub of butter to England than a bushel of " wheat, when large quantities of it are handled.

" Then the keeping of more cattle would furnish profitable employment for the " rural population during the winters. When men are employed for the summer " months only, prosperity is not so permanent."

The second pic-nic gathering assembled at the *Bluffs* on the following day. The district there seems to be admirably adapted for cattle-keeping and horse-raising.

Maple Creek was the next appointment. From there, by the courtesy of Inspector Saunders of the North-West Mounted Police, I was driven out into the Fish Creek district and saw some excellent cattle in very fine condition. From all the inquiries that I made, I learned that ranching upon a small scale with herds of from 200 to 300 animals had been very profitable ever since its commencement. With a small herd the owner is enabled to put up enough hay for feeding during the storm periods. The cattle become accustomed to seek the shelter and service of the turf sheds which are erected, when a storm blows up. They are thus saved from wandering long distances from the homestead. Then the cows which calve during the winter can be looked after and a larger percentage of increase is obtained yearly. From these combined gains, the profits from ranching with smaller herds, not exceeding 350 head of animals, have been very satisfactory. The country towards the Cypress Hills is rolling and affords excellent pasturage summer and winter, with the exception of the storm periods which have been mentioned already.

A round-up is held twice a year for the branding of all calves. The Live Stock Association of each neighborhood superintends that work. Calves which may have escaped branding and which are not found with their dams, are termed "Laverocks." (A man of too covetous a disposition who used to appropriate all such for his own herd, has his name perpetuated in the English language in this most unenviable way) Before the branding is completed at each round-up, these calves are put up at auction and sold to the highest bidder. The proceeds are applied to the payment of the expenses of the round-up. The balance, and, in fact, the main expenses are met by *pro rata* assessments upon those whose cattle have been handled.

Medicine Hat was the next stopping place and then *Calgary*. From *Calgary* a drive was taken south as far as *Davisburg*, a postoffice some 24 miles distant. That country is admirably adapted for stock-keeping. The pasturage is thick-bottomed and stands eating by large herds. The settlement is yet too sparse for the introduction of co-operative dairying, but that will come shortly. The long distance from large-markets, both east and west, necessitates that the products be concentrated into the smallest bulk with the highest value. The ordinary cereals do well in the Calgary district, and roots of enormous size and wonderful yield per acre can be grown very easily.

From Calgary the first view of the Rocky Mountains was obtained. The range of giant hills with their snow clad tops and sides, seemed like the uttermost ends of the earth, where pillars had been left to support the edge of the horizon. A closer acquaintance with the Rocky Mountains intensifies the emotion,—approaching to veneration,—which their first sight awakens. As their mighty masses tower above the slender threads of iron on which the railway trains move, the *greatness of nature* and the *littleness of man in a material sense*, are brought into startling contrast.

One of the greatest engineering feats achieved on this continent during the century by the building of the Canadian Pacific Railway across these mountains, has hardly disturbed the shape of their sides in a perceptible measure; and yet the *superiority of the mind of man*, to *matter in its most gigantic massiveness*, is revealed by the masterful way in which he has made its substances further his ends and serve his purposes. Coal and silver and gold are being taken from the stolid hill sides. From the eastern Foot Hills of the Rockies to the most western slopes of the Coast Range, the iron roadway, the stations, the mines, every handprint and footprint of man reveal the *mastery of mind over matter*; and when farmers on level plains, undulating fields, or mountainous regions, believe in and follow similar methods embodying the same principles, they will ennoble agriculture and its tasks to an equality with the highest of other work.

A few stopping places in the mountainous region were touched at. Among these were *Banff*, *Field* and *Glacier;* but as this report is treating mainly of the agricultural aspect of the country, I refrain from saying what I might say of the wonderfully thrilling pleasure which a trip through this intensely grand region gives to any lover of the beautiful and sublime in nature. If an impassable gulf should be opened between the Rockies and Ottawa, some of us who have seen them once, would be resolved to go around the earth the other way if necessary, in order to enjoy another gaze.

BRITISH COLUMBIA.

At *Kamloops*, B.C., no meeting was held, as some misunderstanding concerning the date of the meeting had arisen from the absence of the gentleman with whom correspondence had been carried on.

The *Experimental Farm for British Columbia* at *Agassiz* was visited. The surprisingly rapid and luxuriant growth of plants in British Columbia seems almost a tropical quality. The gigantic-growing ferns among the underbrush in the woods, often rise to a height of 6 or 7 feet. The report of the *Agassiz Farm* will be full of interest and service, especially along the lines of its fruit culture in the near future.

A visit was made to *New Westminster*, when it was learned that the agricultural meeting had been put off until one of the days of the holding of the annual exhibition, which I purposed to take in on my return journey.

From *Vancouver* to *Victoria* the journey was quickly made by the S.S. "*Islander*." At *Victoria* a meeting was held in the Philarmonic Hall; and the following is taken from the beginning of a newspaper report of the gathering. It is inserted because it contains some of my views with reference to the lumbering and other industries of British Columbia, which are no less important to the people of the Dominion than is that of its agriculture:—

"Prof. J. W. Robertson, Dominion Dairy Commissioner, lectured last evening in "Philarmonic Hall on a subject, in fact, several subjects, of absorbing interest to the "farmers of British Columbia. * * * He said he had been very much "gratified by the evidences of enterprise, prosperity and rapid expansion everywhere "visible in the city of Victoria. He had been led to expect rather a quiet sylvan "place where wealthy English people came to seclude themselves; but here he found "the people Canadian in every sense, in their desires and efforts for the development "of the magnificent resources of this rich province, of which the queen city, Victoria, "is a most worthy capital. The subject of farming has as yet received but little "attention from the citizens who have made their homes in this western part of the "Dominion, owing to the ease with which the necessaries and comforts of life could "be gained from other sources. The vast lumbering enterprises of this province are "the pride of the Dominion and may be capable of an unfailing source of profit. The "careful husbanding of the timber, and a judicious regard for the renewing of the

"supply by protecting the young trees from the ravages of fire will save what will "eventually mean millions of revenue. Reckless devastation will not merely strip "the beautiful mountain slopes, but will mean a diminution of the contents of the "treasury. Of mining the professor did not speak, simply saying that as a Scotch-"man he had no regard for gold (laughter). He had to confess that he came here "rather sceptical concerning some of the stories told regarding fruit growing in "British Columbia, but convincing evidence had been brought forward to prove that "British Columbia could produce more fruit to the tree and the acre than any other "portion of this favored Dominion. The markets of the North-West are open for "the fruit of this genial climate. As yet this industry has hardly been tested as to "its possible profit giving. The climate which produces such beautiful fruit, and "promotes the growth of such truly gigantic trees, must be one well adapted to the "cultivation of such forage crops as will enable the farmer to keep horses and cattle "at the lowest possible cost. The healthfulness of the climate is already widely "known, but the adaptation of this country for profitable farming has hardly been pre-"sented in the best way to those farmers in Eastern Canada who desire to come out "West. It is not the least important of the Professor's objects that he may gain the "requisite information to give to the farmers of Eastern Canada, in order to guide "them in forming a safe judgment in favor of the western provinces."

On Vancouver Island meetings were also held at *Saanich Hall* and in the *Comox* valley. The agricultural areas in *Vancouver Island* are but small compared with its extensive area of rugged mountain. The *Saanich Valley*, *Cowichan Valley*, and the *Comox Valley* comprise the most of the settlement occupied by farmers. These valleys will not average more than 50 square miles each, but nature is wonderfully productive, and generous in her gifts from the soil to those who till it there. Considerable quantities of excellent butter are produced and sold the year round at prices from 30 to 50 cents per pound, when the quality is good.

At *Nanaimo* no less than 8 large ships, of from 2,000 to 4,000 tons burden, were in the harbour waiting to be laden with the superior coal which is to be found in many places on that coast.

On the return journey I was fortunate enough to be able to attend the Agricultural Exhibition at *New Westminster*. In all the departments a most creditable display was made. The cattle of the Holstein and Jersey breeds were exceptionally fine. The display of dairy products in point of quality was not behind the best to be seen at the large exhibitions in Ontario and Quebec. It fell to my lot to do the judging of these articles at the Exhibition, and their superior quality further convinced me of the adaptation of our most westerly Province for a large development of its dairying and cattle-keeping industries.

The value of agricultural exhibitions depends very largely upon the educational turn which is given to their displays, both by the arrangement of the articles and the judging of the same. Dissatisfaction on the part of the exhibitors of all products, results frequently from lack of information as to the points that have guided and governed the judges in their decisions. Wherever possible, I think a record of the points of excellence of the article or animal should be left with the exhibitor; and for the judging of butter and cheese, I here put in *forms of cards* which could be printed by the Exhibition Associations and provided for the use of the judges, as already indicated:—

..... Exhibition,

1891.

DAIRY DEPARTMENT

Exhibit of ..... **BUTTER**

Section ..... *No.* .....

Exhibitor .....

Residence .....

JUDGES' REPORT.

	Perfection.	Points Awarded.
Flavor.....	40	.....
Grain.....	30	.....
Color.....	15	.....
Salting.....	10	.....
Finish.....	5	.....
Total....	100	

For the Judge .....

Remarks .....

.....

.....

..... Exhibition,

1891.

DAIRY DEPARTMENT

Exhibit of ..... **CHEESE**

Section ..... *No.* .....

Exhibitor .....

Residence .....

JUDGES' REPORT.

	Perfection.	Points Awarded.
Flavor.....	35	.....
Quality.....	25	.....
Texture.....	15	.....
Color.....	15	.....
Finish.....	10	.....
Total....	100	

For the Judges .....

Remarks .....

.....

.....

The following report of the introductory part of the meeting at *New Westminster*, as taken from the local press will set forth some views of British Columbia for the information of Eastern Canadians who may be looking for them from the pages of this report:—

"Mr. Thos. Cunningham presided, and briefly introduced the lecturer, who was "well received. The Professor said he had come into the Province, and visited their "exhibition rather to learn than to teach,—to learn in fact the capabilities of British "Columbia and carry the knowledge of them back to Eastern Canada. This was a "splendid dairy farming country; though they, in their modesty, had not yet realised "the greatness of their resources in this respect. Their province was one of the finest "in the Dominion, as would be discovered when its people learned to use all its resources "in the right way. He had been much struck by many things in the exhibition, and "others he had noted outside it, and some of these he would talk about that night. "People were often too reckless of their good reputation. Let British Columbians

"therefore, guard their excellent one carefully. He had noted during his visit the "vast recent development of their mining industries. They were exporting their "minerals and importing much of the miners' food, though they should be able in the "fertile valleys between their beautiful mountains to grow all the food thus needed. "Then, too, their lumber interests were growing fast; and they in Eastern Canada, at "least as far as Manitoba, knew what good work came from the New Westminster "mills. But in lumbering there was too much waste and too little protection of "forests. Good timber was (he thought) sometimes, from want of care, destroyed, "and there was much land, which was only fit for tree planting, left unused. 'Plant, "as well as destroy,' was his advice. What, nevertheless, he learnt was this, and he "should return to East Canada with the news of it,—that Canadians need not go south "of the border for good land. Really British Columbians, unlike their Yankee neigh- "bours, were too modest in talking about their resources. It was false to say as he "heard in the east, that British Columbia was only a sea of mountains. It had ample "capacity of soil to feed a vast population engaged within its borders in fisheries, "mines, lumbering and other industries. Then as to *New Westminster* itself. He "could tell them that their district was one of the most fertile in beautiful Canada; "and it must therefore be permanently prosperous. But farmers in their part took "up too much land. 'Men get too thin when they spread themselves out too far' "(laughter). 'Better would it be to farm small areas thoroughly. Better farm five "acres well than 25 poorly.' Nowhere in the world was there, he thought, a better "chance for cheap and profitable production. Certainly nowhere else in the Dominion, "was the growth so rapid, or the yield so generous as in British Columbia. 'Apply "skill and don't farm too much land, recognising the fact that a little land here pro- "duces much. You have also good local markets and get more for your produce "than the people of the North-West, Quebec, and Manitoba. Produce cheaply by "producing much.' There was, the lecturer added, too little produced to the acre, "and too many men looked mainly to Providence to work their farms. There were "too many men of leisure on the farms in their Province. Their exhibition should "teach them much as to improved methods of feeding and management of stock and "as to the best breeds of horses and sheep and varieties of grain. He could, after "visiting their show, give a flat contradiction to the statement often heard in Eastern "Canada, that British Columbia could not grow grain. They grew it indeed of very "superior quality. Yet farmers might produce even better by getting to know why "one grain gave a better yield than another. The judges at shows like theirs should "specify particularly the points of superiority of one head of stock over another, and "of one farm product over others. An exhibition like theirs did good, by rousing the "enthusiasm of the farmer and showing him that he was no mean factor in the com- "munity. It was in fact part of their educational system, and though some thought "Canadians lacking in culture, he found people nowhere else who knew so much of "their own business and liked to know it,—without putting it all into practice."

PRINCE ALBERT AND FORT QU'APPELLE.

From *New Westminster* the journey eastward and home was made with but few interruptions or delays. From *Regina* the trip was extended to *Prince Albert* by way of the newly opened railway, 247 miles in length. In the *Prince Albert District* the British Tenant Farmer Delegates were met; and in company with them the district surrounding the town was hurriedly examined. We found there excellent samples

of two-rowed barley and Ladoga and Red Fife wheat. Since my return to Ottawa, one sample of Ladoga wheat has reached the Experimental Farm from Mr. William Plaxton, M.L.A., Prince Albert, almost perfect in its appearance and weighing 66 pounds to the bushel. The Prince Albert region is well watered and offers many inducements to those who wish to insure steady prosperity, by engaging in mixed farming and cattle keeping in the North-West.

From *Prince Albert* to *Fort Qu'Appelle*, by way of *Regina* and *Indian Head*, was the next stage in the journey. At *Fort Qu'Appelle* an agricultural exhibition was being held; and it has never been my good fortune to see any other exhibition building where there was so small a proportion of inferior goods. The quality of the roots and vegetables was most excellent. The butter was superior in flavor and body. The grain, although only a few samples were exhibited, was first-class; and one three year old steer, which had been fed mainly upon straw and hay, turned the scales at 1,895 pounds.

CONCLUSIONS.

The return journey to *Ottawa* was made by the North Shore route; and the *Central Experimental Farm* was reached on the 13th of October. After the trip twice across our own country, I am more firmly convinced than before, that *dairy farming* with special attention to the production of butter during the winter, cheese during the summer and beef and bacon the whole year round, are the lines of agriculture which our people in most regions can follow with the greatest certainty of profit and enduring success. The vastness of the area of land, some 3,500 miles one way and 1,400 the other, offers many inviting fields to agriculturists from other lands. Our climate is invigorating and healthy; our resources are as yet hardly recognised; in timber and minerals and fish, nature has been more bountiful to us than to any other nation of equal population and age; and the opportunities in our country for successful agriculture are peerless. The progress and prosperity of the Dominion must depend almost wholly upon the way in which our people apply themselves to make the most of these things, by self-reliant exercise of skill in their various spheres of endeavour.

VI.—DAIRY BULLETINS.

Dairy bulletins, to the number of seven, were issued at intervals during the year. Their first purpose was to spread useful information bearing upon *Dairying* in the Dominion of Canada, for the benefit of the farmers. Their aim was to help in the education of the ordinary farmers and those whose occupations are associated with dairy husbandry, rather than to furnish data of interest only or mainly to scientists. In order to gain the widest possible publicity for their contents, they were written in a style to make them acceptable matter for publication by the newspapers of the country. A special *newspaper edition* of each,—printed on one side only—was sent to the press; and in nearly every case they were reproduced in full or copious extracts were inserted with comments of general or local application. Of the seven bulletins, there were distributed altogether 106,080 copies. They have been sent free to all applicants. When requested by them, the names of farmers and others interested in agriculture are put on the permanent mailing list to receive future publications as they are issued.

The bulletins have been :—

No. 1—MILK FOR CHEESE FACTORIES.

FEED.

The milk of cows is a secretion or direct elaboration from their blood. Whatever interferes with the health and comfort of the animals will also affect the quality and quantity of their milk. Too much care cannot be exercised in providing feed that is cheap, succulent, easily digestible, wholesome and nutritious. The grass of early summer is too watery and weak in feeding substance to be fed alone to the greatest advantage. A judicious allowance of bran, pease and oats, oil-cake or cotton-seed meal will increase the milk supply and fortify the cow's system for the production of a larger quantity of milk during mid-summer, fall and winter. Broadcast fodder-corn, does not meet the needs of milking cows. A soiling crop of some sort or sorts should be grown, to furnish plenty of green fodder at the time when pasture may be bare from prolonged dry weather. Indian corn when grown under conditions favorable to its attainment of mature size and quality,—in rows or hills 3 feet or 3½ feet apart with from 2 to 6 seeds per foot in the row,—yields a fodder by the use of which cows are enabled to produce the largest amount of milk, butter or cheese per acre of land required for their support. Fodder corn is not a complete ration for the most economical production of the best milk. When it is supplemented by grass, bran, oil-cake, cotton-seed meal, or similar feeds, better returns for the feed consumed are realized than when it is made the exclusive diet.

WATER.

Water is nature's vehicle for carrying about most of the matter which she requires to move from place to place. The great boulders were quietly clasped in her arms and without apparent effort brought from the northern ridges to the southern parts of our Dominion. The tiniest specks of nourishing matter needed to replace the worn-out tissues of the body are likewise carried to their proper places in this wonderful omnibus. The identical water swallowed by a cow to serve as a carrying medium in her blood, for the equitable distribution of the elements of nutrition throughout her whole body, is made to serve a like function in the milk which she yields. If that water be impure in the first place, it is likely to carry the impurity with it throughout its whole mission, from the drinking by the cow until after its consumption by the creature which consumes the cows product. Water which has been contaminated by decaying animal matter is specially likely to retain its pollution. The milk from the cows which drink such water is a menace and danger to the public health, and interferes greatly with the commercial value of all dairy products. There should be an abundant supply of pure water, easily accessible by the cows during hot weather. It should be furnished at a comfortable temperature during the cold weather of winter. Cows which are denied access to abundance of water, will not give as much milk, or milk of as good quality, as when plenty of water is provided with wholesome satisfying feed.

SALT.

Dairy cattle should have access to salt every day, and salt should be added to all their stable feed daily. The conclusions from a series of experiments carried on in 1886 indicate that when cows are denied salt for a period of even one week, they will yield from 14½ to 17½ per cent. less milk, and that of an inferior quality. Such milk will on the average turn sour in 24 hours less time, than milk drawn from the same or similar cows which obtain a due allowance of salt, all other conditions of treatment being equal. This may apply with aptness to only the parts of the Dominion

remote from the sea. From Quebec westward, as far as the Rocky Mountains, cows will consume an average of 4 oz. of salt per day, while they are milking during the summer.

SHELTER.

Comfortable quarters are indispensable to the health and well-being of cows. Stables during the winter should have a temperature constantly within the range of from 40° to 55° Fahr. In summer time a shade should be provided in the pasture fields, or adjacent thereto, to protect against the exhausting influence of July and August suns. In all the management of cows such conditions should be provided and such care given as will insure excellent health and apparent contentment.

MILKING.

When practicable the milking of each cow should be done by the same person, and with regularity as to time. He only that hath clean hands should be allowed to milk a cow. I say "he" because I think the men of the farm should do most of the milking, at least during the winter months. It is no more difficult to milk with dry hands than with wet. It is certainly more cleanly, and leaves the milk in a much more desirable condition for table use or manufacture. A pure atmosphere in the stables is indispensable to prevent contamination from that source. Immediate straining will remove impurities which otherwise might be dissolved to the permanent injury of the whole product.

AERATION.

After the straining is attended to, the milk should be aerated. Too often it is poured into one large can and left there just as the cows had given it. That neglect implies three things that are very injurious to its quality for cheese making. (1) The peculiar odour which the cow imparts to the milk will be left in it until it becomes fixed in its flavour. (2) The germs of fermentation that come in the milk and from the air have the best conditions for growth and action when the milk is left undisturbed. (3) The milk will become in a degree unfit for perfect coagulation by rennet. Hence it is needful and advantageous to aerate it for three reasons:—

First, because by pouring, stirring, dipping or by trickling it over an exposed surface, there is eliminated from the milk by evaporation any objectionable volatile element that may be in it.

Secondly, because as has already been stated, the milk contains germs of fermentation. A strange peculiarity about some of these microbes is that they become active only in the absence of free oxygen. When warm new milk is left undisturbed, carbonic acid gas is generated, and that furnishes the best condition for the commencement of action by these almost invisible creatures. After they get started, they can keep up their decomposing work, even in the presence of oxygen. It is impracticable to perfectly coagulate such milk so as to yield a fine quality of keeping cheese. Coagulation by the use of rennet, of milk that is ripe can never be perfect, unless it be thoroughly aerated immediately after it is taken from the cow. *Neglect of aeration will increase the quantity of milk required to make a pound of fine cheese.*

Thirdly, because the airing seems to give vigour to the germs of fermentation that will bring about an acid condition of the milk, without producing the acid. So much is this so that *it has been found impracticable to make strictly first-class Cheddar cheese from milk that has not been aerated.*

COOLING.

The subsequent cooling of milk retards the process by which it becomes sour. Certain germs of fermentation exist in milk which in the act of their multiplication, split molecules of sugar of milk, each into four molecules of lactic acid. By delaying the operation of these germs the milk is kept sweet for a longer period. The

cooling of the milk should never precede the aeration. A temperature of from 60° to 70° Fahr. will be found cold enough for the keeping of milk over night, when it has been previously aired.

PROTECTION.

Milk is a liquid of absorbent proclivities. It should be protected against injury that would result from exposure to impure air. A general purpose milk-stand is a device specially adapted for the spoiling of milk in that way. Such a stand serves as a milk stand and also a carriage stand, both of which are legitimate uses. Sometimes it is also occupied as a bivouac for swine for the convenience of these animals, the end of whose whey trough furnishes one step for the stand. Both of these latter extensions of its uses and hospitalities are all wrong.

HONEST MILK.

The employment of inspectors promises to improve the quality of the milk furnished by some patrons, whose highest moral aspiration is limited by an effort to keep the self-appointed commandment, "Thou shalt not be found out." The adulteration of milk by the addition of water, the removal of any portion of the cream or the keeping back of any part of the strippings is forbidden by the Dominion statutes. Any person who is found out so doing, will not escape lightly. The inspectors appointed by the Dairymen's Associations have been equipped with suitable and competent testing instruments and have been instructed to render every assistance to cheese-makers, looking forward to the prevention of adulteration and the conviction and punishment of those who may be found guilty of the practice.

MATTERS MOST NEEDFUL OF CARE.

In the following short paragraphs I have ventured to gather helpful advice on the matters most needful of care :—

1. Milk from cows in good health and apparent contentment only should be used.

2. Until after the eighth milking, it should not be offered to a cheese factory.

3. An abundant supply of cheap, succulent, easily digestible, wholesome, nutritious feed should be provided.

4. Pure cold water should be allowed in quantities limited only by the cow's capacity and desire to drink.

5. A box or trough containing salt, to which the cows have access every day, is a requisite indispensable in the profitable keeping of cows.

6. Cows should be prohibited from drinking stagnant, impure water. The responsibility for the efficacy of that beneficial prohibition rests wholly with the individual farmer.

7. Wild leeks, and other weeds common in bush pastures, give an offensive odor and flavour to the milk of animals which eat them.

8. All the vessels used in the handling of milk should be cleaned thoroughly immediately after their use. A washing in tepid or cold water to which has been added a little soda, and a subsequent scalding with boiling water, will prepare them for *airing*, that they may remain perfectly sweet.

9. Cows should be milked *with dry hands*, and only after the udders have been washed or brushed clean.

10. Tin pails only should be used.

11. All milk should be strained *immediately* after it is drawn.

12. Milking should be done and milk should be kept only in a place where the surrounding air is pure. Otherwise the presence of the tainting odors will not be neglected by the milk.

13. All milk should be *aired* immediately after it has been strained. The treatment is equally beneficial to the evening and morning messes of milk.

14. In warm weather, all milk should be cooled to the temperature of the atmosphere after it has been aired, but not before.

15. Milk is better for being kept over night in small quantities rather than in a large quantity in one vessel.

16. Milk-stands should be constructed to shade from the sun, the cans or vessels containing milk, as well as to shelter them from rains.

17. Only pure, clean, honest milk should be offered, Any deviation from that will not always go unpunished.

No. 2—NOTES FOR CHEESE-MAKERS FOR MAY.

FACTORIES AND THEIR SURROUNDINGS.

1. *The present*, not next week, will be the best time to see that all the drainage facilities of the factory are adequate and in good order.

2. Whey runs, spouts and tanks should be put into such order that leaking will be prevented.

3. If there be a leakage anywhere from floors, spouts or tanks, which is not immediately preventible, provision should be made at once for the drainage of the waste, if only by shallow open trenches. A liberal supply of lime and gypsum should be spread around such places. Don't fail to secure a barrel or two of each, *some time this month*, for use during the hot weather.

4. If the factory buildings are not painted and will not be painted, get them whitewashed this month. If you cannot get that done by the proprietors or managers, get permission and do the rest yourself. A whitewashed curing-room of imperfect construction can be kept 10 degrees cooler in summer than one not whitewashed. If the cheese become injured, through excess of heat, neither the buyers nor the patrons will whitewash your reputation then, whether the blame belongs to you or not.

5. Make the surroundings of the factory neat and tidy. Plant a few trees and a great many flowers.

6. While keeping the outside of the premises as creditable to your taste and neat habits as possible, make the inside to reflect still more your aversion to everything untidy and dirty. Give every part of the factory a thorough cleaning and keep it in a sweet state all summer.

7. Before the curing-room contains any cheese, fumigate it by burning some sulphur mixed in alcohol. That will help to prevent the growth of mould on the outside of the cheese.

8. The leisure hours of May, before the large flow of milk is received, should be employed putting all the apparatus, appliances, utensils and machinery into the best of working order.

9. Be sure that the making room floor is so well constructed and supported that it will not shake or vibrate *during* the coagulation of the milk.

MILK AND MAKING.

1. Procure a copy of "Milk for Cheese Factories" for each of your patrons by applying to the Dairy Commissioner, Central Experimental Farm, Ottawa, stating the number required and the address to which they are to be sent. They will be furnished free in French and English.

2. Look out for "leeky" flavors in the milk. Don't put such milk into the vat with that of the other patrons. If you have time make it up by itself, and send the cheese from it to the patron who supplied that milk for his private use.

3. Make provision for keeping a short record of each day's work, of the exceptional treatment of every vat and of the comparative quality of the cheese from each vat, before they are shipped.

4. Milk sours *readily and rapidly* for a number of weeks after the period of lactation in the cows begins. Hence milk seldom requires to be ripened for setting, during May.

5. Use enough rennet to coagulate the curd into a state fit for cutting, in from 17 to 20 minutes, at from 82° to 88° Fahr.

6. Cut it rather early, slowly and very carefully.

7. Use the horizontal knife first.

8. Afterwards allow the curd to settle until whey comes over nearly the whole surface.

9. Then begin to cut with the perpendicular knife.

10. Immediately after the cutting is completed, begin to stir the mass slowly and continuously until the curd is cooked.

11. Heat should not be applied until 10 minutes after the stirring is begun.

12. The heating should be effected gradually, at the rate of about 1 degree for every 4 or 5 minutes until 98° Fahr. is reached.

13. Draw most of the whey early, and so guard against being caught unprepared for the rapid development of acid.

14. Don't dip the curd until the presence of acid is discernible by the hot iron test. Sweety flavors result from too early dipping in May.

15. After dipping the curd, stir it gently and keep it at a temperature above 94°.

16. Don't attempt close matting, high piling or packing of the curd this month. See that the whey is separated from it.

17. When it begins to feel "slippy" and smells like fresh made butter, it should be put through the cutter or grinder.

18. Acid develops so rapidly that care must be taken to keep the treatment well in advance of the change in the curd.

19. After grinding or cutting, stir for 10 or 15 minutes before salting.

20. Apply salt at a rate of about 1½ lb., early in the month, to 2 lb. per 1,000 lb. of milk during the last ten days, varying the quantity slightly according to the condition of the curd as to its moisture.

21. Begin to put the curd in the hoops within 20 minutes after the salt is stirred in.

22. Use only pure water in bandaging.

23. Guard against the formation of edges or shoulders from the hoop-followers being too small. Apply the pressure gradually until the whole power through the long lever is used, after four hours.

24. Leave the press-cloths on, and turn the cheese in the hoops every morning. Let no cheese leave the press-room until the shape is symmetrical and the finish neat.

25. Don't press the scaleboards on the ends of the cheese.

26. When the press-cloths are removed, use hot clean whey-oil or butter, into which has been dissolved a teaspoonful of soda per cupful of oil.

27. Try to keep the temperature of the press-room above 60° Fahr.

28. The curing room should be kept at a temperature continuously between 65° and 70° Fahr.

29. Provide strong, smooth boxes of the exact size.

30. Stencil the weight of the cheese in neat figures on the side of every box.

Patrons.

1. Try to get each patron to take a personal interest in the care of the milk.

2. Encourage every farmer in your neighborhood to sow a small area of oats and pease or oats and vetches for summer supplementary feed.

3. Persistently endeavor to induce every patron to plant at least five acres of fodder corn in rows three feet or three and a half feet apart.

4. Send to the Dairy Commissioner, Central Experimental Farm, Ottawa, for a bulletin of instructions on the planting of fodder corn, the construction of silos and the curing of silage.

——:o:——

Every person who fills up the form on the attached sheet and returns it to the Dairy Commissioner, Ottawa, will thereafter receive the Monthly Dairy Bulletins, as they are issued.

Name of Cheese Factory.....
In the Township of.....
In the County of.....
In the Province of.....
Nearest Railway Station.....

Name of Proprietor.....
P. O. Address.....

Name of the Salesman.....
P. O. Address.....

Name of the Cheesemaker.....
P. O. Address.....

No. 3—BUTTER-MAKING.

Fat Globules in Milk.

While her milk is being elaborated by a cow, the ends of the cells which line the inside of the milk-ducts and vesicles in her udder, seem to enlarge. Each one forms a small globule, and when that is perfected it drops off into the serum of the milk. Each bud or globule, so formed, is a globule of fat; from them is made all the butter from cows' milk. These tiny buds of fat seem to grow on the surface of the cells, partly by the destruction of the cells, and partly by conversion of some of the substance of the blood into fat. They trickle down in and with the milk, and are held in suspension not in solution as are the other solids in it. They mostly come during the latter part of the milking, probably because they do not move so quickly or easily as the liquid part of the milk. The fore-milk is thinner than the strippings, because the globules of fat do not free themselves from the internal linings of the milk ducts so quickly as the liquid of the milk. If one finds, sending milk to a cheese factory, a man who is of so modest and retiring a disposition that he will not keep at home for table use a quantity of the average milk given by the cow, but always and only the last quart, his modesty should not be respected or trusted too far; such modesty may not be found compatible with honesty. The condition of the cow's blood and her nervous system very largely affect the quality of the milk she gives. Bad feeding, foul water or the absence of salt will induce in the cow a condition in which she will not yield good milk; a similar condition with its consequent effects, may be caused by neglect, exposure, abuse or excitement. A cow has a peculiarly delicate organisation, and must be handled with kindness, and any man who abuses a cow beats out the profit, for she will pay him back by giving less milk, and that of a poorer quality. The globules of fat before mentioned, are so

numerous that in a thimbleful of milk there will be found millions of them. It is estimated that there are at least one thousand millions of them in every cubic inch of milk. From these specks of fat the butter is made.

CREAM SEPARATION.

To get them out of the milk is the task of the butter-maker; they are too small to be strained out with the finest sieve; fifteen hundred of the largest of them placed side by side, like a row of marbles, would not measure more than one inch. If milk be left at rest they will rise to the top because they are lighter than the liquid in which they float. The heavier parts of the milk are drawn down by force of gravitation, and as the serum of the milk, composed of water, casein, sugar, albumen, etc., moves downward, it displaces the cream globules and forces them towards the top. There are two methods of separating these fat globules from the milk; a natural method and a mechanical method. In the natural method, the power of gravitation is used to pull the heavier portion of the milk down, with the effect that the lighter part, the fat globules are pushed upward. In the mechanical method, centrifugal force is applied to attain a like result. When a quantity of milk is put into a rapidly revolving vessel or cylinder, the heavier parts will be forced outwards against its resisting side or inner surface with sufficient pressure to push the lighter particles, the globules of fat, towards the centre of revolution. In that way the water, casein, albumen and the other heavier constituents of milk, find their way to the outside of the quantity being treated in a revolving cylinder, while the globules of fat are collected in concentric form on the inside surface of the quantity being treated. This is the law, that the cream, mainly composed of fat globules, travels in a direction opposite to that of the force exerted upon the milk whether the force be centrifugal or centripetal.

EFFECT OF TEMPERATURE.

If ordinary milk in a deep-setting pail be left at a temperature of 60° Fahr., it would take these small specks from three to six days to get to the top at the rate at which they would move. They can be helped to move faster. The milk at a temperature between 90° and 98° is slightly enlarged in bulk, and by putting it into deep-setting pails at a higher temperature (90° to 98°), the advantage of a falling temperature from above 90° to 40° or 45° may be gained. That treatment will expedite and facilitate the upward movement of the globules of fat. The rapid cooling of the milk is also believed to prevent the formation of a delicate mesh of lacto-fibrine in the milk, which would hinder the globules from rising freely.

CREAM.

The cream itself is only that part of the milk into which the globules of fat have been gathered in large numbers. Cream has no regular or constant per cent. of fat; the range is from 8 per cent. to 75 per cent. In one hundred pounds of cream there may be only eight pounds of butter, or there may be seventy-five pounds according to its quality of richness. The globules of fat have no skin or organic coverings distinct in constitution from their own substance. Like drops of quicksilver that have separated from each other, they have no pellicle. But sometimes the serum of the milk becomes so viscous that a quantity of it will adhere to the surface of the globules and like a coating of gum will prevent their movement upwards when the milk is set, or their movement inward when the milk is treated in a centrifugal machine. If a quart of warm water be stirred into every pailful of milk when it reaches the dairy room from the stable, the separation of the cream will be facilitated. The water may be at a temperature anywhere between 150° and 180° Fahr., and should be warm enough to raise the temperature of the milk to above 90°.

CHURNING.

In the winter season especially, difficulty is experienced sometimes in churning the cream. The addition of water at a temperature of 70° to the cream, while it is still sweet, to the extent of 25 per cent. of its bulk, will cause it to yield its butter in less time and more completely. The water should be added before the cream is sour and at least 20 hours before the churning is commenced. The next treatment required is the development of lactic acid. If a quantity of *sweet cream* be churned and an equal quantity of *sour cream* of the same quality as to composition be also churned, there will be obtained on the average from the sweet cream only 77 pounds of butter out of every possible 100 pounds, while there may be obtained from the sour cream 97 pounds of every possible 100 pounds. There are thousands of pounds of butter lost in the Dominion annually from the churning of two qualities of cream in the same churn at one churning. The only safe plan is to have all the cream for each churning thoroughly mixed from twelve to twenty hours before the operation begins. It should be kept at a temperature of from 60° to 70° Fahr. according to the season of the year, to permit it to become sour. The higher temperature is required during the winter season and for cream from centrifugal separators during the summer season also. The churning is performed for the purpose of causing the globules of fat to strike on to each other and by impaction to unite. If two globules strike each other at a suitable temperature they will stick together; when large numbers of them unite in that way, it is said that the butter has, "come," and the particles may be washed and removed. All that is required in the churning of cream is that the serum or medium shall be properly treated: (1) by the addition of water if required, as already described, (2) by the development of acid, (3) by the temperature being kept at from 57° to 59° in the summer time or from 62° to 66° in winter. It is imperative that a thermometer should be used to reveal the temperature.

GRANULAR BUTTER.

When the butter particles are half as large as clover seed, 10 per cent. of cold water may be added to the contents of the churn. After they are gathered to be half as large as wheat grains, the churning may be stopped. The buttermilk may be removed and replaced by pure water at a temperature of from 50° to 55° Fahr. It may thus be washed in the granular state. When the water runs off free from a milky appearance, the granular butter should be left in the churn for half an hour to drain.

SALTING.

It may then be salted in the churn or removed to the butter worker for that purpose. Pure salt of fine velvety grain only should be used. The rate of salting should be regulated to suit the taste and requirements of the customers. From three-quarters of an ounce to one ounce per pound will be found acceptable to most of those who purchase Canadian butter. The preparation for the market should be made with a view to giving the butter an attractive appearance, whether it be packed in tubs or firkins, or finished in prints or rolls.

At the risk of repeating a little of what has been already presented, I have gathered into paragraphs some further hints and advice, which may be helpful in attaining the end that is being sought, viz: the improvement of butter and the butter trade.

PREPARATION OF MILK FOR CREAMERIES.

1. See that the cows have an abundant supply of good wholesome feed. Supplement the grass with bran or grain. Corn and pease make firm butter. If grass be dry or scarce furnish green fodder. The quality of the feed determines to some extent the quality of the fat globules in the milk. Fine butter is mostly composed of these. Green fodder is fed with better effect on the quality of the butter, after being wilted for a day or two.

2. See that the cows have a liberal supply of pure cold water. As well might a cook expect to make good palatable porridge out of musty oatmeal and stagnant water as to get pure, sweet-flavored, wholesome milk out of musty feed and foul drink consumed by a cow.

3. See that the cows have access to salt every day. They know best when to help themselves.

4. Let the cows be saved from annoyance and worry. Any harsh treatment that excites a cow lessens the quantity and injures the quality of her yield.

5. Where practicable let the cows be milked regularly as to time and by the same person.

6. The udders should be well brushed and then rubbed with a coarse towel before milking.

7. All milk should be carefully strained immediately after the milking is completed.

8. Thorough airing of the milk for a few minutes by dipping, pouring or stirring will improve the flavor of the butter.

9. When set for the rising of the cream, milk should be at a temperature above 90° Fahr.

10. When deep-setting pails are used, the water in the tank should be kept below or as near 45° Fahr. as possible.

11. The tank should be shaded from the sun.

12. When a flowing spring is not available, the cooling power of the fresh water may be used more economically, if it be carried to the bottom of the tank and the warmed water be caused to run off from the top. If water be scarce, the overflow may be carried into a watering-trough for the stock of the farm.

15. Milk cans should be washed in cold or tepid water first, and then rinsed in boiling water before they are exposed to be aired. The addition of a little soda and borax to the hot water will increase its cleansing properties.

QUALITIES OF CREAM.

14. Since managers of creameries have adopted the plan of paying for cream according to its butter-making qualities, some dissatisfaction has been caused among the patrons by the differences which comparisons have made evident. In most cases, the trouble arises from an erroneous idea that the richest cream is the best for butter-making and the most profitable to the patron. It is not the patron who supplies the cream which yields the greatest number of ounces of butter per inch, who always obtains the largest returns from the milk which has been set. Milk which has been set in deep pails at a high temperature and has not been cooled below 60° Fahr., will yield a cream very rich in butter-making quality; but there will be a smaller quantity of cream obtained from the milk and a less quantity of butter, than where the milk is cooled as low as 45° Fahr. The longer the time cream stands on milk after practically all of it has come to the top, the less space it will occupy. As it shrinks in bulk it becomes richer per inch, but the total quantity of cream from the milk will not yield any more butter than it would have made before it became compact by long standing. (A creamery inch of cream is equal to 113 cubic inches or to one inch in depth of a cylindrical vessel, 12 inches in diameter.) When the milk is skimmed every 12 hours, the cream will not yield as many ounces of butter per inch as when it has been set for 24 hours or longer, but the extra quantity of cream that may be obtained by 12 hours setting in ice water will permit as much of butter to be made from the milk as by setting it for a longer period.

15. Skimming should not be delayed longer than 24 hours after the milk is set. Cream should be removed from the milk before it is sour. Its value to a creamery for butter-making depends not alone upon its richness in butter-fat; purity, sweetness and fine flavor are qualities it should possess.

THE OIL-TEST CHURN.

16. The oil-test churn is used to determine the quantity of churnable fat in each supply of every patron's cream. The requirements for its successful use are:—

(*a*). Careful sampling of the cream, which should be poured at least twice from one vessel to another before the sample is taken for the test tubes;

(*b*). Accurate measuring;

(*c*). Souring of the cream ;—(to ensure a uniform degree of acidity in all the samples of cream, they should be warmed to 70° Fahr. and kept at that temperature for 24 hours before they are churned) ;

(*d*). Heating of the samples to a temperature of 135 degrees Fahr. after they have been churned;

(*e*). Subsequent cooling to 65° or 70° Fahr. ;

(*f*). Churning, reheating and cooling.

17. In a case where the butter-oil on any sample does not separate to show a clear line of demarcation between itself and the other constituents of the cream, the cooling to 70°, the churning and reheating should be repeated.

BUTTER-MAKING IN DAIRIES AND CREAMERIES.

18. When the shallow open pans are used for setting, the surrounding air should be pure ; a damp, musty cellar is no fit place for milk.

19. The cream far each churning should all be gathered into one vessel and kept cool and sweet. A good practice for fall and winter is to mix 25 per cent. of pure water with the cream before it has become sour.

20. The whole of it should be well stirred every time fresh cream is added and half-a-dozen times a day besides.

21. Two days before the churning is to be done, about one quart of cream for every four pailfuls to be churned—(or a quantity equal to two per cent.)—should be set apart and kept as warm as 70° Fahr.

22. One day before the churning, that small quantity of cream, called a fermentation starter, which will then be sour, should be added to the quantity which is intended for churning and be mixed therewith.

23. It should afterwards be kept at a temperature of 60° Fahr.

24. During summer the best churning temperature is 57° or 58°; during the late fall and winter 62° to 64° are found to be preferable.

25. The agitation of churning should be kept up till the butter comes into particles larger than clover seed.

26. The buttermilk should then be drawn off and pure water at 55° added in its place.

27. By churning this for a minute or two the butter will be washed free from milk while it is still in a granular state.

28. The milky water may then be drawn off and replaced by a weak brine at the same temperature.

29. After a minute's churning, the butter may be left to drain in the churn for half an hour before it is removed to be pressed and salted.

30. Pure salt of medium fineness and with a body velvety to the touch should be used.

31. Three-quarters of an ounce to the pound will be the right quantity for most markets for immediate consumption, and one ounce to the pound for packed butter.

32. The butter should be kept cool during the working and also during the few hours while it may be left for the salt to dissolve.

33. As soon as the salt is dissolved, the butter may be worked the second time to correct any streakiness which the first mixing of salt may have caused.

34. It should then be put up neatly and tastefully with as little crimping and beautifying as feminine fondness for these will permit.

STORE-BUTTER.

I venture to add a few hints to the merchants who take butter in trade at stores in towns and villages. I wish to be understood, not as writing anything that will encourage the practice of packing store-butter, but as trying to contribute a little to

the lessening of the losses which will continue to result from that method of handling it.

ROLL-BUTTER.

1. Butter is susceptible to odors or flavors in the surrounding air; it should be kept in a place where the air is pure.

2. If it is to be forwarded to the consumers' market in rolls, it should be handled as little as possible; every handling adds "mussiness" to the appearance and consequently depreciates its value.

3. Each roll should be wrapped in a clean butter-cloth, which has been soaked in a strong brine made up from 16 parts of salt and 1 part each of white-sugar, saltpetre and borax, dissolved in water.

PACKING BUTTER.

4. Butter which is being collected for packing may be kept in fair condition in a clean box; a better plan is to have it immersed in pure, strong brine.

5. In assorting it, more regard should be paid to similarity of body and flavor than to likeness in the shade of color.

6. The mixing table, or butter-worker needs to be kept particularly clean; after it has been thoroughly washed with borax water, it should be scalded and then cooled with cold water.

7. The butter should be worked at a temperature which will prevent it from becoming greasy. The temperature at which it is worked or mixed has more effect on the grain and body of the butter than the movements to which it is subjected can have. The cool atmosphere of early morning and a supply of cold water in which to float the butter will meet the needs of the case.

8. Only such packages as have a clean, neat appearance should be used.

9. The top of the butter should be covered with a clean butter-cloth, prepared in the same way as that for the wrapping of roll-butter.

10. A covering plaster made of wet salt should be put over the cloth, to a thickness of half an inch or more.

11. Butter in tubs and kegs should be brined frequently; the salt-covering should not be allowed to become quite dry; a brine similar to that which has been mentioned for use on butter-cloths, may be used freely with good results.

No. 4—FODDER CORN AND THE SILO.

In olden times when it was counted a more noble achievement to destroy human lives than to make provision for their sustenance and comfort by providing an abundance of wholesome food and convenient clothing, the leaders were accustomed to stimulate the people to prepare for success in their barbarous and deplorable line of endeavour, by urging the prudence of the common maxim,—"In times of peace prepare for war." Farmers in Canada to-day need to be stirred up by some means, to prepare and equip themselves for winning success in their nobler line of effort, during the years of keen conflict and productive competition that are now coming upon them. A mistaken judgment on the cause of hard times has led some men of narrow vision to attribute their occurrence and recurrence to over-production. The over-production of certain articles of general use may, for a time, cause stagnation in the manufacturing industry concerned in furnishing them. In the nature of things, that stagnation must react to some degree upon all other industries and the general community; but an over-production of good food is a blessing by which the world has

not yet been grievously afflicted. To provide food of excellent quality in abundance, at such a low cost for labor expended in its production, that it will be within the easy reach of the poor as well as the rich, must be the object and work of farmers in coming years.

The people's food may be classed as of two sorts,—food from plant or animal sources. The latter must necessarily come originally from the former. Hence, whatever system of farming, or kind of cropping, or sort of animal husbandry, will enable the farmer to provide the largest quantity of suitable food for the community, with the least expenditure of labor, will be for the general benefit of the whole people. However, the work must be followed and performed with good judgment and skill. Because the growth of *Fodder Corn* and the use of the *Silo* will help the farmers to do better for themselves and the whole community, of which in our country they form the most important part numerically and otherwise, I desire to urge again upon their attention the growth of corn and the construction of silos. No subject closely related to agriculture is receiving so much attention from the agricultural press as that of ensilage; and the growth of fodder corn and its serviceability in the form of ensilage are being discussed by the farmers with a zest and thoughtful interest that do not arise from the novelty of the name or curiosity about the process whereby it is made.

THE CORN CROP.

In our Dominion, the corn crop is recognised as by far the most suitable one that can be grown for the making of ensilage. A few of the possibilities of service from its growth may be enumerated:—

1. The hay and straw crops have been factors so important for the economical wintering of cattle, and if they happened to be light and short, a scarcity of cheap feed has been experienced. A part of a corn crop may be planted so late that the farmer can accommodate the acreage to the prospects of a large or light hay crop, an estimate of which may be made with reasonable accuracy by the middle of June in most years.

2. Two alternatives present themselves to the farmer who depends entirely upon pasture for his cattle during the summer months. He must either stock his fields lighter than their capacity can well support during June and early July, or let the cattle suffer from insufficient herbage from which to bite during the hot and dry weather of mid-summer. The system of partial soiling enables the farmer to stock his pasture fields during June to the utmost limit of their supporting power. Green fodder may be grown to carry them over a period of scant feed from pasture fields. While rye, clover, pease and vetches, and pease and oats are admirably adapted for such uses, they give but a small yield per acre compared with what may be obtained from a corn crop.

3. A cheap winter fodder for cattle is indispensable to the dairyman and cattle feeder who farms for profit in these times of comparatively low prices and keen competition. Cattle can be fed upon fodder corn from a silo at a cost at least one-half less per head per day, than when hay is the main ration. That statement will apply to almost every part of the Dominion, In seasons which yield but a light hay or short straw crop, corn grows most luxuriantly. Hence, it has a special complementary-crop value where large numbers of cattle are to be fed during the winter and summer.

4. From the large quantity that may be obtained from a small area of land, the corn crop will enable the small farmer to engage successfully in animal husbandry. On 50 acres of good arable land a farmer, by a rotation of crops and the growth of 10 acres of fodder corn, may profitably feed 25 head of thrifty cattle the year round, besides the ordinary complement of young stock. The number may be gradually increased as he is enabled from their droppings to enrich the soil, for the growth of heavier crops and larger areas of fodder corn.

5. The summer cultivation of the soil during the growth of the crop has a very beneficial action upon its fertility. The long roots of the plant loosen the soil, and

by their action and decay liberate some of the constituents required for the growth of succeeding crops. They also provide for the freeing of the land from obnoxious weeds and the preventing of them from obtaining a new roothold.

INDIAN CORN.

This plant, which is now cultivated in every part of the globe, is believed to have come originally from South America. Its first introduction into Europe is supposed to have been from this continent by the ships and hands of the adventurous Norseman a long time before the voyages of Columbus. From Mediterranean ports it was scattered through Europe; and as everything foreign to home civilization in these days was called "Turkish," the name "Turkish Corn" clings to it still in many of the countries there. Reference is made in the early annals of the settlement of this continent to cultivated corn fields about the mouth of the Kennebec River, in Maine, in 1605.

In 1535 Cartier found waving corn fields at Hochelaga under the care of the Indians, near the site of what is now Montreal. It is an agricultural product which has been of great service and value to the farmers on this continent; and its enormous yields per acre, without apparent serious exhaustion of the fertility of the soil, have made it a means whereby the districts and countries where it has been grown successfully and extensively have become enriched rapidly. Contrary to the belief of many farmers in Canada, it can be grown to advantage for fodder purposes in every Province of the Dominion. In those counties in Ontario where it has been valued for its grain-producing qualities, the average yield per acre in 1888 was 78·2 bushels in the ear, against a yield of 26·3 bushels of shelled corn, as officially stated for the corn-growing States. With this crop, as with the more commonly grown cereals, the several varieties obtain their maximum of service and value in the most northernly limits within which they can be grown to maturity. However, its main service to the farmers of Canada will arise from its value as a fodder rather than as a grain crop.

The numerous varieties of it are due to climatic conditions, selection, cross-fertilisation, cultivation and soil. Attention to the controllable treatment will doubtless enable those in charge of the Experimental Farms of the Dominion to discover and develop some varieties more suitable and serviceable to us than any that are yet well known. The height attained by the plants of different varieties range from 2 to 16 feet. The one leaf carried on each joint varies in size, and the nodes or joints on the stalks vary in number. Ears may be produced at any joint. Sometimes 2 or 3 are carried on one node, and occasionally as many as 10 ears are formed on one stalk. In the climate of our Dominion, varieties that carry more than 2 or 3 ears per stalk have not been ripened successfully. The number of rows of kernels on each cob may be evenly divided by 2. They range from 8 up to 36 rows. The kernels of the several varieties differ very much from each other in shape, size, quality or color. Seventy-one varieties were grown on the plots of the Central Experimental Farm, Ottawa, last season.

GROWING THE CROP.

In Canada *the corn crop* is unquestionably the most suitable for ensilage uses. The manner in which the crop is grown determines to a great extent the possibility of its being cured with success and certainty. It should be grown to a stage near maturity. Then the several plants will have attained the largest amount of nourishing substance for the feeding of cattle, and will be capable also of long preservation without waste or loss. The feeding value per acre is greatest when the crop is almost matured when cut. The conditions essential to enable the plants to reach that stage of growth in our Dominion are:—(1) Early Planting; (2) Suitable Varieties; (3) Thin Seeding; and (4) Frequent Cultivation.

1. *Early Planting.*—Although a loose warm soil is known to be best adapted for its growth, large crops can be obtained from clay lands as well as from sandy

soils. The land should be drained either naturally or by artificial under-drainage. It should be worked into a fine seed-bed. To attain that, I recommend for most soils, deep fall ploughing and thorough surface cultivation in the spring. If the land is foul with weeds, a surface cultivation at two intervals of 10 days each will give the weeds a chance to start, when they may be again destroyed by the cultivation preparatory to the planting of the corn. In that way the young corn plants may obtain a good start on fairly clean soil. The labour of keeping the field clean during the summer will be very much lessened by such a treatment in the spring. The planting in the several districts should be late enough to miss the late spring frosts and early enough to obtain the full value of the growing season. Early planting should be shallow, that the sun may warm the seed-bed and so prevent the seed from rotting in the ground; later planting may, with advantage, be deeper to insure sufficiency of moisture for germination. A liberal quantity of barnyard manure worked into the soil will be applied profitably. Corn from a manured part of a field will be on an average from 2½ to 3 feet longer in the stalk, will tassel out from a week to 10 days earlier, and will carry a much larger proportion of ears to the stalks than on a part of the same field of similar soil where no manure has been applied.

2. *Suitable Varieties.*—Our information on this matter is yet very scant. It may be safely recommended that at least one-half of the acreage to be planted be seeded to some variety that will mature in the locality. The other half may be seeded with some of the larger growing varieties of ensilage corn, such as "Mammoth Southern Sweet," "Giant Prolific," "Sweet Ensilage," "Red Cob Ensilage," "Mammoth Sweet Ensilage," etc., etc. From examinations made and analyses conducted at the Ontario Agricultural College last year under my direction, it was learned that over 42 per cent. of the total dry matter and over 56 per cent. of the total crude protein were contained in the leaves of the plants, which had not then reached a stage beyond what is called "early milk." This would indicate that such varieties as are leafy in their growth will be rich in feeding constituents.

3. *Thin Seeding.*—It has been practically decided by the judgment of those who have had the longest and most successful experience that corn for ensilage should be grown in hills or rows. These should be from 3 to 3½ feet apart. In rows the seeding should not be thicker than 3 grains to the foot. When large white ensilage corn is grown, the seeds should be from 6 to 8 inches apart in the rows; three seeds to the hill is enough. A common force-feed seed drill may be used for the planting in rows, all the spouts except two being stopped up. One idle spout may be dragged in the soil to mark for the driver's guidance, in order that all the rows may be an equal distance apart.

4. *Frequent Cultivation.*—Level cultivation is preferable to "hilling up" or "moulding up." If the surface of the soil should become crusted, as soon as the corn appears 2 inches above the ground it should be harrowed over with light harrows. That treatment will keep down any growth of grass and destroy tender weeds. The harrowing may with advantage be repeated once or twice before the corn is more than 8 inches high. Frequent and shallow cultivation between the rows or hills afterwards will keep down weeds and promote growth. The cultivation should be continued as long as practicable, even until the stalks are higher than the man and the horses. When the lower leaves begin to turn yellow and the ears of the corn are in the milky stage, the crop should be cut.

THE SILO.

The prejudice against the construction and use of silos is fast disappearing from the minds of observant farmers. The partial failures of some of the first efforts to introduce into this country the ensilage system of preserving fodders, originated a timidity and opposition which are now uncalled for. The causes of those failures are understood, and can be so guarded against, remedied or removed that satisfactory results may be obtained with certainty. In the handling of perishable commodities the damage and loss that may be sustained, will be proportionate to the absence of

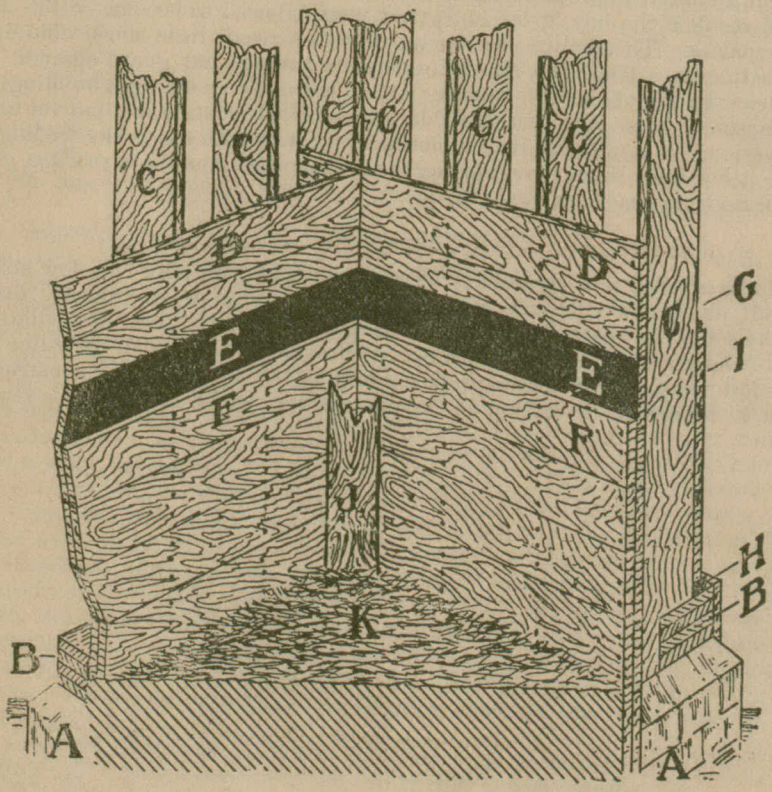
applied knowledge and skill. All rational and successful human effort is the result of some person's accurate observation and clear thinking. A clear knowledge of "how to do it" and the "doing of it" just that way will enable farmers, as well as other men, to cope successfully with the things most difficult to do well. The curing of a crop of fodder corn in the silo is now an easy and invariably satisfactory work to the farmer who follows right directions with reasonable prudence. It used to be stated that there was a loss in the feeding value of fodders when put into or taken from the silo. When the ensilage was partially decayed, of course that was the case; but a similar depreciation of quality and consequent loss in the feeding value would result if the hay, grain and straw were allowed to become rotten in the mows or granaries. The spoiling was and always is a result from unsuitable conditions or treatments. These the silo is intended to remove and guard against. Let me make clear the use of the new names. *A silo* is simply an air-tight building, box, tank, compartment or pit, into which fodders in a succulent state are put for curing and preservation. *Silage*, or, as it is sometimes written, *ensilage*, is the feeding substance after it has been so cured and preserved. Hence, we have corn *ensilage*, clover *ensilage*, oats and peas *ensilage*, etc., etc.

BUILDING A SILO.

If a silo be erected as a separate structure, its foundation may be a low stone or concrete wall, or durable sills treated with tar, or charred to prevent decay from contact with the soil. An earth floor will be cheapest and best. The immediate surroundings of the silo should be well drained, to prevent the entrance of water to its floor. The following cuts have been prepared to illustrate the method of construction.

Figure I. represents a section of an outside silo to be erected as a separate building.

FIG. I.



A. *Foundation wall;* B, *Sills;* C, *Studs,* (2 inch x 10 inch or 2 inch x 12 inch, not more than 2 feet apart); D, *Lining of inch lumber dressed on one side;* E, *Sheeting of tar-paper;* F, *Lining of inch lumber dressed on one side;* G, *Tar-paper;* I, *Outside siding;* H, *Strip nailed behind heel of studs;* J, 1 *inch board* 10 *inches wide, across the inside corner of the silo and filled behind with sawdust;* K, *Cut straw on the floor of the silo.*

Figure II. represents a section of an inside silo to be constructed inside a "bank barn."

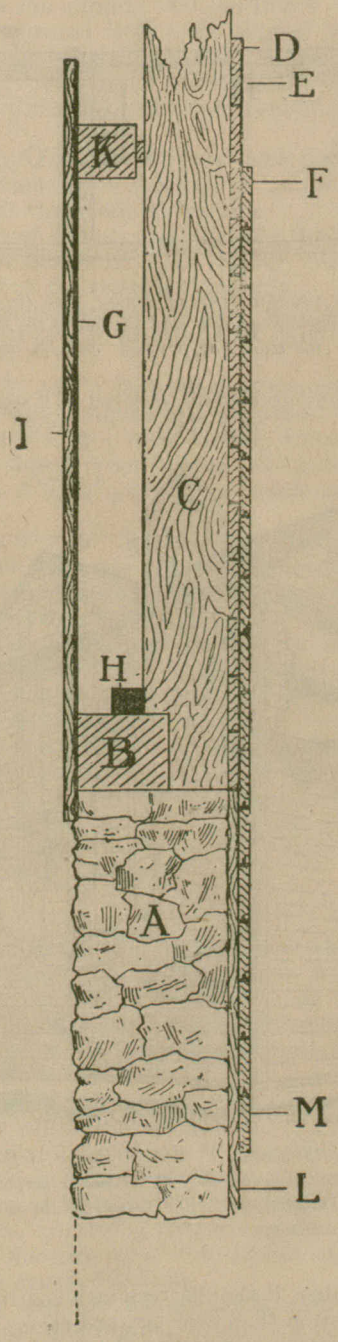
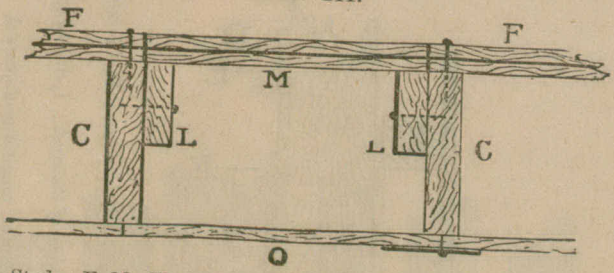


FIG. II.

A. *Stone wall of barn*; B, *Sill*; C, *stud of silo*; D, *Lining of inch lumber dressed on one side*; E, *Sheeting of tar-paper*; F, *Lining of inch lumber dressed on one side*; G, *Tar-paper on the inside of the siding of the barn*; H, *Strip behind the heel of the studs*; I, *Siding of the barn*; K, *Girt*; L, *Strips* 1 *inch thick by* 4 *inches wide, put up and down on the stone wall*; M, *Inch lumber, tongued and grooved.*

Fig. III. represents a simple method of constructing a door in silo.

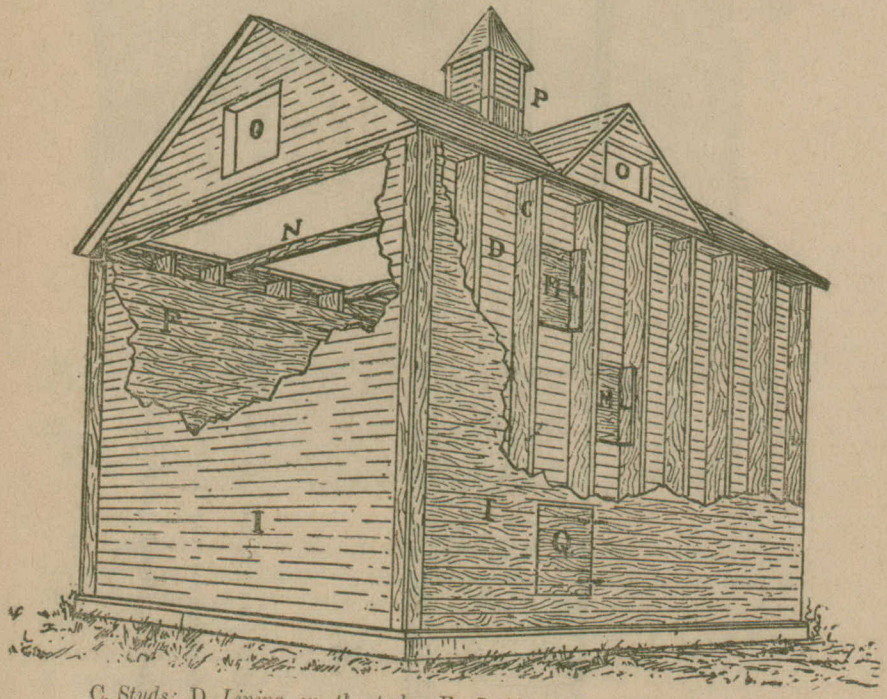
FIG. III.



C, C, *Studs;* F, M, *The two thicknesses of lumber with tar-paper between, on the inside of the silo, to be sawn through flush with the side of the studs;* L, L, *Cleats to be nailed on to the side of the studs;* Q, *Outside door in sections of* 3 *or* 4 *feet and on hinges.*

Fig. IV. represents an outside silo, erected as a separate building.

FIG. IV.



C, *Studs;* D, *Lining on the studs;* F, *Inside lining of the silo;* I, *Outside siding;* M, *Boards of the door to be taken off as the silo is emptied;* N, *Cross ties, to strengthen the building;* O, *Openings for the filling of the silo;* P, *Ventilator;* Q, *One of the outside doors on hinges.*

To preserve the inside lumber, it should receive a coating of crude petroleum, which is much easier of application than coal tar, and seems to leave the ensilage in immediate contact with it in a good condition. I take the following from my last annual report as Professor of Dairy Husbandry at the Ontario Agricultural College, to show the effects on the ensilage from different styles of finishing the inside of a silo;—

"The finish on the inside of the studs was different on each of the four sides of the silo.

"*On one side of the silo* a lining of inch lumber dressed on one side, was nailed on the studs; this was covered with a sheeting of tar-paper; on the tar-paper was put a lining of inch lumber dressed on one side, tongued and grooved.

"*On another side of the silo* the construction on the inside of the studs was similar, with only the difference that the inside lining of lumber was not tongued and grooved.

"*On the third side of the silo* the studs were lined on the inside with tar-paper; on that was nailed horizontally a sheeting of inch lumber, tongued and grooved and dressed on the side next the inside of the silo.

"*On the fourth side of the silo* the finish on the inside of the studs was made by the use of only one thickness of inch lumber, neither dressed nor tongued and grooved; it was nailed on the studs horizontally.

"The following concise statement may help to make the differences of inside finish, clear to the minds of the readers who have had no experience in silo building:—

First side; studs 2"×10"; inch lumber dressed on one side; tar-paper; inch lumber dressed on one side, tongued and grooved.

Second side; studs 2"×10"; inch lumber dressed on one side; tar-paper; inch lumber dressed on one side, but *not* tongued and grooved.

Third side; studs 2"×10"; tar-paper; inch lumber dressed on one side and tongued and grooved.

Fourth side; studs 2"×10"; inch lumber as it came from the saw."

"The lumber on all sides was put on horizontally. The purpose of the DIFFERENCES in the construction of the sides was to discover the cheapest way of building one that would preserve the silage.

"I may here anticipate by reporting that up to the time of writing, with the exception of a short distance from the top of the silage, there was practically no waste or spoiling against the *first*, *second* and *third* sides. Against the *fourth* side the silage was decayed or moulded for a space of from 4 to 6 inches in from the side, for the first 6 feet from the top of the ensilage; below that the waste was confined to a space of about 4 inches around the seam between each two boards."

From within 4 feet of the bottom of the silo there was no waste, even close to the seams. If air finds admission through a knot-hole, or crack, or down the sides, from neglect of tramping, or otherwise, after the ensilage is settled, it will carry spores with it and so cause mould and decay.

FILLING A SILO.

Three conditions or treatments seem to be essential to the obtaining of the best quality of ensilage without appreciable waste from fermentation, moulding or decay:—

1. The plants should be grown to a stage almost mature;
2. They should be wilted in the sunlight until the water which they contain is less than 75 per cent. of the total weight;
3. The ensilage around the sides and in the corners of the silo should be tramped and packed thoroughly while it is being filled.

For the economical filling of a silo, the tools, implements and conveniences should, as far as possible, be adapted to the cheap and easy performance of the work. For the cutting of the corn I prefer and recommend a common corn knife or old-fashioned reaping sickle. A strong reaper may do the work by horse power; but if the crop be heavy and the corn from 10 to 12 feet high, the rakes will not clean the table and stalks will be dragged behind.

A truck or waggon with low wheels and a large platform may be used. A low platform may be put upon the running gear of a common waggon, by hanging the front of it to the under side of the front axle and attaching the back part of it to the under side of the back axle. A cheap and convenient platform for such work may

be made by placing the ends of two poles 14 or 16 feet long on the front bolster of a common waggon and attaching the other ends of them to the under side of the hind axle by the use of a piece of stout rope. If boards be nailed across on these poles, between the front and hind wheels, the platform thus made may be easily loaded and can carry from one to two tons of stalks, if a stake be put in at each corner of it. After the corn is cut, it should be left to wilt for one or two days in small bunches on the ground. In may be filled into a silo without cutting; but more labour would be involved and the work of feeding would be rendered more difficult. Any strong corn or straw-cutter, with capacity for a large quantity per day, will serve the purpose. Carriers should be attached, unless the cutter stands on a level with the top of the silo, which ordinarily is neither practicable nor desirable. Horse power or an engine may be used. From 6 inches to a foot of cut or uncut straw should be spread over the bottom of the silo before the filling is commenced. At the silo, the corn can be fed into the cutter, directly from the waggon platform. The horses may meanwhile be changed from the loaded to an empty waggon. At the cutting box, two men will be required. A 2-inch cut is as good as a shorter one. During the filling, care should be taken to level the heavier parts of the stalk out against the sides of the silo occasionally. The filling may proceed every day, every second day, or every third day, as may be convenient. In any case, the contents should be tramped around the sides and in the corners before the addition of a new layer. Though the corn stalks may be wet from rain, they may be put into the silo without any damage from that cause.

COVERING THE ENSILAGE.

When it is full, after the lapse of two days, the sides and corners should be thoroughly tramped again, after which the whole surface should be covered with a layer of from 2 to 3 feet deep of any kind of straw, cut or uncut. It should be packed closely around the sides and into the corners; and for that reason cut straw is rather preferable. The ensilage may be left to cure and to keep until wanted, be that time four weeks or ten months. When the ensilage is uncovered for feeding, unless the silo be frost-proof over-head, it becomes chilled, and is then not in the best condition for being fed to cattle. That may be guarded against by the putting of movable poles at the top of the silo and the placing of a layer of straw upon them.

SIZE AND COST OF SILOS

A silo 18 by 20 by 18 feet deep, inside measurement, will hold about 100 tons of settled corn ensilage. That allows for the ensilage to settle to a depth of 14 feet. Every hundred acre farm should have one of at least that capacity. The probable cost may be easily calculated. If built inside of a barn the total cost, (lumber at $10 a thousand and tar paper at from 2½ to 3 cents per square yard put on), need not exceed $70 for a silo of 100 tons capacity. If erected outside the cost will vary according to the finish of the building, the quality of lumber used, the price of materials, etc., etc. Twelve tons of ensilage per acre may be reckoned upon with certainty in nearly every district of the Dominion. Every two tons of ensilage from corn which has been well matured, have a feeding value equal to one ton of ordinary hay for the production of milk or the maintenance of cattle, horses an sheep; and 100 tons of ensilage can be grown and cured at a total cost for rent, seed, labor, etc., not exceeding $1.75 per ton in almost any part of the Dominion.

No. 5—NOTES FOR CHEESE-MAKERS FOR JULY.

July cheese, like July butter, has a reputation for being the poorest of the summer. This year it should be exceptionally fine. The abundance of grass in June, with a too plentiful rainfall, will leave the pasture with richer herbage than usual.

Suitable conditions for the production, preparation and preservation of the milk in a fit state for the manufacture of fine cheese can be continued by the patrons giving effect to these simple requirements :—

1. Cows need the owner's providential care in the following matter, viz. :—

(*a*) An abundant allowance of succulent or other feed ;
(*b*) Opportunity to drink pure water at least twice a day ;
(*c*) Access to salt every day ;
(*d*) Shade in the pasture fields from the weakening influence of July suns ;
(*e*) Regularity in milking ;
(*f*) Management and handling with continuous kindness, and an eye to profits.

2. Cows should be prevented from drinking impure water and should be protected against the attentions of all dogs.

3. (*a*) Milk should be strained immediately after it is drawn from the cow ;
(*b*) It should be aired by the use of an aërator or by dipping, pouring or stirring ;
(*c*) It should be cooled to the temperature of the atmosphere ;
(*d*) It should be protected from contamination by the foulness of impure air.

It will be of quick and durable advantage to direct the attention of all patrons to these matters by sending to each a concise, clear and courteous reminder of duty in connection therewith.

When the yield of milk by the cows begins to shrink, the temptation to make up the quantity in some other way is increased. The Act passed by the Dominion Parliament to provide against frauds in the supplying of milk to cheese, butter and condensed milk manufactories is a piece of wholesome legislation.

It forbids the sending to any such factory (1) milk diluted with water, or (2) milk in any way adulterated, or (3) milk from which any cream has been taken, or (4) milk commonly known as skimmed milk from which any portion of that part of the milk known as strippings has been kept back, or (6) any milk that is tainted or partly sour. The penalty for each offence against the provisions of the Act, upon conviction thereof before any justice or justices of the peace, is a fine not exceeding fifty dollars and not less than five dollars, together with the costs of prosecution.

The fine when recovered shall be payable, one-half to the informant or complainant, and the other half to the representative of the factory to which the milk was sent, to be distributed among the patrons in proportion to their respective interests in the product thereof.

Let every cheese-maker get a copy of this Bulletin published in the local newspaper, and further, let him see that every patron is furnished with a copy of that issue.

Some of the qualities that are expected and desirable in the cheese of July are :—

1. Rich, clean, creamy flavour ;
2. Solid, firm, buttery body ;
3. Fine, silky, flaky texture ;
4. Bright, uniform colour ;
5. Attractive, neat, symmetrical, stylish appearance.

In order that cheese having just these qualities may be manufactured regularly, I make the following notes for guidance :—

1. Thorough distribution of the rennet in the milk must be effected by diluting the rennet extract and by vigorous stirring.

2. Sufficient rennet to coagulate the curd into a state fit for cutting in from 35 to 40 minutes at from 86° to 90° should be used. When an extra quantity of rennet is used, a corresponding increase in the weight of salt should be added to the curd.

3. The contents of the vat should be perfectly still when coagulation commences. Vibration of the floor and of the vat during the thickening of the milk causes waste.

4. The horizontal knife should be used first in cutting; and active stirring should not commence until the cubes of curd become slightly heated.

5. The temperature should be raised gradually to 96° or 98° Fahr.

6. The stirring should be continued until the curd particles are so well "cooked" or "dried" that when a handful has been pressed for a few moments they will fall apart again as the result of any slight disturbance.

7. As soon as the presence of acid is discernible by the hot iron test, the whey should be removed. In the case of gassy curds, a further development of acid before the drawing of the whey will be beneficial.

8. Hand stirring will be of advantage *until the curd is firm.*

9. The temperature should be maintained at or above 94°.

10. The curd should be allowed to mat into one mass.

11. It should be turned so frequently that the whey will not collect or stand in small pools in or on it.

12. If it becomes gassy it should be aired (if need be by grinding and stirring) and afterwards kept at a temperature above 94°.

13. The gas formed in gassy curds hinders the development of acid; and the presence of acid prevents the formation of gas. The treatment should provide for the removal of gas by aëration and the maintenance of temperature by the application of hot water to the curd, or steam to the vat or sink in which it is.

14. Close matting and packing of the curd are beneficial only after the curd is sufficiently dry and when aëration is provided for.

15. When the texture of the curd becomes stringy in its nature, it should be put through the cutter or grinder.

16. Aëration should be effected by the stirring of the curd before the addition of salt. Usually 15 minutes of such treatment will suffice.

17. Salt should be added at the rate of from 2½ to 2¾ lb. per 1,000 lb. of milk, according to the dry or wet condition of the curd. A judicious variation in the quantity of salt should be made in proportion to the moist or dry state.

18. The "hooping" of the curd should begin when the harsh surface, produced on each piece of curd by the salt, commences to give place to a slippy, mellow quality.

19. Shoulders or projecting edges on cheese are unsightly evidences of careless workmanship, and lessen their value from 2 to 3 shillings per cwt. in the English markets. Careful pressing and bandaging and the turning of cheese in the hoops in the morning will prevent their formation. The pressure should be continued for at least 20 hours. In that way cheese can be finished having an attractive, neat, symmetrical, and stylish appearance.

20. The sprinkling of cold water in the curing rooms in the morning and just after noon will reduce the temperature.

The curing room should be thoroughly ventilated and should be kept clean.

No. 6—NOTES FOR CHEESE-MAKERS FOR AUGUST.

A cheese factory's reputation is largely determined by the quality of its August September and October output. The beginning of August is a fit time for every cheese-maker, who has had only partial success during the hot weather, to redeem his reputation and that of his factory. A comparison of the prices realized for the summer cheese of Ontario with the figures reported from the United States market, shows that Canadian cheese are in demand at higher rates than United States cheese will sell for. That we have gained in reputation and in market favour with British importers and consumers, is evident. That this advance and advantage are the result of the applied skill of less than half of our cheese-makers, is well known to those who visit the factories and handle their products. To reach and to speedily help those

who work in cheese factories without any ambition or aspiration for improvement is well-nigh impracticable.

However, we desire to make helpful information not only attainable but unavoidable to such.

In a short time there will be numerous cable orders from England, calling for "cool August cheese." That brief description implies a mild, rich flavour that may be preserved for the winter trade, a firm, solid body "full of meatiness," a fine outside finish, with clean, bright rinds, free from cracks, and bandages fresh-looking and not likely to appear mouldy.

To help the cheese-makers in manufacturing a class of goods that may be satisfactorily shipped on such orders, I call attention to some things, both outside and inside of the factories which need their immediate and special personal care.

Around the Premises.—Insufficient or inefficient drainage facilities, unless enlarged or remedied, will show their worst effects during this month. At the cost of only a few hours of labour and a few dollars of expense, the immediate vicinity of every factory can be kept free from the noxious odours that arise from stagnant slop pools. The frequency and foulness of these about the factories in some sections, is not only a menace to the permanent prosperity of our cheese manufacturing industry, but a disgrace to the men in charge of the factories.

At factories from which whey is drawn back to the patrons' farms in waggons, the leaking and spilling near the whey tank, too often leave its vicinity in an almost impassable condition. A few loads of gravel will abate the nuisance, and leave the place fit for approach during the succeeding months when the roads become bad.

The shrinkage in the milk supply will leave a shortage in the whey tank. In order that the whey may have more feeding value, the tank should be thoroughly cleaned and washed at least once a week.

At factories were hogs are fed, provision should be made for supplying them with one feed a day of some green fodder, such as clover, oats and vetches, oats and pease, or cornstalks. Salt should be fed liberally during this month.

In the Making-room.—This month seems the one when flies become most numerous and troublesome. Some afternoon after the cheese are in the hoops, it will be a good plan to close the making-room windows and doors, and to burn a small quantity of sulphur for the purpose of fumigating the place. If a tablespoonful of alcohol be mixed with the sulphur, it will burn more freely. Care must be taken to prevent the fumes from getting into the curing room. The tins of the milk vats and the insides of the sinks should also be washed afterwards before they are used. All vats, presses and utensils should get a thorough quarterly-cleaning-up early this month. The use of a solution of borax on the hoops will help to prevent mouldiness on the sides of the cheese.

Every cheese-maker should presistently fight untidiness and filth in every form, and he ought to have a woman's passion for cleanliness and a similar antagonism to dirt.

In the Curing-room.—There will be difficulty in curing the cheese made during July at a sufficiently low temperature. Ventilation of the room during the early mornings, as well as during the evenings and nights, will be of benefit. Floors should be sprinkled with cold water morning, noon and evening. While the cheese are being turned on the shelves there should be an abundant admission of light. August is the month when the "skippers" are apt to do damage. A plentiful shaking of fly powder in the room before it is shut up for the day will destroy the cheese flies.

Cheese boxes should not be stored in the curing-room. The odour from the elm wood penetrates the cheese and affects their flavour.

Patrons.—Since the milk is richer and less in quality, there will be an increased temptation to "even up" by the addition of water, or to "even down" by the removal of cream. You will be doing the community moral service, as well as the cheese trade some good, by reminding the patrons that the Dominion Act on adulteration of milk, is in force and will be enforced against all discovered delinquents.

Patrons are more likely during this month than at any other times, to forget to provide salt for their cows, and to neglect to supply an abundance of pure cold water. Cool evenings are no excuse for the neglect of aëration. All milk should be most thoroughly aired immediately after it is strained.

The making of cheese for exhibitions is usually undertaken during the first two weeks in this month. Send a circular to every patron, making mention of those matters that are referred to in this bulletin, and inviting their co-operation, in order to aid you in the manufacture of cheese fine enough for exhibition and prize-taking. If some patrons pay no heed, and no improvement results, don't get discouraged. Keep right on insisting on a better state of things in their practice.

Making the Cheese.—When the evenings are cool and the milk needs ripening, don't fail to leave it in the vat until it reaches the proper state of maturity, before the rennet is added. Use enough rennet to coagulate mature milk to a state fit for cutting, in forty minutes when set at 88° Fahr. Dilute the rennet extract to the extent of one pailful of water for every vatful of milk, and then mix it thoroughly by vigorous, rapid stirring.

When you are troubled with gassy curds, allow a development of acid, such as will be indicated by threads from the hot iron test, a quarter of an inch long, before the removal of the whey. It is a good plan to run most of the whey off at an earlier stage, and to leave only enough whey on the curd to permit a free stirring of it. After the whey is drawn, air the curd thoroughly, and make provision for keeping it warm. When a curd sink is used, if need be to retain the heat, put the curd back into the vat, but let the temperature be kept above 94°. Frequent turning and aëration will facilitate the development of acid, providing the temperature is maintained. After the curd cutter has been used, the curd should be stirred and aired for fifteen or twenty minutes before the application of salt. From 2½ to 2¾ pounds of salt per thousand pounds of milk should be added to curds that are fairly well dried by the previous stirring. They should be put in the hoops within twenty minutes after the salt has been mixed in.

Pressure should be applied very gradually. The cheese should be bandaged neatly, when they are turned in the hoops within two hours after they are put in the presses. They should again be turned in the hoops some time in the following morning. Where practicable, cheese should be pressed for at least twenty hours.

Endeavour to get everyone who sends milk to your factory, or who is concerned in its management, to try to bring it to the very front in point of reputation for the excellent quality of its product. Work conscientiously for that end, then talk your factory up always and wherever you go, and get your patrons to do likewise. In short, think and work to make your factory and its product worthy of a higher reputation, especially for August cheese.

No. 7—NOTES FOR CHEESE-MAKERS FOR OCTOBER.

A few years ago "October cheese" of Canadian make were deservedly in bad repute in the English markets. Their soft, porous body made them liable to go off in flavour quickly; they did not possess the keeping qualities, combined with that richness of body and flavour, which are so much desired by English merchants and consumers. During the last two or three years a decided improvement in the quality has been effected; and with the finer quality has come a better reputation in the markets. By the exercise of due care on the part of the cheese-makers throughout the remainder of this season, the reputation of our "October cheese" may be so well established that hereafter they will be counted equal to "September's." Cheese can be made as *firm* and *fine* during October as at any other time of the year. Suitable conveniences for controlling the temperature of the curd, from the milk vat until the cheese is ripe, are required.

MILK.

The milk delivered at factories during October has a higher per cent. of fat and other solids than during the summer months. Its flavour will be equally rich and nice, when the cows are stabled during the cold nights and fed liberally on fodder corn or any other suitable succulent nutritious feed. Turnip tops and rape should not be fed to cows whose milk is furnished to a cheese factory. After the milk is drawn it should be strained immediately, and forthwith aired as thoroughly as during the hot weather of July. The aëration will improve its flavour and prepare it for the manufacture of a finer quality of cheese than it will be possible to obtain if that treatment is neglected. The milk should not be cooled below 60° Fah. A milk house or the farm kitchen will be a more suitable place for keeping it over night, than the open milk-stands when the temperature of the outside air goes below 50°.

CHEESE-MAKING.

The construction and equipment of the making-rooms of some factories are still defective. At the cost of a little labour and building paper, almost any room can be made so close in its walls that the inside temperature may be regulated at will by the use of a stove or steampipes. Thorough ventilation once every day should be secured. The following paragraphs will be of service in refreshing the experienced cheese-maker's memory and in instructing the others in the best practices.

1. Let the milk be ripened by the application of heat before the rennet is put into it. The ripening should be allowed to proceed to such a degree that not more than three hours will be required between the addition of the rennet and the development of acid perceptible to the taste or discernible by the hot iron test.

2. The use of sour whey to hasten the ripening should not be resorted to. Old milk which has become nearly sour to the taste may be added, but loppered or thick milk should never be used.

3. Rennet should be added in quantities to coagulate the curd into a state firm enough for cutting in from 45 to 35 minutes at temperature of 86° or 88° Fah. It should be diluted with water to the volume of at least one gallon of liquid for every vat.

4. After coagulation is perfect the curd should be cut finer than during the summer. The application of heat should be delayed for 15 minutes after stirring is commenced ; and the temperature should be raised to 98° and maintained at that point until the whey is drawn off. After the middle of the month a temperature of 100° will be preferable.

5. Care should be taken to so apply the heat and perform the stirring that the curd particles will be so dry, before the development of acid is perceptible, that after a handful has been pressed into a lump, they will separate readily.

6. The curd should be stirred before and after the removal of the whey until the whey is so well separated out of combination with its particles, that they produce a squeaky sound when bruised between the teeth or ot erwise.

7. After the whey is drawn off, the curd should be kept at a temperature above 94°. If it becomes colder than 94°, the development of acid will be hindered, and excessive moisture will be retained in it during the souring process. The presence of such extra moisture in the curd at this stage will leave the cheese with a weak, "pasty", or "tallowy" body, according to the degree of acid development permitted.

8. A cover over the vat or a curd sink with steam pipes, seems a simple and effective provision for keeping the curd warm. Where no rack is used, the putting of a few pails of hot water in the lowered end of the vat will maintain the temperature.

9. Just after the removal of the whey, the curd should be hand stirred until after the whey, that will run, has been drained off. *After the curd is dry and firm* it may be allowed to mat into one mass, *but not before that condition is reached.* All stirring should be performed so as to avoid wasteful bruising of the grain of the curd.

10. It may then be frequently turned and packed close, till the layers of curd are four or five deep. Whey should never be allowed to collect in small pools on it at this stage. The close packing in layers four or five deep, with frequent turning, prevents the outside of the matted pieces from becoming chilled or more deeply coloured by the action of the air than the rest of the curd.

11. The hot iron test is almost indispensable for determining with certainty, from day to day, the exact stage of acid development at which the whey should be drawn off. The filaments—thread-like processes—should be about one-quarter of an inch long. The proper degree of change for the cutting and salting of the curd has taken place, when it feels mellow, velvety and "slippy," and shows a texture passing from the flakey or leafy into the stringy and fibrous. If it be too moist or soft, it should be cut or ground at a rather earlier stage and hand-stirred until dry enough, before the addition of salt. The most of the hand-stirring should precede the salting.

12. Not less than 3 lb. of salt per 1,000 lb. of milk should be used, and when the curd is on the soft or moist side, 3¼ lb per 1,000 lb. of milk should be added; the 3¼ lb. rate is also preferable during the latter part of the month when cold weather prevails.

13. Immediately after the application of salt, the pieces of curd become harsh and gritty on the surface; then in from 15 to 25 minutes the harshness gives place to a mellow condition. At the second stage—and the temperature should not be under 88°—the curd should be hooped and pressure applied. Delay at this point or coldness of the curd, destroys the desirable rosy flavour, and imparts to the cheese the bitter taste of the salty white whey.

14. Particular care should be taken to use only pure warm water when turning the cheese for bandaging, before the rinds are fully formed.

15. Especially in a cold press room, pains should be taken to apply heavy pressure to the cheese before they are left for the night.

16. All cheese should be finished in symmetrical shape and kept in the hoops until the rinds are smooth and the edges free from any projecting "shoulders."

CURING THE CHEESE.

The temperature of the curing-room should be kept as nearly regular at 65° as possible. Where the September cheese are kept in the same room with those of October make, the latter should be kept on the warmer shelves. A slight chilling, after a cheese has been curing at 65° for two weeks, does little damage; but a steady temperature and constant curing give the best results. Bitter-flavoured cheese are usually the result of chilling in either the making-room, press-room or curing-room. If the cause be prevented, the consequence will be unknown.

TO FACTORY MANAGERS.

As this is the last Bulletin of NOTES FOR CHEESE-MAKERS for this season, I desire to counsel the managers of factories to guard against tendencies that appear to menace the permanent success of our cheese industry, viz:—

1. The employment of inexperienced, incompetent men to manage the inside work of the factories.

2. The conscienceless cutting down of the remuneration of the makers, until the able men are leaving the occupation.

3. The inevitably penny-wise and pound-foolish policy of using factory furnishings of poor quality, simply because they happen to be a little lower in price.

So much additional trouble, loss, worry and disappointment, result from the putting of men without aptitude or experience in charge of large factories, that I strongly urge the proprietors to exercise the utmost care and caution, and invariably to inform themselves as to the fitness of an applicant by enquiry from a reliable expert or cheese-buyer. No factory should incur needless risk of a loss of reputation, of patronage, of prestige, of price or profit.

VII.—STANDARDS FOR MILK AND LEGISLATION IN REFERENCE TO ADULTERATION.

Discussions on the need and desirability of the establishment of a legal standard of quality for milk, have been frequent during late years. These have revealed so many different ideas as to the nature, purpose, use and application of such standards, that it seems difficult to reconcile them with the needs of the conditions prevailing in our Dominion. To further a solution of that problem in a practically useful way, I propose to offer a few suggestions and recommendations by way of pointing out how some of the difficulties may be overcome and provided for, while care is taken to protect the interests of both the ordinary purchasers and producers of milk.

THE MILK OF COWS.

The milk of cows, as the dairyman needs to know it, is composed of substances partly in solution and partly in suspension. It may be described as a thin emulsion of fat, in a serum or watery solution of albuminous matter, sugar, and mineral matters. When obtained from a healthy cow in its normal state, it has a constant tendency towards acidity. It will change the colour of litmus paper, before lactic acid has been developed. A small quantity of carbonic acid is generated soon after it is drawn, if left warm; but that can be taken out by agitation and aëration. The true sourness of milk is caused by the development of lactic acid. The specific gravity of milk varies between 1029 and 1035 at 60° Fahr.; that is to say, a quantity of milk equal in bulk to as much water as will weigh 1000 pounds at 60° Fahr. will weigh from 1029 to 1035 pounds at the same temperature. The effect of each per cent. of fat is to decrease the specific gravity, because the fat of milk is lighter than its other parts. The effect of each per cent. of solids-other-than-fat is to increase the specific gravity. The total solids of ordinary milk vary between 12 and 16 per cent. In some unusual instances the range of variation has been known to be between 11 per cent. and 20 per cent. of total solids, and between 2 per cent. and 10 per cent. of fat. The solids of milk are its only constituents that have any real or rateable value. The water that is put into the milk by the cow, while the process of elaboration is proceeding in her udder, is worth no more per pound or per gallon, than the water that may be put in by a man when it has come into his hands for use or sale. The limits of variation of the solids-other-than-fat, are usually within one-half of one per cent. in the same cow at different periods in her milking season. Different cows of the same breed, rarely show a variation of more than one per cent. in the solids-other-than-fat contained in their milk. The greatest difference exists between cows of different breeds; it will sometimes reach as much as two and a-half per cent., as between the milk of cows giving extra rich milk and those yielding a very poor quality. The solids-other-than-fat, or the solids in the serum of the milk also increase slightly during the milking season; the rate is about ·04 per cent. of solids-not-fat per month.

Composition of Milk.

The average composition of milk from cows may be stated as:—

	Colustrum Per cent.		Normal Milk Per cent.
Water	75·8		87
Fat	2·6		3·75
Casein	15		3·80
Albumen			·75
Sugar	3·6		4
Ash	3		·70

The strippings of milk designate the last portion drawn from the udder of the cow at each milking, and they are richer in fat than the milk first obtained. The first milk may contain less than one per cent. of butter fat, while the very last milk drawn, yields more than ten per cent.

Cream.

Cream has no definite or unvarying composition. It is a word used to define that part of milk into which a large per cent. of its fat has been gathered by setting or by centrifugal force. It is composed of the same constituents as milk, but they are not in the same nor in any constant relative proportion. Frequently the cream of hotels is of a beautiful blue colour, but that liquid does not belong to the products of the dairyman. The results of a great many analyses show that the cream of commerce, may contain anywhere from 8 to 70 per cent. of fat. All the fat of milk is held in suspension in its liquid or serum part, in the form of tiny globules which have no coverings of an organic nature, but are present in the form of an emulsion.

Value of Parts.

The different constituents of milk have different values, according to the ultimate purpose for which they are to be used. The fat is mainly valuable for giving cream its quality, butter its main substance, and richness to the body of cheese.

The casein is the portion which is coagulated by the action of rennet in the process of cheese-making. Albumen may be seen as a thin white scum on milk that has been scalded or boiled; it is similar in composition to the white of eggs. Sugar is one of the heat producing and fattening constituents of milk. Lactic acid has no feeding value, but being anti-febrile in its action with properties that slightly aid in digestion, a small quantity of it is not unwholesome in milk for drinking or for feeding in the stables. The ash of milk furnishes the mineral matter taken into the structure of bones and flesh by the animals which consume it. Where the milk is consumed in its liquid form or reduced in bulk to any of its products, such as butter, cheese, veal, or pork, the constituents which are valuable are its solids only.

Water is always nature's vehicle for moving things about in the animal and vegetable worlds for the support of different forms of life. The vehicle in itself is for carrying the constituents which the eater seeks to appropriate.

The ever changing demands and preferences of markets, make it impracticable to attach a definite value per pound to the several constituents of milk. The work of a skilful manipulator may give to any one of them an increased value. Milk sugar in the raw state in the milk has very little value indeed, as it can be replaced for the feeding of calves by substances that are plentiful and cheap, but in its refined state, fit for druggists' use, it is worth perhaps 75 cents per pound.

Judging of milk from a purely dairy standpoint, I would estimate that under the present conditions, if the butter fat of milk is worth 16 cents per pond in its unprepared or unmanufactured condition, the total solids-other-than-fat in the milk, will be equitably valued at 2½ cents per pound. The latter valuation of 2½ cents per pound has been based upon a scale of values, which places casein at 4½ cents, albumen at 3 cents, and sugar at 1 cent per pound.

NATURE OF STANDARD REQUIRED.

The variability in the quality of milk is due to so many causes, some of which are not controllable by the dairyman, that at first sight it may seem unfair to establish an arbitrary standard of quality, for the purpose of prohibiting the sale of milk which may not come up to its requirements. Milk may be called *pure*, when it is obtained from healthy cows that have been well-fed and kept under wholesome conditions of surroundings and treatment, and to which nothing has been added and from which none of its parts or constituents have been kept back or removed. *Pure* milk is not necessarily milk of a given standard of quality, as that may be estimated at the average of milk furnished from well-kept, well-fed herds of cattle. There may be

pure unadulterated milk that may be also *poor* unadulterated milk Its poverty or the weakness of its quality may arise from the individuality of the animals, from the kind and condition of the feed, from lack of shelter, want of salt, ill-treatment or other bad management.

The experience of the householders and consumers of milk has been such, that an undoubted need exists for the inspection of the milk supply of towns and cities; and to make such inspection at all effective or adequate, it appears to be necessary that a legal standard of quality applicable to that branch of the dairy business, should be established.

If several standards of quality, were defined, and the question of describing the milk according to one of them were left optional for a business arrangement between the seller and buyer, the unthinking and unsuspecting public would sometimes be furnished with milk not up to the standard by which it was described. For instance, milk containing 12 per cent. of solids might be described as Ordinary No. 2; milk containing 13 per cent. of solids might be described as Ordinary No. 1; milk containing 14 per cent. of solids might be described as Extra No. 1; milk containing 11 per cent. of solids might be described as Grade No. 3. Even such an arrangement would still demand the action of some qualified inspector, to insure that the milk delivered was of a quality according to the description under which it was sold.

The matter of entirely prohibiting the sale of milk below a certain standard of quality, if properly described according to its contents of solids, would seem to be arbitrary, partaking of the nature of sumptuary legislation, which is always distasteful to the people, and therefore difficult of being enforced. Still the public health and welfare are of such importance, and depend so much, in many cases, upon the quality of the milk which is sold, that a total prohibition of the indiscriminate sale to householders of milk containing less than 12 per cent. of solids,—3½ per cent. of which should be butter-fat—, seems to be both desirable and necessary. Milk of an inferior grade,—sold under its proper description as such—could be used without injury for cooking purposes or for table use by adults, without detriment to either buyer or seller.

The legitimate and commendable objects of a legal standard seem to be two:—(1) To prevent fraud by the adulteration of the liquid as it is given by the cows; (2) To guarantee to the unsuspecting consumer that he is receiving, in the liquid which he purchases under the name of milk, a commodity at least up to a certain recognised standard of strength.

The legislation dealing with the supplying of milk to factories for use in the manufacture of more concentrated dairy products, such as butter and cheese, should likewise have a two-fold object; but since the nature of the latter transactions in milk is slightly different, the application of the standard cannot be quite the same, as in the case of milk for towns or cities.

DIFFERENT REQUIREMENTS FOR HOUSE USE AND FACTORY USE.

It seems necessary to make as clear as possible the distinction that exists and which should be recognised, between the business of furnishing milk for table use and that of supplying milk to factories for manufacturing purposes. In the former case every transaction is a sale outright as between a milk-dealer and his customer. In the other case, the furnishing of milk is generally done under a business arrangement whereby a patron of the factory participates *pro rata*, according to the quantity of the milk which he has furnished, in the proceeds from the sales of the product or products made therefrom.

For *city supply*, the ends sought to be gained by legislation and its enforcement are the supplying of wholesome milk, honest milk, pure milk, sweet milk, milk of certified strength, in order that the purchaser may obtain equitable value.

For *the supply at factories*, the aim of all legislation and regulations should be to secure the supplying of honest, pure, wholesome milk. Then, to provide for a fair and equitable valuation of milk furnished by each of the patrons of any factory, it would seem desirable and necessary, that all the milk should be of equal or nearly

equal value per unit of measure, or that two measures of valuation should be applied; namely, the ordinary one of weight, and another one of strength or per cent. of solids, whereby the true relative value per hundred pounds of milk of different qualities, might be ascertained.

The nature of any standard that may be fixed, must make provisions for these two distinctly different branches of the milk trade and the relation of the public thereto. If any individual offers for direct sale to house-holders, milk which falls below the standard of quality that is prescribed by law, it should be held to be *unmerchantable as ordinary standard milk*, whether it owes its weakness to having been watered or skimmed by a man or a cow.

The countries of the old world, in fact, nearly all the governments of civilised communities, have somewhat stringent laws relating to the adulteration of the so-called perfect food. The adulterating substances that have been discovered in it are so varied and numerous, that I refrain from making a list of their names in this connection; but over 90 per cent. of all such cases have been effected simply by the addition of water or the removal of part of the cream.

Standards for pure milk have been adopted as follows:—

	Total Solids. Per cent.	Butter-fat. Per cent.	Other Solids. Per cent.
Society of Public Analysts, England	11·5	3	8·5
France	13	4	9
Massachussetts	13	....	....
Minnesota	12	3	9
New Jersey	12	....	....
New York	12	3	9
Wisconsin	.....	3	....
For Canada there has been recommended by Mr. Thomas Macfarlane, Chief Analyst, a standard of	12	3·5	8·5

While recognising the natural differences that exist as between the milk of different cows, and at different seasons of the year, Mr. Macfarlane bases his judgment upon the results of a large number of analyses of milk from many parts of the Dominion.

The fat is the most variable constituent in milk, and it varies so much as between the quality of the first milk drawn from the cow at each milking, and the "strippings," or last drawn from the same animal, that if the "strippings" be kept back, that practice is quite equal, in its weakening effect upon the quality of the milk, to the removal of a large portion of the cream. The following may be taken as denoting the relative percentages of fat to be found in the different portions of one milking:—

First milking	½	per cent. of fat.
Middle milking	2	do do
Strippings, or last milking	8	do do

In view of these facts, it may be complained that if a man is unable to control or to compel his cow to give milk of a uniform quality or strength, it would be unfair to render him liable to a penalty for the sale of an honest product. A law which makes it possible to inflict imprisonment or any other disgrace upon an honest man, because his cow played him false, must be an unjustifiable one, unless it can be shown that in every case where a cow yields milk of inferior quality her owner was guilty of contributory negligence or cruelty. If these were the sole cause of milk being poor in solid constituents, I would hold up both hands, and use both voice and pen for the speedy enactment and rigid enforcement of legislation dealing with the guilty ones. But while it may be unfair to punish a man by law for keeping cows that yield poor milk, it is quite fair, and even essential, that such a man should be prohibited from disposing of his milk to

an unsuspecting consumer for what it is not,—namely, milk of good average quality.

If a legal standard were made so low as to include the poorest of the milk, given by the poorest of cows, kept by the poorest of dairymen, in the poorest kind of way, then all milk might be adulterated down to that grade and still be sold legally for milk of standard quality. The establishment of such a low limit would offer a temptation —and an additional one is not required—to dilute all milk down to the limit allowed by the law.

The law should certainly first provide for the punishment of dishonest practices by adulteration, dilution, or removal of fat by skimming or witholding the "strippings"; and it should also make it illegal to offer for sale without a specific description, any milk that is below a standard of quality such as has been recommended by the Chief Analyst of the Dominion. Skim milk, or butter-milk, or milk of a lower grade could be sold upon its merits, according to the description of its true quality.

MILK FOR CITIES AND TOWNS.

The quantity of milk consumed in the towns and cities of the Dominion is yearly increasing in quantity and value. No means are at hand for ascertaining with exactness the volume of the business annually, but I estimate that $4,000,000 is well within the limits of the retail value of the milk consumed in the six cities of Canada from which the Chief Analyst obtained his samples for analyses, as the basis for the recommendation of a standard of 12 per cent. solids. It is very necessary as a matter of commerce, and still more so in consideration of the public health, that the milk should be honest and wholesome in its character. With regard to the per cent. of butter fat, found in samples in the various districts, the following is the showing as taken from Bulletin I, Inland Revenue Department.

——	Highest Per cent. of Fat.	Lowest Per cent. of Fat.	Average Per cent. of Fat.
Halifax	5·40	3·00	4·24
St. John	4·62	3·43	3·91
Quebec	4·18	3·02	3·54
Montreal	5·17	2·80	3·82
Ottawa	5·29	3·62	4·26
Toronto	4·50	2·52	3·38
Total average			3·86

"It thus appears, that there are whole milks offered for sale in the cities of the "Dominion, likely enough at the same price, whose percentage of butter fat varies "from 2·52 to 5·40. This variation is, no doubt, caused by differences in the breed, "condition or feeding of the animals. The number of the inferior samples is, how-"ever, small; among the 162 samples analysed in Ottawa, 35 are between 3 and 3·5 "per cent., and only eleven below 3. Still, the fact remains that the richest samples "might be diluted with an equal amount of water and still be as good, so far as re-"gards butter, as some of the inferior sorts of genuine milk. Watering, even to a "slight degree, may be readily detected, and, under the present law, punished. This "may also be accomplished when milk is skimmed, but it does not seem fair that "the dairyman, who mixes say fifty per cent. skim milk with a whole milk of 4·5 "per cent., thus reducing it to 3·2 of butter fat, should be punished, while the man

"who keeps poor animals, feeds them insufficiently and sells milk containing only "2·75 per cent. butter fat, which may be legally genuine, should be allowed to es- "cape.

* * * * * * * * *

"The "total solids" or "dry substance," as the Germans call it, is obtained by "adding together the butterfat and the "other solids" given in the tables. The "averages shewn in the various districts are as follows:—

Halifax	12·72
St. John	12·45
Quebec	12·39
Montreal	12·29
Ottawa	12·93
Toronto	12·08

Total Average 12·48 p.c. total solids.

* * * * * * * * *

"The total average of butterfat found in the whole 162 samples is 3·86 per cent., "which deducted from the average total solids, 12·48 per cent., leaves for the solids- "other-than-fat 8·62 per cent. In the event of standards being established in Can- "ada, it would seem wise to adopt the principle that milk must be of good standard "quality, and to establish the following as the *lowest* limits for its contents in nutri- "tive substances:—

Total solids	12·0 per cent.
Butter fat	3·5 "
Solids other than fat	8·5 "

"Since skim milk contains at least 0·5 per cent. butter fat, it follows that, when "sold, it should be required to contain 9 per cent. total solids.

"The foregoing figures will serve to show that the public must not wholly rely "on the Department to prevent the sale of inferior qualities of whole milk, but must "exercise discrimination themselves. The value of the various milks on the market "depends on the amount of butter they contain."

In a later Bulletin of date, 30th October, 1889, Mr. Macfarlane presents some information on summer milk:—

"If the average be taken of the milks from the twenty-four herds above des- "cribed (excluding the one marked as pure Jersey) it is found to amount to 12·62 "per cent. total solids and 3·66 per cent. butter fat. The latter figure is lower than "the average of the samples described in Bulletin No. 1 which was 3·86 per cent., "although the total solids show no diminution. Still the difference in the butter fat "is not such as to call for any change in the recommendation already made of 12 "per cent. total solids and 3·5 per cent. butter fat as the lowest limits for milk of "good standard quality."

In a still later Bulletin, No. 17, Mr. Macfarlane deals with the milk supply of Towns. The object of this bulletin is set forth in its preface:—

"In former reports regarding milk supply the particulars given, had reference "chiefly to the cities and larger towns of the Dominion. In several of these—such as "Montreal, Toronto, Hamilton and London—the examination of milk is now carried "on either by a special food inspector appointed by the municipality and working "under the Adulteration Act, or by medical health officers exercising the powers "conferred on them by such statutes as chapter 205 of the Revised Statutes of Ontario. "On account of these circumstances, it was thought advisable during the first quarter "of the present fiscal year to collect samples of milk sold in some of the smaller "towns of Ontario. In order to do this fairly, and obtain a correct estimate of "the quality of the milk supplied in the towns visited, the collectors were instructed "to obtain samples from as many vendors as possible in each place. The particulars "regarding these and the results obtained in their analyses are given in the follow- "ing tables":—

The conclusions are set forth in the summary which follows:—

"The following summary shows the number of the samples taken in each of the "towns visited, and the number of genuine samples obtained, as well as of those judged "to be adulterated or inferior, in view of the facts recorded in the foregoing tables:—

	No. of Samples taken.	No. Genuine.	No. Adulterated or Inferior.
Hull, P.Q	15	10	5
Alexandria	12	7	5
Cornwall	9	9	0
Prescott	7	4	3
Cardinal	2	0	2
Morrisburg	9	6	3
Peterborough	7	2	5
Lindsay	5	3	2
Beaverton	5	1	4
Orillia	8	7	1
Barrie	7	2	5
Bradford	6	1	5
Newmarket	4	2	2
Aurora	4	2	2
Toronto	12	2	10
Harriston	10	8	2
Walkerton	5	3	2
Paisley	5	4	1
Southampton	4	1	3
Listowel	5	4	1
Stratford	10	7	3
Seaforth	4	4	0
Clinton	4	4	0
Goderich	6	4	2
	165	97	68"

From these facts, which I have cited as existing in our own Dominion, it seems that the business of supplying milk at some places, is in rather a deplorable state; and urgent need exists for the enactment and enforcement of such legislation as will insure a supply of honest milk of good standard quality to everyone who wishes to purchase the same. The milk business, from a dairyman's point of view would be very much helped and improved, and the interests of the consumer would be protected. By the courts in other countries the sale of milk of inferior quality—though honest as given by the cows and pure as to condition—to unsuspecting persons who have not been notified of its weakness, has been held to be a fraud. The making of each herd its own standard of quality would provide for the suppression of dishonest practices, by adulteration but would not protect the consumer against milk of inferior quality.

Enforcement for Convictions.

In case of the enactment of a legal standard for milk, it would seem to be reasonable, in view of the variability of the milk from the cows, that no seller should be convicted under it until at least two samples of his supply upon different dates, had been found to be substantially below the required limits.

Application of Public Health Act.

The Ontario Public Health Act of 1884 provides for the inspection of cow byres, dairies, and places in which milk is sold or kept for general use in the following regulation, which is Clause 10, of Schedule A, being by-law in force in every municipality till altered by the Municipal Council:—

"All milch cows and cow byres, and all dairies and other places in which milk "is sold or kept for general use, and all cheese factories and creameries shall be "subject to regular inspection under the direction of the said Board; and the pro- "prietors shall be required to obtain permission in writing from the Board, to keep "such dairy or other place in which milk is sold or kept as aforesaid, or to keep a "cheese factory or creamery, and the same shall not be kept by anyone without such "permission, which shall be granted after approval of such premises upon inspection, "subject to the condition that all such places as aforesaid are so kept and conducted "that the milk shall not contain any matter or thing liable to produce disease either "by reason of adulteration, contamination with sewage, absorption of disease germs "infection of cows, or any other generally recognised cause, and upon such conditions "being broken the said permission may be revoked by the Board."

The Ontario Public Health Amendment Act, 1887, at clause 5, provides as follows:—

"The Medical Health Officer under the direction of the Local Board of Health "shall have authority to make or cause to be made by a veterinary surgeon, or such "other competent person, as the circumstances may require, a periodic inspection "of all dairies, cheese factories and creameries, dairy farms and slaughter houses, "which come within his or their jurisdiction"

Regulations at London, Ont.

In the case of the cities, these regulations are enforced under the direction of the Local Board of Health. A plan that seems to be efficacious and beneficial has been carried into effect by the inspector in London, Ont., with gratifying results. For this purpose the city council enacted a by-law, which provides for inspection and examination by the inspector, and that any person offering milk for sale, shall first obtain a certificate from the health officer, that his animals are clean and healthy, that his stables and premises are also clean, that his waggon has his name and number painted upon it, and that he has complied with all the requirements of the by-law. Upon this certificate a license is issued by the city treasurer for one year, subject to be withdrawn at any time for infraction of the by-law. The fee paid for the license is one dollar annually. Nearly 100 dealers and over 1,200 cows are now under this system of inspection. The milk is examined by the official inspector twice a year, when a report of the results of the examination and also of the observations made during the inspection of the premises, stables and cattle, as well as the water and food supply, are made through the columns of the city press. As a consequence, the quality of the milk has been steadily improved during the past years. If other cities and towns would do likewise, a change for the better in the quality of the milk supply could speedily be effected.

To guard against disease.

Milk has been known to convey disease from the source of its supply to the homes of the customers into which it went. The following Ministerial regulations regarding the milk product in Prussia seem to be beneficial and necessary:—

(1). The milk is to be prevented from souring while being brought to market or depot by suitable cooling and cooling apparatus.

(2). Preserving the milk in vessels from which it can take up foreign materials (vessels of copper, brass, zinc, or earthen vessels with defective glazing, cast iron vessels with enamel containing lead) is prohibited.

(3). In the event of contagious diseases prevailing in the house of the milk producer or seller, or in the neighborhood, care must be taken that no possible spread of the disease can take place. Persons who come in contact with the patients should not have anything to do with handling the milk. All places which are set apart for keeping the milk should be kept especially clean and well-aired, and should be situated at a distance from the sleeping and sick rooms. These precautionary measures are also applicable to shops, where it is also required that the vessels be not kept open but closed.

A similar enactment by the Provincial Authorities in Canada would be opportune and for the public welfare.

Keeping the Milk Sweet.

Many methods for the preservation of milk have been tried; but for ordinary practice the safest treatment is to observe the most scrupulous cleanliness in the stables and the utensils, and to cause the milk to be cooled down to 40 degrees, to insure its sweetness. The question of the frequent removal of milk from one vessel to another in transit, before or during its delivery to the customers, is one that needs more attention. As far as possible, milk should be delivered without frequent change of vessels between the first milk-pail and the customers' houses. Each change exposes the milk to an atmosphere which too often is impure. Thus its wholesomeness and keeping qualities are both endangered.

THE MILK FOR FACTORY USE.

In the regulation of the supplying of milk to factories for manufacturing uses, two existing difficulties have to be met and provided for. In some cases there occurs, while the milk is under the care of the patrons who furnish it, intentional adulteration by somebody and that apparently with dishonest motives. Then there exists the natural differences in the quality of the milk from different herds, but more particularly from different cows; and it is needful that some basis should be established and applied, providing for the equitable payment for such milk, according to its real value for manufacturing purposes. A value which does not consist wholly in the per cent. of solids, arises from the peculiar flavour and the conditions as to quality which result from the treatment and feed of the cow. To prevent the dishonest adulteration alluded to, there exist statutes by both the Dominion and the Ontario Governments. The following are the text of the same :—

CHAP. 43.

An Act to provide aganst frauds in the supplying of Milk to Cheese, Butter and condensed Milk Manufactories.

[*Assented to 2nd May*, 1889.]

HER Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows :—

MILK SUPPLIED TO FACTORIES TO BE UNADULTERATED.

1. No person shall sell, supply or send to any cheese or butter or condensed milk manufactory, or to the owner or manager thereof, or to any maker of butter, cheese or condensed milk, to be manufactured, milk diluted with water, or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as skimmed milk.

A CERTAIN PART OF THE MILK NOT TO BE KEPT BACK.

2. No person who supplies, sends, sells or brings to any cheese, butter or condensed milk manufactory, or to the owner or manager thereof, or to the maker of cheese or butter or condensed milk, any milk to be manufactured into butter or cheese or condensed milk, shall keep back any portion of that part of the milk known as strippings.

AS TO TAINTED OR SOUR MILK.

3. No person shall knowingly sell, supply, bring or send to a cheese or butter or condensed milk manufactory, or to the owner or manager thereof, any milk that is tainted or partly sour.

AS TO DISEASED ANIMAL.

4. No person shall sell, send or bring to a cheese or butter or condensed milk manufactory, or to the owner or manager thereof, or to the maker of such butter or cheese or condensed milk, any milk taken or drawn from a cow that he knows to be diseased at the time the milk is so taken or drawn from her.

PENALTY FOR CONTRAVENTION.

5. Every person who, by himself or by any other person to his knowledge, violates any of the provisions of the preceding sections of this Act, shall, for each offence upon conviction thereof before any justice or justices of the peace, forfeit and pay a fine not exceeding fifty dollars and not less than five dollars, together with the costs of prosecution, and in default of payment of such penalty and costs shall be liable to imprisonment with or without hard labour for a term not exceeding six months, unless the said penalty and the costs of enforcing the same be sooner paid.

WHO SHALL BE LIABLE.

6. The person on whose behalf any milk is sold, sent, supplied or brought to a cheese or butter or condensed milk manufactory for any of the purposes aforesaid, shall be *primâ facie* liable for the violation of any of the provisions of this Act.

WHAT SHALL BE EVIDENCE.

7. For the purpose of establishing the guilt of any person charged with the violation of any of the provisions of sections one, or two of this Act, it shall be sufficient *primâ facie* evidence on which to found a conviction to show that such milk so sent, sold, supplied or brought to a manufactory as aforesaid to be manufactured into butter or cheese or condensed milk, is substantially inferior in quality to pure milk, provided the test is made by means of a lactometer or cream gauge or some other proper and adequate test and is made by a competent person: Provided always, that a conviction may be made or had on any other sufficient legal evidence.

SPECIFIC NATURE OF DETERIORATION NEED NOT BE DESCRIBED.

8. In any complaint or information made or laid under the first or second sections of this Act, and in any conviction thereon, the milk complained of may be described as deteriorated milk, without specification of the cause of deterioration, and, thereupon, proof of any of the causes or modes of deterioration mentioned in either of the said two sections, shall be sufficient to sustain conviction. And in any complaint, information or conviction under this Act, the matter complained of may be declared, and shall be held to have arisen, within the meaning of "*The Summary Conviction Act*," at the place where the milk complained of was to be manufactured, nothwithstanding that the deterioration thereof was effected elsewhere.

APPEAL.

9. No appeal shall lie from any conviction under this Act except to a judge of a Superior, County, Circuit or District Court, or to the chairman or judge of the Court of the Sessions of the Peace, having jurisdiction where the conviction was had; and such appeal shall be brought, notice of appeal in writing given, recognizance entered into or deposit made within ten days after the date of conviction, and shall be heard

tried, adjudicated upon and decided, without the intervention of a jury, at such time and place as the court or judge hearing the same appoints, within thirty days from the date of conviction, unless the said court or judge extends the time for hearing and decision beyond such thirty days; and in all other respects not provided for in this Act the procedure under "*The Summary Convictions Act*," so far as applicable, shall apply.

WHO TO GIVE EVIDENCE.

10. Any person accused of an offence under this Act and the husband or wife of such person shall be competent and compellable to testify.

APPLICATION OF FINES.

11. Any pecuniary penalty imposed under this Act shall, when recevered, be payable one half to the informant or complainant, and the other half to the owner, treasurer or president of the manufactory to which milk was sent, sold or supplied for any of the purposes aforesaid, in violation of any of the provisions of this Act, to be distributed among the patrons thereof in proportion to their respective interests in the product thereof.

CHAPTER 32.

An Act to provide against frauds in the supplying of Milk to Cheese and Butter Manufactories.

[*Assented to 23rd March*, 1888.]

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario enacts as follows;

NOTICE TO BE GIVEN WHEN MILK DILUTED, ETC.

1. No person shall knowingly and wilfully sell, supply, bring or send to a cheese or butter manufactory, or the owner or manager thereof, to be manufactured, milk diluted with water, or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as "skimmed milk," without distinctly notifying, in writing, the owner or manager of such cheese or butter manufactory, that the milk so sold, supplied or brought to be manufactured has been so diluted with water, or adulterated, or had the cream so taken from it, or become milk commonly known as "skimmed milk," as the case may be.

NOTICE TO BE GIVEN WHEN "STRIPPINGS" KEPT BACK.

2. No person who in the course of his business sells, supplies, brings or sends to any cheese or butter manufactory, or the owner or manager thereof, to be manufactured, the milk of cows, shall knowingly and wilfully, in the course of such dealing and business, keep back any part of the milk known as "strippings," without distinctly notifying, in writing, the owner or manager of such cheese or butter manufactory, of his having so kept back such "strippings."

NOTICE WHEN MILK TAINTED.

3. No person shall knowingly and wilfully sell, supply, bring or send to a cheese or butter manufactory, or the owner or manager thereof, to be manufactured, any milk that is tainted, or partly sour, without distinctly notifying, in writing, the owner or manager of such cheese or butter manufactory of such milk being tainted or partly sour.

PENALTY FOR VIOLATIONS OF SS. 1-3.

4. Any person who by himself or by his servant, or agent, violates any of the provisions of the preceding sections of this Act, upon conviction thereof before any justice or justices of the peace, shall forfeit and pay a sum of not less than $5 nor more than $50, together with the costs of prosecution, in the discretion of such justice or justices, and in default of payment of such penalty and costs, shall be liable to be committed to the common gaol of the county, with hard labor for any period, not exceeding six months, unless the said penalty and the costs of enforcing same be sooner paid.

RIGHT TO TEST MILK.

5. It shall be lawful for the owner or manager of a cheese or butter manufactory to require the owner or custodian of any cow or cows whose milk is being brought for, or supplied or sent to, the manufactory, to submit such cow or cows at his farm, or other premises, where such cows are usually kept, to such milk test, by persons named by such owner or manager, as may be necessary for the said persons to ascertain the quantity and quality of the milk of such cow or cows, on any day, and at such time on any such day as may be appointed by said owner or manager; and in case the owner or custodian of the cows refuses to so submit them, or obstructs in the execution thereof the persons engaged in making the milk test, or interrupts the test, or interferes in any way with the test, or the application of its result, he shall, on complaint before any justice or justices of the peace, forfeit and pay for every such offence a sum of not less than $10 nor more than $100, in the discretion of the justice or justices of the peace who may hear such complaint, together with the cost of prosecution, if so ordered, and in default of payment of such penalty and costs, shall be liable to be committed, by such convicting justice or justices of the peace, to the common gaol of the county, with hard labour, for any period not exceeding six months, or until said penalty and the cost of enforcing same be sooner paid.

RIGHT TO TAKE SAMPLES OF MILK.

6. It shall be lawful for the owner or manager of any cheese or butter manufactory, who suspects any persons of selling, supplying, sending or bringing milk to the manufactory, of any offence under this Act, to enter upon or to appoint some person or persons to enter upon, and such appointed person may enter upon the premises of the suspected person, with or without notice, and take samples of milk from the cow or cows, from which the supposed offender was or had been immediately before then procuring the milk or part of the milk so sold, supplied, sent or brought as aforesaid, and any such suspected person who obstructs or refuses to permit the taking of any such sample shall, on conviction thereof, be liable to a penalty of not less than $10 nor more than $50 with costs of the prosecution, and in default of

payment thereof, shall be liable to be imprisoned in the common gaol of the county in which the offence has been committed, for a period not exceeding three months with hard labor.

EVIDENCE OF VIOLATIONS OF SS. 1-3.

7. For the purpose of establishing the guilt of any person under the first three sections of this Act, it shall be sufficient *prima facie* evidence to shew that such person, by himself, his servant or agent, sold, supplied, sent or brought, to be manufactured, to any cheese or butter manufactory, milk substantially below the standard of that actually drawn, or by the accused represented as having been drawn from the same cow or cows within the then previous week, provided the comparison or test is made by means of a lactometer and cream gauge, or by some adequate means of making the comparison.

APPLICATION OF PENALTIES.

8. Any penalty imposed under this Act shall, when recovered, be payable one-half to the informant or complainant and the other half to the treasurer of the local municipality in which the offence has been committed.

Detective Inspectors.

It is but necessary that one or two men for the Dominion should be specially designated and equipped for the purpose of seeing that the provisions of these statutes are enforced. A wide publication of the particulars of a few convictions would doubtless prevent others from indulging in like dishonesty.

Valuation According to Quality.

For the second difficulty, namely, the need for providing an equitable basis for the distribution of proceeds from a factory, according to the true value of the milk or cream furnished, very little of a reliable nature has yet been done, except for creameries.

Creameries.

For creameries operated on the cream-gathering plan, the oil-test churn seems to provide for the equitable distribution of proceeds, according to the true value of the cream for butter-making uses. Where the whole milk is received, the Babcock apparatus for testing milk, or Fjord's controller, will enable the factory manager to value each quantity, according to its true butter-making qualities.

Cheese Factories.

The comparative value for cheese-making, of milk containing different percentages of fat has not yet been authoritatively settled. The percentage of butter-fat which it contains may not be a true and invariable index of its quality for cheese-making. It is expected that investigations along this line during the coming season will be undertaken under the supervision of this Department, to settle that question for the guidance of the cheese-makers. In the meantime, the instruments at the service of the cheese-maker—the lactometer, cream gauge, lactoscope, and pioscope—will enable him by an easily applied test to examine and compare the qualities of different milks with reasonable accuracy. The use of the lactometer and of Babcock's apparatus for indicating the percentage of fat would enable any cheese-maker to test 25 or more samples of milk accurately within one hour.

VIII.—A DISTINCTIVE CANADIAN BRAND.

VOLUME OF TRADE.

The export trade in cheese and butter is a most valuable one to the farmers of Canada. In the article of cheese, the rapid extension of our export transactions may be seen from the following table. The shrinkage in the exports of butter is due to several causes. Not the least of these has been the substitution for genuine dairy butter, of butterine and other imitation compounds from other countries in the British markets. It can never be impressed too often or too strongly upon the attention of European consumers that our dairy products are all genuine and pure.

The exports of butter and cheese from Canada for five years have been:—

		1885.	1886.	1887.	1888.	1889.
Butter	lb.	7,330,788	4,668,741	5,485,509	4,415,381	1,780,765
Value	$	1,430,905	832,355	979,126	798,673	331,958
Cheese	lb.	79,655,367	78,112,927	73,604,448	84,173,267	88,534,887
Value	$	8,265,240	6,754,626	7,108,978	8,928,242	8,915,684

In 1889, fifty-two per cent. of the butter, and over ninety-nine and a-half per cent, of the cheese exported from Canada were sent to Great Britain.

The following return from the Board of Trade Returns of Great Britain for five years (ended 30th June) show the total quantities and values of these articles imported into Great Britain:—

		1885.	1886.	1887.	1888.	1889.
Butter	cwt. (112 lb.)	2,401,373	1,543,566	1,513,134	1,671,433	1,927,842
Value	£	11,563,508	8,141,438	8,010,374	8,913,045	10,244,636
Butterine	cwt. (112 lb.)	Included with butter this year.	887,974	1,276,140	1,139,743	1,241,690
Value	£		2,962,264	3,880,327	3,268,313	3,655,061
Cheese	cwt. (112 lb.)	1,833,832	1,734,890	1,836,789	1,917,616	1,907,999
Value	£	4,069,344	3,871,359	4,514,382	4,546,408	4,490,970

From these, it may be seen that Canada now furnishes to Great Britain 41 per cent. of the cheese and less than half of one per cent. of the butter which she imports from outside countries. The competition between the countries which are making a specialty of dairy farming, for supremacy in the British markets, is yearly becoming keener. Two factors, both of which are wholly within our own jurisdiction in Canada, can be made to bring the best of the trade to ourselves, and when we get it, they will enable us to keep it. In the competition for cheaper foods to sustain the great masses of wage-earners in manufacturing centres, the tendency is towards lower prices per pound for the several articles of diet. Further economy

in their production would enable us to compete successfully with our producing and commercial rivals, especially in the matter of concentrated articles of food. That aspect of the subject has been treated of in other parts of this report. The other factor which will enable us to win greater success and maintain our place in foreign markets, is that of producing the very best quality of those things which we send abroad, and of guarding with jealous care our reputation for such, when it is won.

CHEESE AS A FOOD.

Ignorance on the part of the masses of consumers concerning the relative place of cheese in the list of ordinary articles of diet, has prevented a more general and generous consumption of it. The expression "bread and cheese" is a phrase common in many countries to denote all that is required to sustain life in health and comfort. In our own country it is seldom used with any local signification. An opinion prevails among a great many of our citizens that cheese is not a wholesome food, that it is a rather expensive and dangerous delicacy or luxury. By some it is counted to be indigestible. The idiosyncracies of a few individuals may render it such in their experience; and those being usually the talkative persons in communities, their expressed opinions find currency, while the sheepish element in humanity reveals itself by following in a general throng, the leadership of the most self assertive, be that in a right or wrong direction.

Cheese is a most wholesome and nourishing food. It is comparatively cheap, convenient for use and, when good, is promotive of, rather than antagonistic to good digestion. The chief service of a diet to the people is to furnish those elements or materials which are required for the nutrition of the tissues of the body, and to supply heat or energy for the activities of life. These tissues have the power of appropriating, from food that has been swallowed, the elements which they require, and also of changing them into their own substance. Effete matter, that has served its purpose, is cast off. The serviceability of a food depends upon its adaptation to maintain in these tissues, an even balance between the processes of waste and reparation. The main substances required have been termed "*nitrogenous*," and "*non-nitrogenous*" or "*carbo-hydrates*" and "*salts*" or "*mineral matter*." The proper proportion in which these can be taken with most advantage in food is 1 part of "nitrogenous" matter to $3\frac{1}{2}$ or 4 parts by weight of "non-nitrogenous" matter. The following table, from Letheby, shows the relative quantities of these that are to be found in a few of the main articles of diet. They may be cited for comparison here:

	Nitrogenous.	Non-Nitrogenous.			Salts.
		Starch.	Sugar.	Fat.	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Lean Beef	19·3	....	.....	3·6	5·1
Fat Beef	14·8	....	.....	29·8	4·4
Cheese	34·59	.....	4·	29·75	4·25
Milk	4·1	.....	4·4	3·3	0·7
Bread	8·1	47·4	3·6	1·6	2·3
Potatoes	2·1	18·8	3·2	0·2	0·7

It may be calculated that cheese can give at least one and a half times as much nutrition per pound as ordinary beef. Then the sense of taste has power to stimulate the secretion of digestive fluids; and the pungent, agreeable flavour of well-cured cheese renders it a food easy of digestion, even to the extent of promoting the digestion of other foods that may have been consumed. The loss in beef for bone will be quite equal to 8 or 10 per cent., and when that is allowed for, the economy of buying cheese for at least a portion of the diet of an ordinary family may be easily seen. The trade in cheese in our home markets is capable of more extension, when those who cater for the public and those who furnish the cheese for home consumption have decided to change the present practice, which consists in the keeping of the "culled" or inferior cheese for the home trade.

GUARDING OUR REPUTATION.

An extension in our foreign trade may also be made, mainly by maintaining the good quality and good name of the cheese which has been sent abroad, and by bringing up the quality and reputation of our butter to an equal standard of excellence. The guarding of our reputation for honest, pure, and fine dairy products, will enable us to lay a sure foundation upon which to rear a trade of ever-growing dimensions with the assurance of continuous profits. The markets must be suited; the particular class of requirements must be met; the preferences of those who purchase at the highest prices must be consulted and gratified; and our customers when once satisfied with our goods, must be retained by the protection of our own good name. Our reputation has been won after long and keen competition; and now if we allow it to become lost, our indifference will be inexcusable. It would be the very concentration of commercial folly to hold our national good name so cheap, that we will let it be risked by neglecting to take the steps necessary to protect it. Especially will that be so, since this will be neither costly to ourselves nor injurious to others.

When inferior cheese come from elsewhere through Canadian ports, the unsuspecting buyer in Great Britain, without any positive information to the contrary, supposes them to be of Canadian manufacture. In that case a prejudice is easily created and perpetuated to the injury of Canadian dairy interests. It is alleged and acknowledged that some foul compounds by the name of cheese have gone to Great Britain from the United States, and that too through our ports, without any designating mark to distinguish them from the pure cheese of Canadian manufacture. The following correspondence which has been taken from one of the official United States reports, sets forth the danger that exists :—

"REPORT OF THE COMMITTEE ON CHEESE, OF THE NEW YORK PRODUCE EXCHANGE, IN RELATION TO "FILLED CHEESE."

"THE LIVERPOOL PROVISION TRADE ASSOCIATION AND EXCHANGE COMPANY, LIMITED.

"LIVERPOOL, January 8th, 1890.

"DEAR SIR.—The directors of this association respectfully wish to draw the attention of your government to the exportation from the United States to the United Kingdom of what is termed "filled cheese."

"This article is a compound of skim milk and grease, such as old butter, oleomargarine, or lard, the favorite ingredient being at present stale butter, on account of the belief of the manufacturers that they can thus defy the analyst.

"My directors believe that this product is exceedingly harmful to the dairy farmers of your country. It is not the natural product of the cow, known as cheese. It is a well known fact that, for the past five years, since this fraud has been practiced, the price of pure cheese, instead of advancing in the spring months, has steadily declined.

"This product is neither wholesome nor palatable, but is injurious to the "American cheese trade, as it curtails consumption of the pure article, disgusting the "community with American cheese as an article of food.

"We believe the true remedy lies in prohibiting the production of filled cheese, "which is manufactured in the western states, chiefly in Ohio, Illinois and Wisconsin. "We are informed that New York state has prohibited its production.

"We ask you for your assistance in this matter, and trust you will not only put "this matter in the hands of the government, but suggest they should draw the "attention of the dairy associations and Governors of the various states where this "article is produced.

"Your obedient servant,

"J. L. HARMOOD BANNER,
"*Secretary.*

'THOMAS H. SHERMAN, ESQ., American Counsul, Liverpool."

After passing through the regular course of official or diplomatic documents, that letter from the Secretary of the Liverpool Provision Trade Association and Exchange Company was referred to the New York Produce Exchange of New York City. By that body it was again referred to their committee on cheese; and by that committee the following report was made to the Produce Exchange, which received and approved of it on the 27th of February, 1890:—

"NEW YORK, February 26th, 1890.

'C. G. BURKE, ESQ.,

"*President New York Produce Exchange:*

"DEAR SIR—Your committee have the honor to acknowledge the receipt of the "several communications concerning the adulteration of cheese emanating from the "Liverpool Provision Trade Association and Exchange Company, Limited. The "subject has had full and thorough investigation which its importance demands. This "matter received the attention of the members of this exchange on February 23rd, "1887, upon which occasion the following preamble and resolutions were adopted:

"WHEREAS, Large quantities of cheese are being manufactured in some portions "of the western states from milk from which the cream has been entirely extracted "by the separator process, and other animal and vegetable fats substituted for the "butter so extracted; and,

"WHEREAS, These goods are being almost entirely exported to Great Britain "without being stamped or branded so as to distinguish their true character, and "which are calculated to deceive; and,

"WHEREAS, These spurious goods are working an injury to legitimate trade in "cheese; therefore, be it

"*Resolved*, That the cheese trade of the New York Produce Exchange deem it "their duty to expose and discountenance such frauds by every means in their power.

"*Resolved*, That we condemn the practice of adulterating cheese with animal or "vegetable fats as demoralizing, and tending to create a prejudice in the markets of "the world.

"*Resolved*, That the attention of the dairy commissioners be drawn to the above "resolutions, with a request that they do all they can to enforce the laws in regard "to the make and sale of imitation cheese.

"Since then the vigilance exercised by the assistant dairy commissioners in this "city has put a stop to the trade in filled cheese in this market. Your committee "have communicated with the several dairy and food commissioners of the following "states, to-wit: New York, New Jersey, Ohio, Wisconsin, Iowa, Minnesota and Con- "necticut. The state of Illinois, as far as we can ascertain, has no dairy commissioner. "The letters received have gone into the subject thoroughly and fully, and we submit "extracts from these bearing on the subject.

"J. K. Brown, New York State Dairy Commissioner, under date of February "19th, says: "The statutes of this state do not in express terms prohibit the manu- "facture and sale of butter filled cheese. I am in favor of a national law, as well as a "state law; the former would reach many cases which the latter could not, and "whatever its provisions, they would be uniform, affecting all states alike. Any "legislation tending to stop the tampering with dairy products is of the utmost "importance, not only to the consumer, but to the producer as well, as it would help "to restore and maintain the confidence necessary to a normal consumption of the "product."

"Wm. K. Newton, New Jersey Dairy and Food Commissioner, under date of "February 17th, says: "I enclose a marked copy of the laws of this state relating to "food. You will notice that 'filled cheese' may be sold if the box is properly marked 'and branded 'imitation cheese,' and at the time of sale the purchaser must be "informed."

"Henry Talcott, Assistant Dairy and Food commissioner for Ohio, writes under "date of the 15th of February: "In answer to your questions: first, our law does "prohibit the manufacture of cheese out of any subtance but pure milk, salt and "harmless coloring matter; and I would punish a filled cheese manufacturer in Ohio "very quick if such a one could be found; second, I would most heartily approve of a "national law prohibiting it. Ohio is free from this stain of filled cheese."

"H. C. Thom, Dairy and Food Commissioner for Wisconsin, states, under date of "February 20th, that "the laws of this state do not prohibit the manufacture of filled "cheese when said filling consists of butter. The laws of the state demand the "branding only of full cream cheese. I am in favor of a national law that will pro- "hibit the filling of cheese in any way. We have made it so very warm for parties "in Wisconsin who have been filling cheese with low grade butter that the business "has been discontinued, and I feel safe in saying that not a pound of filled cheese is "being made in this state at the present date."

"H. D. Sherman, Iowa state dairy commissioner, writes under date of February "17th: "I this day send you by mail a copy of our state dairy law. As you will see, "it covers the adulteration of cheese the same as butter. I am most heartily and "emphatically in favor of a national law that will cover all kinds of the detestable "stuffed cheese. It is no better than oleomargarine, and should come under the same "law of control."

"Warren J. Ives, Minnesota state dairy and food commissioner, writes as follows: "February 19th. Our law does not permit the manufacture of filled cheese, even

"though filled with butter. I most certainly approve of a state as well as a national "law with reference to filled cheese even more stringent, if possible, than the present "oleomargarine law."

"J. B. Tatem, state of Connecticut dairy commissioner, writes under date of "February 21st: "Our state has no law which applies to cheese. I believe that a "law similar to the oleomargarine law, so called, applied to cheese would prove a "benefit to both producer and consumer."

"From the foregoing it will be noticed that the laws of the states of New York, "New Jersey and Wisconsin do not prohibit the manufacture of cheese filled or "enriched with butter; while those of Ohio, Iowa, Minnesota, and we may add "Pennsylvania, prohibit filling of any kind.

"Illinois, we understand, has no statutes on this important subject, and from the "best information we can obtain, there are several firms manufacturing filled cheese "in that state, of nearly every size and shape adapted for the home trade and also for "export; the latter are being consigned and shipped by the manufacturers direct to "commission agents in Great Britain for sale; and, owing to more favorable rates of "freight, are shipped via Portland, Boston, Philadelphia and Baltimore, few or none "passing through this port. Regarding the quantity of filled cheese made in this "state, we are of the opinion that the quantity is very much smaller than in previous "years.

"While it is the opinion of your committee that this article may have merit as a "'cheap cut' when the price of best quality is high, and it has had strong scientific "endorsement in Europe. The manufacture of filled cheese is, we are informed, "carried on to a considerable extent both in Norway and Scotland. We would "certainly recommend the enactment of a national law regulating the manufacture "and sale of this article by the imposition of a nominal tax on manufacturers sufficient "to cover the expense incurred, and that the tax and supervision be imposed and "collected in the same form and manner as is now in force under the act regulating "the manufacture and sale of oleomargarine.

"We attach herewith the correspondence referred to, and also copies of the "different state laws as furnished to us, all of which is respectfully submitted.

"M. Folsom,
"W. E. Smith,
"S. W. Doty,
"Thomas Bamber,
"Alfred C. H. Froemcke,
"*Committee on Cheese.*"

In the Dominion of Canada not a single box of "filled" cheese is manufactured; and yet our dairy interests are in danger of being damaged by these imitation or "filled" cheese coming into unfair competition with our wholesome product in the English markets. The following circular was received from the Liverpool Provision Trade Association and Exchange Company, limited:—

THE LIVERPOOL PROVISION TRADE ASSOCIATION AND EXCHANGE COMPANY, LIMITED.

"SECRETARY'S OFFICE, 24 NORTH JOHN STREET,
"LIVERPOOL, 26th March, 1890.

"DEAR SIR,—We desire to inform you that a Committee consisting of the "undersigned has been appointed by this Association to watch the interests of the "Cheese Trade, which are being seriously menaced by the continued increase in "manufacture of the article known as "Filled" Cheese.

"We desire to co-operate with you in the direction of obtaining such legislation "as will lead to the suppression of the manufacturing of this article.

"The legitimate interests of the 'Trade' are seriously imperilled, and the rea-"sonable expectation of the consumer disappointed, and we are clearly of opinion "that the distribution of 'Filled' Cheese is disgusting the British public with the "pure article, and that our Trade and mutual interests are in danger of suffering a "permanent and lasting injury.

"We are in communication with our Home Sanitary Authorities, and are plac-"ing the matter before our Agricultural Government Department, and Members of "the House of Commons.

"We venture to suggest that you should call upon your Government and State "Legislatures to prohibit the manufacture of these goods.

"We would ask you to inform us what steps are being taken on your side, and "what course should in your opinion, be adopted to bring about the end we have in "view.

"We await the favor of your reply.

"Yours faithfully,

"W. CARSON,
"A. W. DUNN,
"J. L. GRANT,
"C. HOLLAND,
"T. LONSDALE,
"SAMUEL WHITE,
"J. S. HARMOOD BANNER,
Secretary.

Letter from Importer in England.

A member of one of the firms in Liverpool which imports largely of Canadian products, wrote to his agent in Canada under date of February 13th, 1890, to the following effect:—

"In order to improve the value of Canadian cheese as a whole, it is necessary, "in the face of the present competition from the United States, to brand every "cheese as follows:—"Canadian Full Cream Cheese, being the whole product of "Pure Milk." This ought to be branded twice on the cheese itself and once on the "boxes. Every factory throughout the country should have a registered number "which ought also to be branded on the cheese. All factories where patrons were

"found skimming, should be debarred from using this brand during such period or "for a certain length of time whilst skimming had been proven to have taken "place. It ought also to be suggested to the Government that all skimmed cheese "should not be allowed to be exported. As the matter now stands, the retailer can "place before the consumer a skimmed or margarine cheese as a finest Canadian, "because there is no check to such dishonest practices. Therefore, I consider, "Canada as a whole is not reaping what she should do in producing an honest "article, made out of milk which has not been tampered with.

"This matter ought to be brought before the Upper House this session and "become law before the new season starts. It is of vital importance to the dairy-"men and the buyers. We feel the competition of this wretched margarine cheese "very acutely. One of our neighbors sold on Tuesday last, 1,500 boxes of these "frauds, whilst we only sold 25 boxes of fine cheese. The reason is very easy to "get at. The retailers are greedy for profit; they buy these common cheese; sell "them at 6d per pound; drive the people off the consumption; and the best cheese "suffer"

Resolution by Dairy Convention.

The following resolution was passed at a cheese-makers' Convention held at Lancaster, Ont., on March 13th, 1890:—

"Moved by D. M. Macpherson, seconded by C. C. McDonald and carried "unanimously:—

"That, whereas, Canadian cheese made from full-cream milk has secured a good "reputation in England for its standard quality; and

"*Whereas*, some few skim-milk cheese are being made and shipped out of "Canada to the English market as whole-milk; and

"*Whereas*, a quantity of American cheese is being imported into Canada and "branded as Canadian make:

"*Be it resolved*, that steps be taken to ask the Federal Government to enact a "law permitting a mark to be put on all full-cream cheese made in Canada, as "'Canadian Full-cream Cheese.' And any person or persons putting such a mark "on skim-milk cheese, or United States cheese imported into Canada, be liable to a "penalty of not less than $100 or more than $500."

VIEWS OF DEPUTATION.

A deputation waited upon the Honourable the Minister of Agriculture on the 18th of April, 1890, and presented their views in reference to the branding of cheese from the United States, which passed through Canada in bond. Their recommendations might be mainly summed up as follows:—

(*a*). Cheese, before being shipped from a Canadian port, should bear a brand setting forth the name of the country where they were manufactured. It was pointed out that when cheese reach their destination on the other side of the Atlantic, they are supposed to be the product of the country from whose ports they had been shipped. The Bills of Lading on which cheese, that have been stored in Canada or warehoused in Montreal, go forward, are Bills of Lading dated from the Canadian shipping point. The cheese represented by such Bills of Lading can readily be sold as Canadian products, unless there be some distinctive and easily seen mark upon the cheese themselves and upon their boxes.

(*b*). It was urged that legislation should be enacted, providing for the putting of a distinctive Canadian brand on all cheese manufactured from pure whole milk,

and that the dairymen should be protected in the use of that brand by an enactment rendering it a punishable offence for anyone to use that or a similar brand wrongfully.

ACTION TAKEN.

From these letters and documents, which have been quoted, it is evident that the exportation from this side of the Atlantic of imitation or "filled" cheese is to the detriment of our trade in honest pure dairy products. Their quality damages the interests of the honest producers, by turning the consumption of the people towards other kinds of food; and Canada is made to share in the blame and condemnation from those who do not distinguish between the origin of products which are called "American." Since the name "America," includes Canada, United States, Mexico, Brazil, and several other countries, the trade and citizenship designation "American", seems a trifle too comprehensive to be exact or useful as a descriptive term for any one nation. *Hence, I take it that all cheese or other products similar in appearance to the products of Canada, which go from our ports to foreign markets, should bear a distinctive and easily recognisable description of their nature and also of the name of the country where they were made or manufactured.*

Application of Statute.

The Merchandise Marks Offence Act, 1888, seems to make adequate provision for the proper branding of products passing through or being offered for sale in the Dominion. I took occasion in July to bring to the attention of the exporters of cheese and butter, the matter set forth in the following communication:—

It will be remembered by those interested in the cheese trade, that an influential deputation of dairymen waited upon the Hon. John Carling, Minister of Agriculture, just before the close of the session of Parliament and laid before him some facts and suggestions in reference to the protecting of Canadian dairymen against loss and damage from the wrongful use by some shippers of the Canadian brand upon United States cheese going through Canada in bond. As the season when the shipment of these cheese through Canada is now at its commencement, the Dominion Dairy Commissioner, Prof. Robertson, is considering ways and means to carry into effect the provisions of the "Merchandise Marks Offences Act, 1888," in so far as they apply to the cheese and butter trade of Canada. It has been represented to the Department that small quantities of United States "filled cheese"—(made by the removal of the cream from milk, and the substitution of lard, cotton seed oil or other fats)—were carried through in bond last year, and left the ports of our Dominion with Bills of Lading dated from a Canadian place where they had been stored in bond. It has been alleged also that United States full-cream cheese, the products of the United States, have been shipped through our country, and have been branded by the shipper with a false trade description, representing them as cheese of Canadian make. In brief, the provisions of the Merchandise Marks Offences Act of 1888 that may be applied directly to the cheese and butter trade, are:

I. Any person who applies any false trade description to goods is subject to the provisions of the Act.

II. Every person who sells, or exposes for, or has in his possession for sale, or any purpose of trade or manufacture, any goods or things to which any forged trade mark or false trade description is applied, is guilty of an offence against this Act.

III. Every person guilty of an offence against this Act is liable:

(*a*) On conviction on indictment, to imprisonment, with or without hard labor, for a term not exceeding two years, or to fine, or to both imprisonment and fine; and

(*b*) On summary conviction, to imprisonment, with or without hard labor, for a term not exceeding four months, or to a fine not exceeding $100, and in case of a second or subsequent conviction, to imprisonment, with or without hard labor, for a term not exceeding six months, or to a fine not exceeding $250.

(*c*) In any case every chattel, article, instrument or thing, by means of or in relation to which the offence has been committed shall be forfeited.

IV. The expression "trade description" means any description, statement or other indication direct or indirect:

(1) As to the number, quantity, measure, gauge or weight of any goods; or

(2) As to the place or country in which any goods were made or produced; or

(3) As to the mode of manufacturing or producing any goods; or

(4) As to the material of which any goods are composed.

V. The expression "false trade description" means a trade description which is false in a material respect as regards the goods to which it is applied, and includes every alteration of a trade description, whether by way of addition, effacement or otherwise, where that alteration makes the description false in a material respect; and the fact that a trade description is a trade mark or part of a trade mark, shall not prevent such trade description being deemed to be a false trade description within the meaning of this Act. A person shall be deemed to apply a trade mark, or mark, or trade description to goods who

(*a*) Applies it to the goods themselves; or

(*b*) Applies it to any covering, label, reel or other thing in or with which goods are sold or exposed or had in possession for any purpose of sale, trade or manufacture.

The probability is that such a watch will be kept on the imports and exports of cheese, that if any lot of United States cheese be found with a brand on the cheese or on the box representing that they are the product of Canada or Canadian in make, the offenders will be subjected to a rigorous prosecution for infringement of the statute.

Action by Department of Customs.

Subsequent to that, instructions were issued from the office of the Commissioner of Customs, at Ottawa, to the Acting-Collector of Customs at the port of Montreal, from which the following extract is made:—

"I beg to refer you to the Assistant Commissioner's letter of 15th August last, "and to inform you that I am now instructed by the Honourable the Minister of "Customs to say, that while the action in relation to the shipping mark placed on "the cheese in transit is all right in most respects, it has been decidedly wrong in "the use of the words "American Produce," and instead of these words, the marks "should always be "Produce of the United States;" the former marks are liable to "misinterpretation in the English markets. The people in the United States have "no more claim to the term American than parties of other countries on this conti-"nent."

"I have therefore to instruct you, to order to be used, the words I have mentioned in substitution for the words you have been in the habit of using."

RECOMMENDATIONS.

In view of the practices that have been in vogue in the past, and of the present condition of the dairy trade, it seems most desirable that enactments should be made, providing for the branding of cheese of Canadian manufacture in such a way that they may be distinguished easily from the product of other countries, and also that that distinctive brand shall be evident to the buyer, whether he seeks the information or not.

I would suggest that every manufacturer of cheese from pure whole milk containing not less than 3½ per cent. of butter fat should be entitled to use on such product a brand, such as "Canadian Full Cream Cheese." The use of the brand might

be entirely permissive; but its use should also be prohibitory, except to factories making cheese of that description. A penalty for the wrongful use of the brand should be inflicted to the extent of $20.00 per box of cheese for every instance where it was wrongfully applied.

Then each cheese factory should be entitled to a registered number. Brands of uniform style, and the registration number should be furnished from the Office of the Dairy Commissioner for the Dominion. The complete brand may take a form similar to the following:—

CANADIAN
FULL CREAM CHEESE.
Factory No.

Many advantages would accrue to the honest dairymen from the adoption of this plan. The product of each factory might be followed or traced back from the retailer's counter to the factory where it was produced. Those factories which turn out the very best quality would reap an undoubted advantage directly; and the difference in price which would thereby be created, as between fancy quality and common goods, would help very much to improve the quality of all our factory products, and consequently to strengthen our reputation and hold upon the British markets. Doubtless for a time, some of the cheese buyers and cheese exporters would oppose the use of the brand. When a retail seller of cheese in an English town or city finds that his customers are pleased with the quality of a certain brand, he will want the product of the same factory again; and he will want it badly enough, to pay a relatively higher price for it than for others. The wholesale house from which he buys his supplies, may instruct their importers or agents on this side, to secure the product of that or those factories at even an advanced price, because of the active and persistent demand for it by customers who are in the retail trade. Thus a keener competition for the goods of the best factories, and a marked difference in the prices paid for different qualities, would result. Both of these would be very much to the advantage of the dairymen who patronise the cheese factories.

An immediate advantage would also accrue by the preference which Canadian cheese under our own national brand would receive in the English markets. It would be a guarantee to the consumer that there was no fraudulent imitation under its cover.

The finest English and Scotch cheddar cheese are still sold wholesale in many instances for 4 cents per pound higher than the Canadian cheese. Yet Canadian cheese, by some of the magic of commerce, are to be found on the counters in the best retail provision shops, doing duty at the highest prices for English and Scotch Cheddars. Our cheese are wanted because of their own quality; and our own brand upon them, as CANADIAN would bring to our own people, part of that wide profit which now stays in the retail or wholesale merchants' hands, in the difference between the prices paid for Canadian cheese as such without brands, and the prices paid by the consumers of the same cheese when it is furnished to them as finest "English Cheddar" and "Scotch Cheddar."

The use of this brand need not be compulsory; but I think nine-tenths of the factories in the Dominion would adopt its use, if assurance were given to them that they would be protected against a wrongful application of the brand upon goods not entitled to be so described.

It is hoped that our export trade in butter will from this time be put on a better footing, by the manufacture of fresh-made butter during the winter months to meet the demands of foreign markets. From the very commencement of that trade, it will be to our advantage to have a distinctive Canadian brand, lest our fancy cream-

ery butter should suffer from misrepresentation. A distinctive Canadian package in the form of a cask would also tend to give us a place in those markets.

Hence, it seems desirable that a brand

CANADIAN
CREAMERY BUTTER.
Factory No. .

should be available for use on creamery-made butter. Similar protection should be afforded to those using it to that which is given in the use of the brand "Canadian Full Cream Cheese." A registered number for each creamery would also be a service to the butter-makers and also to the general trade in dairy products, both for home and foreign markets.

IX.—BOARDS OF TRADE.

SYNOPSIS OF THE PROVISIONS OF THE ACT, R S.O. CHAP. 130, RELATING TO THE INCORPORATION OF BOARDS OF TRADE (WITH FORMS.)

Any number of persons not less than thirty, who are Merchants, Traders, Brokers, Mechanics, Manufacturers, Managers of Banks, or Insurance Agents, and residents of any district which has a population of not less than two thousand five hundred persons, may associate themselves together as a Board of Trade, and appoint a Secretary.

The persons so associating themselves together as a Board of Trade shall, under their hands and seals, make a certificate specifying the name assumed by the association, and by which it shall be known; also the name as defined, of the district in which the same is situate and its business transacted, and the name of the person by them appointed Secretary to the said Board of Trade.

Such certificate shall be acknowledged before a Notary Public, Commissioner for taking affidavits, or Justice of the Peace, by the Secretary of the said Board of Trade, and shall be forwarded to the Secretary of State, who shall cause the same to be recorded in a register to be kept for that purpose; and a copy thereof, duly certified by the Secretary of State, shall be evidence of the existence of such association.

The expression "district." unless the context otherwise requires it, means the city, county, town, village or judicial district, within and for which a Board is established under the Act.

The expression "Board of Trade" includes Chambers of Commerce.

With the certificate, the applicants must transmit the fee of five dollars to the Secretary of State; and such fee must be paid in cash, or by an accepted cheque, made payable to the order of the Honourable the Secretary of State, and should, if sent by mail, be transmitted to him in a registered letter.

FORMS.

Form of Certificate of Association.

Know all men by these presents, that we, the several persons whose signatures and seals are hereunto subscribed and set, and whose occupations are set opposite our respective signatures, do hereby declare that we have associated ourselves together as a Board of Trade, under the provisions of Chapter 130, of the Revised Statutes of Canada, intituled "An Act respecting the Incorporation of Boards of Trade."

The name by which the said Board shall be known is "The .....
....."

The name of the district in which the same is situate and its business transacted, is the district of.....which has a population of not less than two thousand five hundred persons.

The name of the person appointed as the Secretary of the said Board is ....of the..... .....of.....
in the County of..... .....and Province of.....

As witness our hands and seals this.....day of..... .....
A.D., 18 .

Witness.		Name.	Occupation.	
....	1	.....	....	[L.S.]
....	2	.....	....	[L.S.]
.....	3	.....	.....	[L.S.]
....	4	....	....	[L.S.]
.....	5	....	.....	[L.S.]
....	6	.....	....	[L.S.]
....	7	....	....	[L.S.]
.....	8	....	....	[L.S.]
.....	9	....	.....	[L.S.]
....	10	....	....	[L.S.]
.....	11	....	....	[L.S.]
.....	12	....	....	[L.S.]

In the matter of the Incorporation of The ....
Board of Trade.

1. ....of the.....of.....
in the Province of..... , ...do hereby acknowledge and declare that the certificate hereto annexed was signed and sealed (in my presence) by the respective persons by whom it purports to have been signed and sealed, and that their occupations are set opposite their respective names, and that all the said persons reside within the said district of..... .....
which has a population of not less than two thousand five hundred persons.

2. That I am the duly appointed Secretary of the said "The ..... Board of Trade."

As witness my signature,

....

Taken and acknowledged before me
at the..... ..... of.....
in the.....of.....
this.....day of.....
A.D. 18 .

.....

(A Commissioner, or Notary Public, etc.)

DAIRYMEN'S BOARDS OF TRADE.

The establishment of Dairymen's Boards of Trade, at different places, each convenient of access to the representatives of factories in a large district, has been of undoubted benefit to the dairy interests. In order to promote the formation of these very useful commercial institutions in other sections, where as yet they do not exist, the following set of Articles and By-Laws has been prepared. A careful reading of them, will enable those who are concerned in the marketing of dairy products to understand the nature of the service, which these Boards of Trade are designed to render.

The practice of having cheese sold by auction at the Board of Trade meetings has been introduced in a few places. At Brockville, Ont., this practice was first adopted in Canada, and I am informed that it has given almost general satisfaction to the *salesmen* and the *buyers*. Butter has not yet been marketed in Canada by the auction method, but it seems the business-like way of effecting the transactions in all products which have been "boarded" for sale. The old-fashioned manner at cheese and butter markets was more like the conduct of children than that of experienced business men. Offers were made under the solemn pledge of secrecy—to be broken within a few moments—and fair square open and above-board transactions were discouraged, lest the prices that had been offered, accepted, or refused, should influence some other seller or buyer to withdraw his *goods* or his *bids*.

ARTICLES OF ASSOCIATION.

1. This organisation shall be known as the "Dairymen's Board of Trade of..... ....."

2. Its officers shall consist of President, First Vice-President, Second Vice-President, Secretary-Treasurer, and.....Directors. These officers shall constitute a Board of Management; and any five of them shall constitute a quorum for the transaction of business.

3. The officers shall be elected to hold office for one year and until their successors are elected. Vacancies occurring during the year, may be filled by election at any regular meeting of the Board of Trade.

4. The payment of an annual subscription of.....to the Secretary-Treasurer shall constitute an individual membership for one year.

5. A membership ticket, entitling any *salesman* to be admitted to the privileges of the Board of Trade, shall be granted by the Secretary-Treasurer on the payment of an annual fee of....., for each cheese factory or creamery which is represented by him.

6. All *buyers* shall be entitled to all the privileges of full membership in the Board of Trade, without the payment of an annual subscription.

7. Members only shall be entitled to vote.

8. Members shall be entitled to all the privileges of the salesroom, and to the information obtained from other markets or other sources by the Secretary-Treasurer in his official capacity; but it is to be understood that when a factory has more than

one *salesman*, only one shall represent that factory and act for it at any meeting of the Board.

9. It shall be allowable for a member of the Board of Trade to be accompanied in the salesroom by a friend, who is not actively interested in buying or selling the goods offered on the Board; but it is to be understood that this is granted as a matter of courtesy, and any violation of good faith will be considered and held to be a breach of the rules of the Board.

BY-LAWS.

1. Only members, duly qualified according to the articles of the Board of Trade shall be entitled to the privileges of the salesroom.

2. A register shall be kept and a bulletin board shall be placed in a conspicuous place in the room, upon which shall be displayed all the telegrams and other information which has been received, and to these all members shall be entitled to free access; they shall also have the privilege of posting upon the same register and bulletin board a notice of any dairy or other produce which they may have for sale.

3. It shall be the duty of the Secretary-Treasurer to procure information from other markets by telegram or cable and to post the same promptly upon a conspicuous place in the salesroom; he shall also receive the fees for membership and issue tickets of membership, and under the direction of the President shall have the general supervision of the salesroom.

4. The President shall have the power to cause to be expelled from the salesroom any person who is not entitled to be there in his right as a member, and to eject any member or non-member for a breach of the rules of the Board.

5. Every meeting of the Board of Trade shall be called to order by the President or Vice-President at the hour of....o'clock, or at such other hour as a majority of the members from time to time appoint.

6. The regular meetings of the Board of Trade shall be held upon..... .....of .....week in the month.

7. As soon as practicable after every meeting is called to order, the President or some other person appointed by the Board of Management for that purpose, shall offer for sale to the highest bidder such lots of cheese or butter as any *buyer* shall select.

8. All *buyers* who bid for a selection of the cheese or butter offered on the Board, shall make their bids publicly, and shall state the quantities which they are willing to take at the price offered.

9. As soon as the President or acting auctioneer shall have declared a *buyer* entitled to make his selection from the Board, the said *buyer* shall proceed immediately to publicly name the lots or quantities which he will take at the price offered, and every *salesman*, as the name of the lots which he represents and is entitled to sell is called, shall accept or refuse the offer which has been made.

10. When two or more *buyers* make an offer at the same time, the President or acting auctioneer shall at once decide whose offer shall have the preference.

11. A *salesman* shall have the right to decline accepting any offer even although it be the highest bid which has been made, if the conditions of delivery and payment be not satisfactory to him. And a refusal to accept the first or any offer will not debar a *salesman* from accepting the same or any other price from the same or another buyer.

12. There shall be no private buying or selling, or public buying at private terms of cheese or butter, which has been registered on the Board, from the time when the same is called to order until it is closed for that day.

13. All transactions on the Board shall be considered as cash transactions. The cheese shall be paid for on delivery, unless otherwise agreed upon between the *buyer* and *salesman*.

14. All bargains between members made at the salesroom or elsewhere, verbally or otherwise, shall be considered binding upon both parties thereto and shall be

carried out by each, and a failure of either party to perform his or their part, shall be considered sufficient cause for the expulsion from the Board of Trade or salesroom of the party or parties so failing to perform his or their part.

15. The *salesman* whose name appears on the bulletin board shall be held to be the *salesman* of the factory for that day, and his action shall be binding upon the other salesman (if any), of that factory.

16. It is to be understood and agreed that all goods, so far as weights and quality of the same are concerned, shall be subject to the inspection of the *buyer* at....., unless inspected and accepted by the *buyer* at the point of delivery which may be agreed upon between *buyer* and *salesman.*

17. The "*leading price*" shall be the average price of the three lots which have been sold highest; and the "*ruling price*" is to be considered as the price at which the greatest number of lots shall have been sold.

18. A Board of Arbitration shall be constituted for the purpose of hearing, adjusting, and settling all differences which may arise between buyers and sellers from time to time, and it is expressly understood and agreed by and between the members acting on the Board of Trade, that judgments or awards by a regularly appointed Board of Arbitration shall be final and shall be adhered to. The said Board of Arbitration shall be chosen and constituted as follows:—

In case of a difference or differences between two parties or interests, the said parties or interests shall each choose one member of the Board of Trade; the two members thus chosen shall select a third member; and these three shall constitute a Board of Arbitration and shall have appropriate jurisdiction. In case the two members, who are chosen on such Board of Arbitration, fail to choose a third member of such Board of Arbitration, then the President of the Dairymen's Board of Trade shall appoint a member to act in conjunction with them, and the decision of such Board of Arbitration shall be final.

19. In case of any dispute arising, the parties or party who considers himself aggrieved must make complaint to the Secretary-Treasurer of the Board of Trade, within two weeks from the date agreed upon for the delivery of the products; and in all cases of action by the Board of Management or the Board of Arbitration, the party or interest against whom the decision is rendered shall pay all necessary expenses incurred by such action.

20. Any apparent or alleged violation of these by-laws shall be considered a sufficient reason for the appointment of a committee by the Board of management; such committee shall look into and take cognizance of the facts concerning such apparent or alleged violation and shall render a report setting forth what action they recommend to be taken by the Board of Trade in reference thereto.

21. Any amendments or additions to these Articles of Association and by-laws may be made at any regular meeting of the Board of Trade by a majority of votes, providing notice of the proposed amendments shall have been given at a previous regular meeting.

Officers for 1891.

President..... .....
First Vice-President..... .....
Second Vice-President..... .....
Secretary-Treasurer..... .....

Directors.

....
....
....
.....

X.—EXPERIMENTAL DAIRY STATIONS.

The value of all experimental work is two-fold. Every act of investigation has in itself, a double power of service. It is competent to discover what was before unknown and unrecognised; it is also capable of imparting information and instruction by illustration and demonstration. To farmers and the manufacturers of dairy products, the main value of experiments is not from discovery but from tuition; most of them are so far behind the leaders in knowledge and scientific practice, that they are in need of the helpful guidance which can be given by illustrations of how the well known truths can be applied in practice to their own business with most advantage to them. Hence Experimental Dairy Stations, while providing for the carrying on of the work of original investigation, should also be centres whence reliable and authoritative instruction in the best practices should emanate. A further value would come from repeated demonstrations of the results that arise from different methods and practices; and by these even the manufacturers who are indifferent about the extension of the interests of Dairying in Canada would be helped.

The following are the suggestions of a memorandum which I had the honour to submit for your consideration on 5th January.

THE NEED FOR THEM.

I. The magnitude of the dairy interests of Canada is unequalled by any other single branch of agriculture or manufacture in the Dominion. The success of the cheese trade in Ontario and Quebec has been satisfactory to the farmers. The other Provinces, in many respects, are as well adapted for the prosecution of this industry, but a little outside encouragement is needed to set it going in them.

I would cite the case of Prince Edward Island, which is admirably suited for the development of dairying upon a large scale. Over twelve years ago several cheese factories were established; they were managed with such ill success that now the farmers are doubtful as to whether there is not some inherent condition in their situation, soil, cattle or circumstances, which prevents them from succeeding.

A branch Experimental Dairy Station there would serve for direction, illustration and demonstration, and thus help both manufacturers and farmers.

II. Besides, the milk from cows in Quebec, is different in quality from milk in Ontario. Investigations into the best methods of carrying on the business in each of the Provinces would furnish valuable guidance for the dairymen of each. As an instance of the need of this, let me refer to the experience of one brief trip to the Saguenay district last summer. One cheese-maker drove 60 miles to receive one day's instruction from me at a factory at Ha! Ha! Bay. His patrons reported afterwards that the cheese from his factory sold for one cent per pound relatively higher than they did before. A branch Experimental Dairy Station could be visited at least once a year by large numbers of cheese-makers.

THEIR OBJECT.

III. Again the instructors of the cheese-makers in the several Provinces would acquire uniformity in their methods, from having the privilege of visiting these stations. That would do away with the differing qualities and the names—as "Ontario Cheese," "French Cheese,"— and give us a better reputation for uniformly fine "Canadian Cheese."

IV. Then the manufacture of small, fancy varieties of cheese, which are in great demand in England—as well as in home markets—could be introduced into Canada through these Experimental Stations. A few trial shipments of these to foreign markets, would furnish useful data for the guidance of dairymen and the promotion of trade.

V. Moreover farmers in many sections are now beginning to turn their attention to winter dairying. The export butter trade of Canada has almost clean gone from us, and in my opinion the only way to build up a large trade in butter is to encourage the manufacture of it during the winter.

No endeavour will be made, or should be made to displace the cheese industry by a butter one. Our country is exceptionally well fitted for the production of cheese during the summer, even if not so well situated as many other competitive countries for the production of butter for export during that season. It appears to me quite possible to develop the butter-making industry during the winter months to as great a magnitude, and that with more remunerative profits to agriculturists, than those which arise from summer dairying in cheese-making. The possibilities of cheap and suitable winter feed by the use of ensilage, have been so well and satisfactorily demonstrated, that now milk can be produced at less cost during the winter than upon pasture only during the summer. In the winter season, the average price of butter is almost twice as much as during the summer. Safe transportation can be economically provided for during the cold weather.

VI. The buyers in England hardly know what fresh-made Canadian creamery butter is like. The quantities exported are often stale before they reach the consumer. That fact led the members of the Dominion Dairy Convention in Ottawa last year to pass a resolution, urging upon the Government the desirability of making a provision of at least $5,000 for the purpose of making weekly shipments, with a view to opening up this trade.

The Danish Government supervised the shipments of butter for a considerable period; and one of the Australian Governments gives bonuses now to promote shipments.

VII. These branch Experimental Dairy Stations would encourage the farmers to furnish milk during the winter season, and also provide small quantities of finest butter to be used as trial shipments for introducing fresh-made creamery butter to foreign markets.

Butter has been carried by the Canadian Pacific Railway across our continent to Asiatic markets, and Canadians ought to be able to supply those markets.

The West Indies offer many markets that might be secured to Canadians by the making of a few trial shipments in specially adapted packages. The publishing of the results of these would furnish valuable commercial data, and the enterprise of commerce would do the rest.

THE PLAN.

VIII. The plan is a feasible one, and well within the usual policy of Governments in looking after the interests of the farmers, and the foreign as well as the domestic trade of Canada.

IX. Branch Experimental Dairy Stations should be organised in the several Provinces for the stimulation and guidance of dairy farmers. Through them it would be practicable to spread acceptable information as to the best practices. Everyone would be welcome to visit and learn. Frequent publications of bulletins on the results of experiments, would keep them before the public, and that within a few months from their establishment.

X. New, small, and fancy varieties of cheese would be made.

XI. Investigations under the direction of the Dairy Commissioner would be made; and some of the cheese would be brought to the curing room in the dairy building at the Central Experimental Farm to prosecute enquiries into the causes of bad flavour in cheese, which is becoming a menace to the success of the trade in recent years.

XII. Butter would be made at the Stations, particularly during the winter, for use as already indicated,—viz., to promote winter dairying among farmers and to facilitate the getting a foreign demand at high prices for Canadian butter.

(I put this illustration in here. At the Colonial and Indian Exhibition in 1886 I had charge of over $10,000 worth of butter and cheese sent there by the Provincial

Government of Ontario. The fresh-made creamery butter was sold to take the place of Danish butter, and during intervening years I have had enquiries for such butter from importers, who state that they will pay the Danish price for quality similar to what they received then. Presently and up till now no provision has been made for promoting the commerce in butter.)

XIII. I would suggest that suitable cheese factories or creamery buildings be rented by the year in the several Provinces. A guarantee by the Dairy Commissioner could be given to the farmers who furnished milk, that they would receive for it, a price equal to or slightly higher than the average price realised from neighbouring factories.

XIV. The location of the Experimental Stations need not be permanent in one district in any Province. After serving one district for a year or two, the Station could be transferred to another; and after several years' work, if the Stations had fully served the purpose of their existence, they could be discontinued, and the plant in each could be disposed of.

XV. The Imperial Parliament gives a grant of £5,000 sterling for the support of similar Stations and instruction.

XVI. This is a most opportune time for the establishment of these stations.

Recent occurrences, that have interfered with commerce, have directed the attention of farmers to the possibilities of making farming pay better, by new methods and the acquisition of new markets. The time is ripe for leading the farmers in the right direction.

These Stations would be very useful and exceedingly popular with the agricultural classes. If provision is made for their establishment, no effort will be spared to make them realise more than has been set forth in this brief memorandum.

XI—BUTTER-MAKING IN WINTER.

The following is the Report of an address which I delivered at the Annual Convention of the Creameries Association of Ontario which was held at Berlin Ont., January 13th and 14th, 1891.

Mr. President, Ladies and Gentlemen. I have been very much gratified this morning by being driven around the streets of this thriving town of Berlin. We people who spend most of our thought and nearly all of our time, in trying to provide food for the working people,—who in turn furnish other things that we need,—too often forget that the prosperity of our country depends not alone on the success of our farmers, but on the thrift and enterprise of those men who even make the buttons for the farmer's coats, the shirt for his back, the shoes for his feet, and all those other things which we have seen in process of manufacture this morning. Yesterday I told a friend of mine that the population of Berlin was about six thousand, and I felt that I had been stretching; but now I find you have nearly eight thousand people and that your throbbing manufacturing enterprises enable you to make every township and county in Canada pay their tribute to you, because your goods go from one shore of the continent to the other. I want to say in this connection that the closer the bond of sympathy between people working in towns, and those who work on farms, the more will they be able to help one another, and to enjoy even privileges. Very often the countryman thinks the townsman is a man who waits to take advantage of him at every turn; and the townsman often thinks that the countryman is a fit subject to be skinned down close every chance he gets. When we know each other better, we will be able to work together more harmoniously for the advancement of the many interest of our one Dominion.

This morning I will speak to you upon one aspect of a matter which may promote our common happiness and prosperity,—that of making more and better food in the winter time. The task and occupation of the farmer is to devote his talent and strength to solve those problems that face him, in such a way as to bring back from nature, as much as possible of all kinds of food which contribute to the support of the race to which he belongs. Now, a man who follows dairy farming and provides food for the people during the summer months only, is like a man who owning a button factory, shuts it up for the winter saying, "Closed because the weather is cold." With all the plant idle, all the hands discharged, no income throughout the winter months, he could never compete with another button manufacturer up in Port Elgin who runs his factory all the year round. No more can a farmer in Waterloo, who does a profitable business for only half the year compete with a farmer over in Wisconsin or in England, who keeps going all the year, and has an income in every month of it. Winter dairying has nothing in itself that is hostile to summer dairying any more than shirt-making in winter has in it anything that is hostile to shirt-making in summer. Perhaps you make a different class of goods; that is all. At the same time, business should run the year round in both instances.

Farmers have come to this experience in their calling, that their profits are threatened with annihilation. Times are hard,—there is no questionabout it—times are hard upon the farmers whose profit-producing occupation lasts only half the year. Times are not hard in Ontario with farmers who keep their business going and sell their products in the summer time, and fatten and sell steers and other stock products in the winter and spring. These men have been doing well during these past ten years, even if times were hard. A dairy man who has no fat steers to sell, can do something else. The point is can we begin winter dairying without much further outlay? A Creamery Association is an organisation which should take hold of this new problem and help the farmers to solve it. A man who runs a Creamery for only five months in the year will find his patrons becoming thoroughly dissatisfied with the receipts from their cows. It cannot pay a man to feed cows for twelve months from which he obtains cream for only five months; and the man who runs a creamery can never afford to make a profit out of the losses of his patrons. Put that down as a solid fact. And the man who furnishes skill and helps to make the profit of his patrons larger, will get a larger share for himself. If a man, running a creamery, will try and extend the manufacturing season for a few months more, he will find he will get so little cream that the running expenses will run away with the profit. You cannot begin to practice winter dairying in creameries, until you educate the farmers to feed their cows so that they will give milk during the winter. You need to begin at the foundation, and educate the farmers to feed their cows so that they will give milk, and send it to the creamery. Then when they have abundance of pay coming in regularly all winter, they will have money to pay their current expenses. It will not take all the summer to pay the accumulated grocery bills of winter; but they will be ahead in the spring and the summer will leave them more profit. I have said that much by way of preface, to try and remove any misconception that winter dairying has any hostility in it to summer dairying.

Now, put this down as my second proposition, that the price of butter in the summer time is one factor in a farmer's business over which he has almost no control. One man, twenty men, fifty men, five hundred men, can never by any manipulation raise the price of creamery butter in summer by one cent a pound. But creamery butter fresh-made will sell, on the average, throughout the winter, for about a half more per pound than it will from June to September. A man has exclusive jurisdiction over that factor. He can make creamery butter from June to September and take the prevailing price then, or he can make it from September to April and get the prevailing price then.

Then put this down as my third proposition, that the man who lets his cow go dry for five months of the year, will get less during each of these seven months when she does milk, than will the man who makes his cow milk, not seven but ten months of the year. Men say if they milk their cows all winter, they will get a

smaller flow in summer. As a matter of fact, they will get a larger flow during the summer months. A cow that goes dry in the winter time—that is fed upon dry feed, will have her system so ill-adjusted for milk-making that she will give less milk in the summer. Take these charts now. I will take the Jersey cow, not because she is the best cow, but because the ideal form is easier described on this contour. The form of a cow's body will reveal both its capacity and power for making milk to the eye of the skilful judge. She is a milk-making machine, adjusted even in regard to the economical contrivance of her body for appropriating bulky food here, (the mouth), coming out in the concentrated form of milk at this end (the udder). Now if allowed to become dry, she may not be so well developed there (the udder) and in a short time you will find that she drops off in her milking, because she is not developed into the form for giving milk. In your heifers, the first season, develop these parts of the body, and thus make your means better adapted for carrying on your work. Let me give you the points of a cow, and show how she can be assisted for the enlargement of her capacity for winter dairying. Beginning at the most valuable one, you know a large udder is desirable and the points of excellence are first length, then breath, then elasticity—softness of quality. This is a very peculiar and mysterious laboratory wherein the cow changes the blood of her system into the milk she gives the dairyman. The next point to look for is a soft mellow skin. Any one knows that a steer will thrive better if he has a soft mellow skin. A man who feeds his cow during the winter on succulent feed, discovers that his cow has a skin more mellow, soft and unctuous. The skin is a most important organ, which goes around and through the cows body, the main interruptions being in the stomach. The digestive action depends upon the activity of the internal lining of this canal, in pouring juice upon the food in the stomach, and then in assimilating the food after it is partially digested. Any treatment that will make the outside skin more mellow, more moveable, will give you a better cow. The next point is a large barrel with ribs broad and wide apart. By the use of bulky and nutritious feed, you will develop and conserve the digestive power and augment its potency. A cow that lives all winter on straw, will find in the spring that she has been reduced so much in her productive capacity, having had to wrest nutrition from this straw, that she has got into the habit of wasting things. That cow won't give so much milk all summer. Then a cow needs to have broad loins and long rumps. You cannot change this part arbitrarily, it is born in the cow; but you can do this. If you keep on developing the milking qualities of any cow, you will find that her progeny—her calves—will very soon have the long rumps and broad loins. Then you will have better bred animals for giving milk. The cow should have a rather long fine neck, fine quiet face, with large eyes. Did you ever see a cow with a short thick neck that milked a long time? I do not think I can recollect a beefy necked cow that gave milk for a long period. The object simply is to show that a man by giving the cow some chance will develop in her, just the form that will help her to give the largest possible quantity of milk for the longest possible period. It is a good practice, because it is in accordance with a man putting himself into harmony with the laws of the universe, which when he does that, will shower blessings on him every time.

The cows that milk through the winter or ten months in the year, will give more milk per head than cows that give milk for six or seven months only; and when a man gets more milk per head, he will find that he has larger profits and then he will keep more cows. I will repeat what I said yesterday, that I think that every dairy man who has a hundred acres of good land should keep at least twenty five good milch cows. Now, how will he get the cows? The trouble is if he milks only in the summer time, he will not raise many calves. You will find this all over the country, the man will raise the winter calf seven out of eight times. I would not advise a man who has twelve cows to buy thirteen more, but by having winter calves, if he will rear these, in three years time, he may have twenty five cows.

I would have crops adjusted to feed those cows, by growing corn and filling silos. In that way I would put myself down as saying that every cow in each year should earn at least $50.00 on an average. One man down near Brampton for three con-

secutive years, by making butter and selling it in Toronto, had receipts averaging $73.00 per head. He had $72.00 one year and $75.00 another. This was from twenty-eight cows. He had private customers and sold butter at twenty-eight cents per pound. Then not merely will you have more cows for milking. Half of the calves are bull calves. Well, why should the farmer kill his bull calves, when all the year round people are clamouring for beef of good quality. I remember a story of a man who suggested that the beef should be graded as they grade wheat in Manitoba. This man got a piece of an old ox and tried to cut it; but the knife and the beef seemed to be ill adapted to each other to the end of bringing about separation. He suggested to the proprietor of an hotel that if they graded their beef as they graded their wheat, this should be graded as number one hard." If calves are raised through the winter they can be fattened rather more rapidly, coming into the market in capital shape when they are two years old; and the dairyman who grows lots of corn can fatten lots of steers and add income in the spring in this manner, to summer and winter dairying. I want to say this also, that the man who sells butter through the winter will get for that butter a *constant demand* at a good price. He will have some trouble at first, but there is an unlimited demand for excellent butter in the large centres of population. Mr. Moyer stated they were paying twenty-three cents in Toronto for butter which is adapted to the wants of their customers, and that they get a butter which they could not sell at 5 cents or even give away. Meanwhile if we could send across a weekly shipment of butter to England, we would get the Danish prices, netting now about 26 cents per pound. In 1886, I went to the Colonial Exhibition. I had some butter from the Ontario Creamery. It did not get there in very good shape and was kept at the Exhibition until it was unsuitable to be sold as first-class butter and yet I think it sold at 108 or 110 shillings per cwt; but a capital shipment was sent through afterwards and that was sold at the price of Danish butter; and every year since, I have been asked by the firm who bought that shipment to send from three to five hundred tubs and I could charge what I had to pay to get it. There was no limit. Now one point more.

It is difficult to get farmers to go into this business, so I will tell you what my own view is, of the best way to go to work about it. You will find first of all that the farmers will hardly make their cows milk through the winter and send milk to the Creamery at first, unless they have positive proof that creameries which run in winter are to be a success in our country. Farmers are rather timid about going into anything they do not understand. If a man comes along with a first class humbug, many of them will go into that straight; but if a good thing comes along, they are the most conservative class of our population. The farmers say, "Well, we do not know exactly how well the Canadian made butter would sell in England; it might only sell as second class." Farmers fear that winter dairying by supporting the creameries would not pay very well. They say, "We don't know that England will pay us a high price for our fresh-made winter butter." To meet the difficulty and to dispel the doubt and hesitation, I would like to see in Ontario at two points perhaps, and in each province throughout the Dominion, such an experimental dairy station established, as would endeavour to discover the best method of making cheese, and find out how to solve problems in that difficult process of cheese-making. Then I would propose to have these same buildings used for making butter all winter, by having the farmers in those sections send their milk to the factory to be made into butter and to be sent to England. This butter might be shipped every second week or oftener; and if, at first, it does not sell at high prices, I think the Government has resources enough and interest enough in the dairy business, to be able to stand all the loss on weekly shipments of fresh made butter for five or twenty weeks until we establish a reputation in England and let the people know that our butter is excellent. The whole benefit will not come at once, but when people see how these stations succeed, then I dare say, that twenty more factories will start up the next year. They will become and continue a source of influence to help the farmers throughout the country. Now I do not see why we should not do that this coming winter of '91-92. If to the men whom the farmers send to Ottawa

to vote their moneys, to make their laws, to help to develop the resources of this Dominion, they would say "We want that, we are going to have that"—the Members of Parliament would say "Yes, you will have it." We have in this Creameries' Association, with all the power of farmers behind it, an organisation which can say that these Stations should be started this year. If you want them, if you are bound to have them and if you don't get them, then I suppose you will have to do as the good old woman did when she was in trouble. She said she always got some consolation, when everything else failed, by trusting in that promise: "Just grin and bear it for a while."

Let me say a few things as to how this winter dairying presently can be carried on with advantage on the farms; because in connection with that scheme of helping farmers to make butter in winter by furnishing cream to creameries, I would like to see the farmers helped in some practical way to make more and finer butter at their own places. Notwithstanding the importance of the creamery industry and the advantages that flow from its development, I think one-half of the butter will be made in home dairies for some time to come—in my life-time anyway. From isolation of settlement, from various causes, about one-half of all the butter product in Canada will be made in private dairies. Now I think that the farmers' wives are eager to learn when they get a chance, and I know the farmers' wives are able to make the very finest of butter when they get a fair chance, but the trouble has been that the men have had all the good things. *They* had to have the horses, and the reaping, and mowing machines, and the driving sheds, and everything else, *they* wanted, while their wives had to get along with one pantry for keeping the milk, the butter, the cold vegetables, the pies and everything else. Then the cream took in the mixed flavour. If the farmer would give the wife a small milk house, I will warrant that it would be kept far more tidy than his driving shed; and she would take such a pride in it that it would make a man look after his part of the business better. Go round and see the women struggling with an old fashion churn, working twice as long in churning the butter as there is any need for, and until it is not so nice as it would be if churned more rapidly—all because *the man* had to buy a new top buggy and to build a new driving shed, &c., never thinking that his wife should have her strength spared and the needs of her department provided for. Get rid of these old fashioned churns and milk houses, and you will revolutionise the butter trade at once. I am not in favour of strikes; but if I could reach the ears of the good women that are such an ornament and joy to the households of Canada, I would have them strike and say,—"We won't do anything until you give us new churns and milk houses." Men would likely stand out for awhile, but they would have to give in.

I would like to see a scheme inaugurated throughout all the Provinces and across our whole continent, whereby one man or two men in each province, with a capital equipment of dairy apparatus loaded on a travelling waggon, would go to every township and spend one day at one side of it and another day in the middle and another day at the further end of it,—letting the people know before hand that they were coming —in order to shew the nicest butter prints and other dairy appliances, and practically to illustrate and demonstrate the best way of making butter. How much would that cost, do you suppose? Each man would cost, say $800 and for two $1,600. In this province, there are about two hundred thousand farmers somewhat interested in dairying. How much would that cost each? Less than one cent a piece. I think this would induce the farmer to get his wife a new milk house and a new churn. I believe if one woman gets a nice, attractive, cheap dress, twenty more women want to get the same or something better; and if one woman gets a nice new milk house and churn, twenty more women give their husbands no peace, night nor day, until they get that new milk house and churn also. This would bring very much good to the dairy business.

Let me mention a very few facts about the making of butter after it has got that far. The cow elaborates the milk in the udder. There is blood coming in by the arteries at the top of the under, which is composed of two glands lying lengthwise. Peculiar cells line the inside of the lactiferous ducts down which the milk

trickles to the milk cisterns at the top of the teats. In each cell a formation grows that is almost like a tiny bud. That bud by and by drops off and trickles down with the liquid milk. These buds are the globules of fat from which butter is made. They float in the milk. Milk is practically all soluble except these globules, and these are held in suspension in the liquid of the milk. They come to the top—when the cream rises—because they are lighter than the serum; but if a person after milking, leaves the milk in the stable until the temperature goes down to sixty degrees, these globules do not get through quite so quickly. Changes occur which make it almost impossible for these fat globules to gather to the top, either so completely or so quickly as if the milk were set in cold water immediately. To give an illustration. A man gets into the habit of doing nothing for an hour after breakfast every day. He will by and by, want to take an hour and a half and by and by will become an unskilful, lazy man all day. Let him get into the habit of setting down the milk pail for half an hour after milking and these globules will follow his example, since the man they are trying to serve is not trying to hurry. In that way you will find that inanimate nature always responds to man's activity or to man's slowness.

The centrifugal machine is meant for the purpose of separating the cream. It swirls around very fast, and the heaviest parts of the milk are thrown to the outside and the lightest parts to the inside. Meanwhile if a man cannot use that—and for sometime it will not be in common use—every man through the winter time can get plenty of cold water, as ice is very easy of access. Cold water can be gotten very easily; and if you put the milk pail into cold water, you will get off the cream very quickly.

What about this bad stable flavour that never comes in milk from a cow that is fed on wholesome feed? If you feed a cow in the winter time on turnips, you will have a turnipy flavor. Every man should have a well ventilated stable, but not too well ventilated;—not so well ventilated that in January those winter zephyrs will find their way across the cow's back,—but a fairly well ventilated stable that keeps the cow healthy. When the cow gives the milk, it is warm—between ninety-seven and ninety-eight degrees. At that temperature milk will evaporate slowly, and stable odour can not settle on it so long as it is steaming; but if you leave it until cold, it will absorb the stable odour. If you attend to this matter of quick setting you get two gains,—more cream and butter and a better quality of both. A man never does the right thing without getting two or three consecutive rewards for it. Unmeasured are the advantages of doing what is right at the right time.

Then a very few words about the effect of churning. In making butter at home, one can all through the winter churn once a week only if need be, and have the butter of exquisite flavour. Thus, you see, there is a great deal of labour saved by churning one day a week instead of three. That can be done in this way; if the cream is quickly cooled until it stands at forty degrees and is left cold until one day before churning, and then warmed up gradually to seventy degrees, and has added to it a small portion of sour cream or sour skim milk, the cream will churn easily and save all the trouble of churning and washing of utensils three times a week. Keep the cream at a temperature of 40°, raise it to 70° one day before churning, and add about two per cent. of sour cream or sour skim milk. No one can afford to churn without a thermometer. He might as well shut his eyes and try to guess the colour of the neck-tie of the next man. This plan of trying to tell the temperature with the fingers is no use.

If you will do these things you will find that dairying in our country will begin to take the place it should have in our agriculture. It will be the one thing to which all the rest of the farm work will mainly tend, and the selling of concentrated products will pay far better than the marketing of hay and coarse grains. A man can concentrate more skill and labour in a ton of butter, which at twenty-five cents a pound is worth $500, than he can load into an equal weight of hay. Besides he need not load into $500 worth of butter one-tenth as much of real hard manual labor as into the hay required to fetch as much money. It will leave and compel more time to

think; and thought always sells dear in products. So instead of going on—blindly grinding out blind results—merely following the men that have gone before us, we will find Canada certainly the best place to make milk, cheese and butter—summer for cheese mainly, winter for butter mainly. The raising of stock in winter and the fattening of swine in summer can be combined. With these, sheep and horses can be reared. The more of these products and animals and the less hay, grain and straw we sell, the richer we will keep our farms and the farmers will become wealthier than before. Along that line I believe winter dairying will come; and when it does come, we will wonder why we have been foolish so long.

XII.—MIND AND MUSCLE ON THE FARM.

The following is part of an address which I delivered at the Annual Convention of the Dairymen's Association of Eastern Ontario, at Brockville, Ont., on 7th and 8th January, 1891.

The farmers of Canada require to do more thinking, instead of more labouring with their hands. The experimental stations of this country are intended to aid in the enlargement of thought and to stimulate activity in head work among the farmers. Somebody's clear thinking must precede and underlie every rational action that makes for the mitigation of toil and the increase of profit. Farmers spend too little time in practical thought. Men in other callings sit down to think out the questions pertaining to their business, but the farmer is often too tired to think on purpose to plan. Every farmer should think out the problems he has to face, and having solved them mentally, he should proceed to carry his plans into practice. Too many farmers are content to get their living in a dreary, humdrum way, without a single aspiration more than to have a bare living—and two ounces of tobacco a week. If each would try to be the leading farmer of the locality, profits would come more certainly and easier, than if there be only the desire to be merely a sort of higher animal that eats and sleeps comfortably. I was pleased to hear the Minister of Agriculture for Ontario, say that governments cannot legislate good times for the farmers. Governments cannot legislate bad times for the agriculturists. If a man depends upon himself he can make good times come, but if he looks off to the far hills and lets his muscles and brain become numb he will never amount to anything. Personal ambition is a good thing in a farmer, and so is persistence. Now, farmers often cannot make ends meet, because they lack the element we call persistence. Let me give an illustration. In one part of the Dominion recently visited, I found that the roofs of houses were still wearing those brackets used twenty years ago when the shingles were put on. There were new barns grown old, before the doors had been hung. Most things were left half finished; and the people wondered why the good Lord did not smile upon them. They were complaining of hard times and moving away, yet that section is in my opinion blessed with good land and a fine climate. But the people lacked persistence, reliance, aspiration and clear thinking.

A farmers occupation demands peculiar powers and special training. Men who live in cities or towns have only one trade or business or profession, but the man who lives on the farm has to follow a three-fold occupation. He must be a good tradesman and understand the use of tools; he must be a good business man, to know when to buy and sell, and he must be a professional man to plan how and when and what to sow and feed in order to get a profit from his work. He must be fitted for his calling, if success is to follow. Farming with every body but Scotch people is to make money;—the sole object with the Scotch people is to set a good example.

I will not speak to you about the importance of knowing how to handle tools, etc., any more than to suggest its importance. You all know that in neighbourhoods

where ploughing matches are held annually, the crops grow the better. And the boy who excels in ploughing, usually becomes fond of the farm work. Where land is ploughed uniformly the crop has a better chance in the seed bed, and so it pays to encourage good ploughing.

It is not necessary to dwell upon the business aspect of a farmer's life. It is too generally the case that the farmer does all the business of the family, even after the boys are grown up. The young men have no experience in marketing until they are thrust out, at say twenty-five years of age, to do for themselves—with the experience of a lad of ten. Let the boy take a load of grain to market, and even if he loses a little at first, it will not be a great amount; and he will be gaining valuable experience which will be a most useful part of his education.

The farmer should thoroughly *understand* his business. The man who knows *why* be drives a spade into the ground will do better work because of that knowledge. If he does not know why he should drain his land, he will not be able to adjust his efforts to his conditions with the same certainty of success.

Speak to some farmers about their place in society, and they will hardly ever assert themselves as having influence, power or dominion. But if a man can govern plant and animal life for good, he will likely be able to influence his fellows in the higher activities of life. Many a man is lost because he would not think for himself but delegated that to others. When a man begins to think, and says "I want to know," he is asserting his manhood, and that one thing distinguishes the man from the hind. A man in those countries where agriculture is behind is called a hind,—a grade between a man and a lower animal. But as the tiller of the soil, thinks, he assumes or rather resumes the birthright of prosperous manhood. In this country we have a capital illustration of this. First we had the deep and almost impenetrable forest; and then a farmer was a devastator. Those magnificent monarchs of the woods fell before the strokes of his axe, and the bush became a ruin. While the work was destructive, there was not much thought or skill required. But when man began to put new plants in the place of those cut down, he began to need the helpful guidance of clear thinking. Then came the construction of roads, the erection of bridges, and the building of houses, and general development. For that kind of constructive work, —that work which emulates creation,—a man must have some thought and bring his own hands to his own work.

The farmers were, at first, getting big crops from virgin fields; but after a time the fields became poor, the crops would not yield enough, and men needed new instruction in order to make the earth give forth a fresh increase. Farmers need to rescue their calling from a condition of decay. No sudden calamity or disease is going to strike us; but agriculture has been suffering from slow decay. Farmers must recover themselves, and that improvement must come through the mind.

Many farmers have had a prejudice against education, but I am happy to know that it is no longer needed, that one should plead with them as to the value of an education; for they now say that their boys must not start where they began. The old misconception was that education would hinder a man from being practically useful; but now these old prejudices are being uprooted, and it is recognised that *education helps to fit a man to bring things to pass*, whether it be in the office or on the farm. A man should live on a farm to guide nature to give out a bountiful increase just because he is there. A few farmers still belittle education because "it makes a man stuck up." They say "Oh, he is a fiddling scientist, but there is nothing in him." When you find a man who loads up knowledge,—to put it upon his back or in his head,—that he may carry it around with him for display, you will find him a very tiresome person indeed. But if you find a man who gets knowledge only to use it, and keep it under his feet for the elevation of his manhood, he is deserving of and will receive respect. I want to say to the youngest men here, that knowledge is power to a man, just as fuel is power to an engine. You may have a big engine,

magnificently prepared by the skill of the ablest mechanics, but if there be no fuel in the furnace box, it will have no power. The boy who goes through life and gets no instruction about his own calling, is just as magnificently constructed, but he has no power, because he has not possessed himself of the energy of knowledge. Get knowledge, not to carry it about, but to make men better, more useful and more comfortable because of your having it. That is the purport and nature of true education.

Now just a few words about the present needs and how they can be met. The Government of Ontario has authorised the introduction into the public schools of a text book on "The First Principles of Agriculture." That I consider one of the greatest strides in the right direction ever made by the Government. It is a book costing only 40 cents, but it is a compendium of agricultural information, the equal of which has not before been printed. The boys of this province and Dominion will be all the better for reading this book; they will farm better because of its help. I hope every Board of School Trustees will insist upon having it put into their school, for the good of the little boys, the bigger boys and the old boys. I do not know of a better way of spending 40 cents than by buying this book,—and I have no royalty on it.

Then there is the agricultural press, but with our 200,000 farmers there is a circulation of only 20,000, or about one in every ten homes,—a bad state of things. Man's mind needs food, but that brain food should no more be borrowed than his breakfast should be. Such a breakfast would not taste very good. Do not borrow your agricultural paper; subscribe for it; pay for it.

We have also our Farmers' Institutes, the existence of which has done more than anything else in the past ten years to stimulate better farming.

Then we have our Dairy and Creamery Conventions, and last of all our Experimental Stations, to send the kindly light of information into the homes of the poor, as well as into the homes of the wealthy and enterprising. At Guelph, the Ontario Government has had an Experimental Station for sixteen years, and it has rendered good service to the province.

The Dominion Experimental Stations are to-day doing equally good work for all the provinces. In connection with this system there are a number of pupils who do not live at its centres, whom we may call non-resident pupils. They are expected to do all they can to assist in the usefulness of the work of the department. They are the farmers of Canada, and it is inspiration to a man to think that 3,000,000 non-resident pupils are looking to him to play the part of one giving them information—helpful knowledge.

The farmers are said to be seven-tenths of the people; and if you can get them to have confidence in and co-operate with each other in their study and work, you will have them bound together in a nationality which will make them strong and great. Individually—alone,—each farmer cannot do much. I have watched a boy blowing soap bubbles and floating them off into the air—little things they were,—glistening, sparkling timidly, and tenderly beautiful before they burst. There was so little water in their film that when one broke I could not see it. I began to wonder what a soap bubble would look like if it were as large as a waggon wheel. Perhaps I could then see some of those wonderful molecules. But Tyndall says that if a bubble were magnified to the size of the earth, those molecules might be seen about the size of No. 6 shot. Taken singly and alone, these infinitesimally wee units of matter cannot do much. Let us see an evidence of their power in united action. A quart of water,—all made up of these inconceivably little molecules,—is put into a strong iron vessel which it quite fills. The sides of the receptacle are as thick, and strong as the acquired experience of centuries of metal working can make them. The small opening is securely closed. The water is made to freeze.

These little molecules seem to turn a little and, when shoulder to shoulder they all push together for more room for themselves, the strong vessel is burst like an egg shell.

Let farmers co-operate for ends that are just, and objects that are for the common good, and nothing can hinder their success. Education in concerted action is their great need,—not for coercive application but for mutual help in bettering their avocation, their circumstances and themselves.* * * We have in this country every natural resource that the heart of a man can desire; and to realise upon their power of service for our national development, we have only to put our skill into practice. I trust that all the educational helps to agriculture mentioned this evening may have plentiful fruitage, and such a gathering as this will not be in vain. May we all with one united effort, try to make this Canada of ours prosperous, that our land may be filled with happy homes, kindly hearts, and a strong manhood.

XIII.—THE ESTABLISHMENT OF CHEESE FACTORIES AND CREAMERIES.

The business of dairying, when followed with intelligence and good judgment, ensures to the farmers a fair return for their labours. The co-operative plan of carrying on the manufacture of cheese in factories has superseded almost entirely the home or private dairy practice. Economy in the application of labour, and uniformity in the quality of the output, were the main factors which gave the factory system a good start. Since 1863, when the first co-operative factory in Canada was opened, the art of cheese-making has been studied and expounded until increased information and acquired skill have enabled our cheese-makers to win a foremost reputation abroad for general excellence of quality. Neither the reputation nor the character of the cheese on which it is founded, are yet beyond the possibility of improvement. One of the obstacles in the way of progress in the cheese industry of Canada, arises from the wretchedly poor and wholly unsuitable buildings in which it is attempted to carry on the business in many instances. To aid in the replacement of these unsightly, unwholesome, badly-constructed, worse-arranged and still worse conditioned buildings, by neat, convenient, compact structures in which cleanliness can prevail and in which the temperature can be controlled by the exercise of reasonable care, is one object of this bulletin. The illustrations, descriptions, general information and suggestions are also intended to guide those who are desirous of establishing cheese factories in districts where none, as yet, have been introduced.

The butter trade of Canada is not in a satisfactory state. Home dairying or butter making at private dairies has not yet been transferred to creameries where the manufacture of butter for a whole neighbourhood can be managed by one skilful butter-maker. The change of butter-making from private dairies, to public creameries will be much slower and never so general as in the case of cheese. The private dairies may meet the needs of home markets adequately, as soon as suitable milk-room and dairy utensils are provided in them; but it does not occur to me that the butter trade of the country will ever attain any considerable commercial importance, in providing an article which will be called for at high prices in foreign markets, until the creamery system has been adopted. Many enquiries come to this office from time to time seeking information as to the style and size of buildings that are needed, and the utensils which are required. To meet that expressed need, these illustrations, descriptions, general information and suggestions have been prepared for creameries as well as cheese factories.

THE BUSINESS BASIS.

The basis, upon which a cheese factory or creamery may be established and the business carried on, may be ;—

I.— *A private enterprise* whereby some individual or firm undertakes to provide buildings and to conduct the business.

II.—*The formation of a Joint Stock Company or Co-operative Association.*

I.—PRIVATE ENTERPRISE.

In this case, one of four plans may be followed :—

(1.) The individual or business firm, who, for the purpose of this Bulletin, will be called the "manufacturer," may charge such a rate per pound of cheese or butter, as may be agreed upon with the *patrons* who furnish the milk or cream ; in consideration of which the *manufacturer* will undertake and agree to manufacture cheese or butter, as the case may be, of first-class merchantable quality, and to provide all furnishings required in the manufacture and boxing or packing of the same.

NOTE.—The collecting of the milk or the cream is sometimes done at the expense of the *manufacturer* and sometimes these are delivered at the factory by the *patrons*. A different rate is charged by the *manufacturer* in the two cases.

Where the milk is collected by the *manufacturer* for cheese-making, the usual charge ranges from two cents to two and three-quarter cents per pound of cheese, according to the quantity of the output, the distances to be travelled collecting the milk, and other local and particular circumstances.

Where cream or milk is collected by the *manufacturer* for butter-making, the charge varies from three and a half cents to five cents per pound of butter.

(2.) The *manufacturer* may carry on the business and meet all expenses incident thereto, in the providing of furnishings, &c., for a stated per cent. of the product.

NOTE.—The disposal of the by-products, whey, butter-milk, or skim-milk are matters for mutual agreement between the *manufacturer* and *patrons*. That will be more fully discussed in a later paragraph.

(3.) The *manufacturer* may purchase the milk or the cream from the *patrons* at such a price as may be agreed upon. The price may be uniform per 100 pounds of milk or per unit of cream for the whole season, or it may vary for different months.

NOTE.—This plan is not recommended as a prudent one, as the market for cheese or butter may advance to such high prices that the *patrons* will become dissatisfied with their bargain and lose interest in the factory, or the market may go so low that the *manufacturer* will be unable to realize from the product as much as he has agreed to pay. In either case the factory business suffers. A fair equitable basis, with as little as possible of the element of speculation, is safe.

(4.) A price for milk or unit of cream may be fixed on a sliding scale, according to some recognised market quotation for milk, cheese or butter from time to time during the season.

NOTE.—A unit of cream is sometimes called a "creamery inch" and should represent any quantity which will yield one pound of butter.

II.—CO-OPERATIVE COMPANIES AND ASSOCIATIONS.

A co-operative company or association may be formed to conduct business as a *manufacturer*, in a similar capacity and on similar lines to those mentioned under the heading of "private enterprise"; or it may conduct business in a special way for the benefit of its share-holders who furnish milk or cream to the factory which it controls. In the latter case one or other of the subjoined sets of arrangements may be followed.

(5.) A certain charge per pound of product may be charged by the company, or association, called hereafter the *manufacturer*, similar to the plan mentioned in (1). The balance between the receipts and the expenditures of the Company or Association in its manufacturing capacity may be distributed as a dividend among

the shareholders according to the amounts of stock which they hold, or it may be disposed of otherwise as they may direct.

(6.) Each shareholder may be entitled to furnish to the factory a stated quantity of milk or cream for every share which he holds in the Company or Association. The product from such quantities of milk or cream may be manufactured at a fixed rate per pound, sufficient to cover the actual running expenses of the concern; and a slight additional charge—(say $\frac{1}{4}$ cent per pound for cheese, or $\frac{1}{2}$ cent per pound for butter)—may be made for all the quantities of milk or cream furnished in excess.

A rate equal to or higher than the shareholder's excess-rate may be charged for manufacturing the product for the milk or cream supplied by all non-shareholders.

NOTE.—According to this arrangement $12 of shares in cheese factory stock, might entitle the holder to furnish 9,000 pounds of milk annually at the lowest rate for manufacturing; $10 in a cream gathering creamery, and $15 in a centrifugal separator creamery, might entitle the holder to furnish cream or milk sufficient to yield 350 pounds of butter at the lowest rate for manufacturing.

(7.) Under the arrangements set forth in (1), (2), (5) and (6), a general meeting of the *patrons* called for that purpose should designate some individual as *Salesman* for the disposal of the products of the factory. The plan of appointing one salesman has been found more satisfactory than the appointment of two or three with equal powers. The *Salesman* may have an advisory committee associated with him.

THE FORMATION OF JOINT STOCK COMPANIES AND CO-OPERATIVE ASSOCIATIONS.

These may be organized under the Dominion or Provincial Statues and obtain a charter of incorporation. In every case the capital stock should be placed at a sum large enough to enable the Company or Association to erect and equip suitable buildings; and power should be obtained to carry on the manufacture of cheese and butter or either.

A short name for the Company or Association, which will be distinctive rather than descriptive, is desirable.

In the Province of Ontario the following short Act was passed:—

CHAPTER 24.

An Act to provide for the incorporation of Cheese and Butter Manufacturing Associations.

[*Assented to 23rd March, 1888.*]

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1.—1. At any time hereafter, any *five or more persons* who desire to associate themselves together for the purpose of manufacturing cheese or butter, may make, *sign* and acknowledge before a *notary public*, commissioner, or *justice* of the *peace*, in duplicate, and file in the office of the *registrar* of the registry division in which the business is to be carried on, a *certificate in writing*, in the form mentioned in the schedule to this Act, or to the same effect, together with the rules and regulations, signed by such persons respectively.

2. The signatures to the rules shall be verified by the affidavit of a subscribing witness thereto, made before a notary public, justice of the peace, or commissioner authorized to take affidavits, or before the registrar or deputy-registrar.

3. Upon the filing of the certificate and rules as aforesaid, the members of the association shall become a body corporate, by the name therein described, with the power to hold such lands as are required for the convenient management of their business.

4. The registrar or deputy-registrar shall, if desired by the persen filing the certificate, endorse on the other duplicate certificate and upon the duplicate of the rules, certificates of the other duplicates having been filed in his office, with the date of filing, and every such certificate shall be *prima facie* evidence of the facts stated therein and of the incorporation of the association.

5. All rules made by the association may be repealed, altered or amended by other rules passed at a regular meeting called for that purpose, provided no such new rule shall have any force or effect until a copy, proved by the affidavit of the president or other head officer of the association to be a true copy of the rule or rules passed by the association at a meeting specially called for the purpose of considering the same, has been filed in the registry office in which the certificate of incorporation was filed.

6. The association shall cause a book to be kept by the secretary, or by some other officer especially charged with that duty, wherein shall be kept.

(*a.*) A duplicate of the certificate and of the rules filed as aforesaid in the office of the registrar, so that persons becoming members of the association may sign the said certificate and rules.

(*b.*) Any person so desiring to become a member of, or a stockholder in the said association after incorporation as aforesaid, may sign the said certificate and rules in the said book and shall thereupon become such member, and he shall be entitled to the rights and privileges thereof, and shall become liable as such member, as fully as though he had signed the certificate prior to the said incorporation of the association.

2. No association shall be registered under a name identical with that by which any other existing association has been registered, or so nearly resembling such name as to be likely to deceive the public.

3. Any certificate so to be filed, may designate any one or more places where the business is to be carried on ; but if in different registry divisions, a duplicate must be filed in the registry office of each division.

4. A member of an association incorporated under this Act, may have shares therein to an amount mentioned in the by-laws of the association not to exceed $1,000.

5. Before an association commences operations under this Act, they shall agree upon and frame a set of rules for the regulation, government and management of the association, which shall contain—(1) a mode of convening general and special meetings ; (2) provisions for audit of accounts ; (3) power and mode of withdrawal of members ; (4) appointment of managers and other officers, and their respective duties, and a provision for filling vacancies caused by death, resignation and other causes.

6. The rules of every association registered under this Act, shall bind the association and members thereof to the same extent as if each member had subscribed his name and affixed his seal thereto ; and all moneys payable by any member to the association, in pursuance of said rules, shall be deemed to be a debt due from such member of the association.

7. The capital of the association shall be in shares of such denomination as mentioned in the rules.

8. The shares of the association shall be transferable subject to the consent and approval of the association.

9. All elections shall be by ballot, and each member shall have one vote for each share held by him, in respect of which he is not in default for any calls made thereon.

10. Every dispute between members or between members and the association established under this Act, or any person claiming through or under a member or under the rules of the association, and the directors, treasurer, or other officers thereof, shall be decided by arbitration in manner directed by the rules of the association, and the decision so made shall be binding and conclusive on all parties without appeal.

11. The liability of the shareholders shall be limited, that is to say, no share- holder in such association shall be in any manner liable for or charged with the payment of any debt or demand due by the association beyond the amount of his share or shares subscribed for, and any shareholder having fully paid up the amount of his said share or shares shall be absolved from all further liability.

12. The fees to be charged by the registrar for filing any certificate shall be fifty cents, and for any search relating thereto ten cents.

SCHEDULE.

(*Section 1 (1).*)

Form of Certificate.

Province of Ontario, } We (*insert names of subscribers not less than five*) do hereby certify that we
to wit : } desire to form a company or association pursuant to the provisions of the "Act to provide for the incorporation of Cheese and Butter Manufacturing Associations."

The corporate name of the Association is to be (*insert name of the Association*), and the objects for which the Association is to be formed are (*insert objects for which the Association is formed*). The number of shares is to be unlimited and the capital is to consist of shares of (*insert amount of shares*) each, or of such other amount as shall, from time to time, be determined by the rules of the Association. The number of the trustees who shall manage the affairs of the Association shall be (*insert the number of trustees*), and the names of such trustees are (*insert names of trustees*), and the name of the place (*or* places) where the operations of the said Association are to be carried on is (*or* are) (*insert name of place or places where the operations of the said Association are to be carried on.*)

Dated the day of

(Signatures.)

On the day of A.D. 18 , before me personally appeared (*insert names of subscribers to the certificate*) to me known to be the individuals described in the foregoing certificate and they severally before me signed the said certificate and acknowledged that they signed the same for the purpose therein mentioned.

A. B.,
Justice of the Peace, *or*
Commissioner for taking Affidavits, *or*
Notary Public.

ORGANISATION.

The following forms of By-laws, Rules and Regulations, or as many of them as apply, may be filled up and modified to suit the local or peculiar needs of any Joint Stock Company or Association for the manufacture of butter or cheese.

BY-LAWS.

Shareholders and Shares.

I. The Company (or Association) shall consist of shareholders, holding one or more shares of $..... each, who have enrolled their names in a book kept by the Secretary of the Company (or Association) for that purpose.

II. The payment of shares shall be made in such a manner and at such times as the Directors of the Company (or Association) shall from time to time direct, but in each case the Directors shall give at least thirty days' notice in writing to each holder of a share or shares in the Company (or Association) of such a call upon the stock, and not more than twenty per cent. of the value of the subscribed stock shall be called in at any one time, and not more than thirty per cent. shall be called for within twelve months.

III. The Directors shall call in at least twenty per cent. of the subscribed capital stock of the Company (or Association) at or before the last distribution of the proceeds from the sale of products in each year, until all indebtedness of the Company (or Association), which is not provided for by mortgage, is paid and satisfied.

IV. In default of payment of all or any such calls upon stock, the Directors shall proceed to enforce the payment of the same by an action at law; or they may, in the exercise of their powers, sell any such shares and apply the proceeds of the same towards the payment of any unpaid call or calls due in respect of such stock or shares, and the surplus,—if any remains after the payment of such arrears and all expenses incurred by the Directors in such action,—shall be deposited in some Chartered Bank to the credit of the defaulting shareholder, and all liability of the Directors shall thereby cease.

V. No subscriber for stock shall be accepted as a shareholder or be entitled to hold stock in the Company (or Association) until the same has been duly allotted to him by the Board of Directors.

VI. Stockholders may sell or transfer their shares, but such sale or transfer must be with the consent and approval of the Directors of the Company (or Association.)

VII. The books of the Secretary for the transfer of stock shall be closed during fifteen days preceding each annual meeting of the shareholders. The Secretary shall register all transfers of stock in the books of the Company (or Association) when furnished with duly executed instruments of transfer, signed by both transferrer and transferee. A fee of 25 cents for each share transferred shall be paid into the general fund of the Company (or Association). No transfer shall be considered valid until it has been made on the books of the Company (or Association).

VIII. Each shareholder shall be entitled to one vote for every share which he or she may hold, and shareholders may vote by proxy duly appointed. No person shall be entitled to act as a proxy who is not himself or herself a shareholder in the Company (or Association).

IX. No shareholder shall be entitled to vote upon any share or shares on which any regular instalment or call has become due and remains unpaid. No shareholder shall be entitled to vote on any stock unless the same shall have been registered in his name in the stock book of the Company (or Association) at least 15 days prior to such general or annual meeting of the Company (or Association).

X. No person shall be entitled to subscribe for or to vote upon more than..... shares of the Company, either in his or her own right or by proxy.

Officers.

XI. The Officers of the Company (or Association) shall consist of a President, Vice-President, Secretary and Treasurer and.....Directors. The Directors shall be elected at the Annual General Meeting of the Company (or Association) and shall hold office for one year, and until their successors are elected. Shareholders only shall be eligible as Directors in the Company (or Association).

XII. The President, Vice-President and the Directors shall constitute the Board of Directors. All the members shall retire every year and an election shall take place at the Annual General Meeting for the appointment of their successors, and all the members of the retiring Board of Directors, if otherwise qualified, shall be eligible for re-election.

XIII. The President and the Vice-President of the Company (or Association) shall be elected at the Annual General Meeting of the Company (or Association) or they shall be elected from the Directors at the first meeting of the Board of Directors which is held after the Annual General Meeting of the shareholders.

Powers of Directors.

XIV. The presence of four Directors shall constitute a quorum for the transaction of business at a meeting of the Directors. The President, or in his absence, any Director who may be chosen by a majority of those present at such meeting shall preside, and shall decide all questions of order, subject to an appeal to the Board.

XV. If the Annual Meeting of the shareholders and *patrons* has not appointed a *Salesman*, then the Board of Directors shall appoint from their own number, or from the shareholders or *patrons* of the factory, a person who shall be *Salesman* of the products of the factory.

XVI. The Directors shall also appoint a Secretary and Treasurer, which two offices may be filled by one and the same person if the Directors so decide.

XVII. The President shall have a vote as a Director at all meetings, and in addition to that vote, in the event of a tie shall have a casting vote as Chairman.

XVIII. The Board of Directors shall have full power to enter into agreements or contracts with any person or persons to carry on the business of the Company (or Association), and such person or persons shall have their salaries and remuneration determined by the Board of Directors to whom they shall in all cases be directly responsible.

XIX. The Directors shall also have full power to determine all salaries and remuneration to officers or employees of the Company (or Association), but the Directors shall not be entitled to receive more than ..... for each meeting which they attend, unless the same be authorized at the Annual General Meeting of the shareholders.

XX. The Directors may borrow money for the purposes of the Company (or Association) in any manner which may seem to them expedient, and their bond, promissory note, or other obligation shall bind the Company (or Association); and they are authorized to hypothecate, mortgage, or pledge the real and personal property of the Company (or Association), in order to secure any sum or sums borrowed for the purposes of the Company (or Association).

XXI. The corporate seal of the Company (or Association) and the signature of the President,—or other officer designated for that purpose at a regular meeting of the Board of Directors,—counter-signed by the Secretary and Treasurer, shall be attached to all such instruments or documents pledging the credit of the Company (or Association).

XXII. The Board of Directors may appoint from their own number an Executive Committee which shall include, or to which may be added the *Salesman* and Secretary of the Company (or Association,) to whom they may designate executive powers to be exercised under the direction of the Board; and they may also appoint Standing Committees.

XXIII. The Directors shall also appoint one Auditor to act in conjunction, in the auditing of the accounts of the Company (or Association), with an Auditor to be elected at the Annual General Meeting of the shareholders.

XXIV. In the case of any vacancy or vacancies occurring in the Board of Directors between the Annual General Meetings of the Company (or Association), they may be filled from qualified shareholders by the Board of Directors.

Duties of the Secretary.

XXV. (1.) The *Secretary* shall keep an accurate and true record of the minutes of the Annual Meetings, of any Special Meetings of the shareholders, and of the meetings of the Board of Directors.

(2.) He shall also keep an accurate account of all financial transactions of the Company (or Association).

(3.) He shall keep a stock book for the proper recording of the ownership and transfers of shares in the Company (or Association).

(4.) He shall render an accurate statement to each of the *patrons* of the Company (or Association) of his or her account therewith from time to time as the President may direct.

(5.) He shall prepare an annual statement for each of the *patrons* of the factory, and also an annual statement giving an abstract of the business of the Company (or Association) for presentation to the Annual Meeting, and he shall render an annual account of the affairs of the Company (or Associaiion) to the office of the Dairy Commissioner for the Dominion, at Ottawa.

Duties of the Treasurer.

XXVI. (1.) The *Treasurer* shall deposit all moneys received, by him, in..... .....Bank in his name as Treasurer.

(2.) He shall pay the same always and only on the order of the President, duly countersigned by the Secretary.

(3.) He shall present vouchers for all his expenditures to the Auditors, and shall present a statement of the receipts and expenditures of the Company (or Association) to the Annual General Meeting of the shareholders.

Duties of the Salesman.

XXVII. (1.) The *Salesman* shall use his best endeavours to sell the products of the factory so as to further the interests of the *patrons* to the best of his judgment and ability.

(2.) As soon as practicable after the completion of any sale, he shall notify the President and Secretary of the quantities sold, the price agreed upon, particulars of sale, date of shipment, and any other condition or element in the transaction which affects the *patrons* or the *manufacturer*.

Annual Meeting.

XXVIII. The Annual General Meeting of the shareholders shall be held at..... .....or at such other place in..... as the Directors may determine, on the .....in.....each year.

XXIX. Notice of the time and place for the holding of such Annual General Meeting shall be given at least ten days previously thereto, in two of the newspapers circulating in the neighbourhood, and also by postal notice to that effect, mailed to each shareholder's address as last registered in the office of the Company (or Association.)

XXX. If from any cause the Annual General Meeting of the Company (or Association) shall not be held, or due and legal notice thereof shall not be given, then it shall be the duty of the Directors to cause a Special General Meeting of the shareholders to be called as soon as may be thereafter, for the purpose of transacting the business of the Annual General Meeting, and at such meeting or meet-

ings all matters may be dealt with and acted upon as if such meeting were in fact the Annual General Meeting of the shareholders of the Company (or Association.)

XXXI. The rules of order for the Annual General Meeting shall be:—

1. The meeting called to order by the President or acting President.
2. The reading and disposal of the minutes of the last meeting.
3. The reading and disposal of communications.
4. Reports of Standing Committees appointed by a General Meeting of the shareholders.
5. Reports of Special Committees appointed by a General Meeting of the shareholders.
6. Reports of the Officers,—including the report of the *Salesman*.
7. Report of the Auditors.
8. Unfinished business.
9. Nomination and election of Officers for the ensuing year.
10. Appointment of one Auditor.
11. New business.

Special Meetings.

XXXII. Special Meetings of the shareholders may be called by the President or any four of the Directors, or on the requisition, in writing, of the shareholders of the Company (or Association) who may hold one-fourth of the subscribed stock of the Company (or Association); and in every such call or requisition for a Special Meeting, a statement shall be made of the definite purposes for which such Special Meeting is called, and no other business shall be transacted at such Special Meeting than shall be mentioned in the notice or notices which have been given calling the same.

XXXIII. At least ten days' notice of every Special Meeting shall be given by advertising the same in at least two newspapers circulating in the neighbourhood, and also by mailing a notice to the same effect to the address of each shareholder, as last registered in the office of the Company (or Association.)

XXXIV. Any alterations in the By-laws of the Company (or Association) shall be made only by a two-thirds vote at the Annual General Meeting of the shareholders.

XXXV. A copy of the By-Laws shall be at all reasonable hours, open for inspection by shareholders at the factory where the business of the Company (or Association) is carried on.

CHEESE FACTORIES.

NOTE.—The By-Laws from I to XXXV on pages 9 to 14 are suitable for cheese factories or creameries; to them should be added for cheese factories the following:—

RULES AND REGULATIONS.

1. The Company (or Association) hereinafter called the *manuacturer* shall draw the milk, manufacture and care for the cheese during the curing, provide boxes and all necessary furnishings, at a charge of ..... for every pound of cheese which is manufactured.

or

1*a*. The *manufacturer* shall charge each shareholder at the rate of ..... per pound of cheese for the manufacturing of the milk furnished by him up to ..... pounds per share of ..... in the stock of the Company (or Association) held by him or her, and shall charge all non-shareholders a rate of ..... per pound of cheese, in consideration of which the *manufacturer* will manufacture the cheese, care for it during curing, provide boxes and all necessary furnishings.

2. *Patrons* who may be dissatisfied with the weights of their milk recorded at the factory, must report the same to the Directors, that they may adjust and settle the matter.

3. The milk of each *patron* shall be tested at any time during the season ; and, at the discretion of the Directors, a statement of the quality of the milk of all the *patrons* shall be posted up in the factory in a conspicuous place where it may be seen by all the *patrons* and shareholders.

4. In case any milk furnished should be of such doubtful quality as to warrant the assumption that it has been adulterated, a committee appointed by the Directors shall visit the premises of the *patron*, see his cows milked morning and evening, and have the quality of such milk compared with the record of the tests made of the milk which he was previously furnishing, and if a substantial difference in quality is evident, it shall be optional with the Directors as to whether they shall (1) prosecute the *patron* according to law, (2) effect a settlement with him upon the payment to the funds of the *manufacturer*, of such a sum as may be agreed upon, or (3) exclude the *patron* from the privileges of the factory for a stated number of years.

5. Each *patron* upon being notified, shall convey in a waggon or otherwise, his or her share of the cheese which has been manufactured, from the factory to the point of delivery as agreed upon by the *Salesman*, and failure to comply with this rule will subject the *patron* to a fine of $2.00, which shall be deducted from his share of the receipts from the sales of cheese. It is open to any *patron* to find a substitute for himself for the drawing of cheese.

6. If any *patron* should send to the factory upon the milk waggons engaged by the *manufacturer*, milk which is sour or unfit for use in cheese-making, such milk shall be returned to his or her milk-stand and a charge sufficient to pay the *manufacturer* for the expense of drawing it to the factory, and to the milk-drawer for returning it to the milk-stand shall be made in every such case. The decision of the Directors in this matter shall be final.

7. Each *patron* shall be entitled to the cheese required for use at his own table at the wholesale price ; but no cuts shall be made in less than pieces of 5 pounds.

8. In the case of any *patron* who does not continue to furnish the milk from his or her herd to the factory until the close of the manufacturing season, a sum equal to ..... cents per pound of all the cheese manufactured from the milk which they have furnished during the season, will be deducted from his or her share of the receipts, unless he or she shall first have obtained the consent of the Directors to such discontinuance.

9. The *manufacturer* shall insure the cheese in one or more Insurance Companies to any extent; but the *manufacturer* will not be responsible for any cheese which may be destroyed, other than for the amount received by the said *manufacturer* from the Insurance Companies.

10. Milk shall be supplied from only healthy cows, which are fed upon wholesome food, with access to plenty of pure water and salt.

11. The pastures, yards and lanes shall be kept free from carrion and all decaying matter which may cause noxious smells.

12. Each *patron* shall furnish pure sweet milk, to which nothing has been added and from which no part has been removed or kept back ; and if any be reserved, it shall be of the average quality of milk given by the herd of cows.

13. Milk must be drawn from the cow in a cleanly manner ; the udders should be brushed or washed, and milking with dry hands is preferable to the practice of dipping the fingers in the pail in order to moisten them.

14. Immediately after the milk is drawn from the cow, it should be strained through a wire or cloth strainer.

15. All other pails and utensils with which the milk is brought into contact must be of tin; the use of wooden pails for milking or holding milk is strictly forbidden ; and any contravention of this rule will subject the *patron* to the liability of being deprived of the privileges of the factory.

16. The milk shall be aërated by dipping, pouring or stirring, or by the use of an aërator ; during hot weather after it has been aired, it should be cooled quickly to

at least the temperature of the atmosphere; the milk-can should never be left in a tub of water over night, unless the milk has been previously cooled to below 60 degrees.

17. The milk must be kept in a place where the atmosphere is free from foul and injurious smells.

18. Milk that is left without the protection of some roof, shall be protected from the falling of rain, either by turning the lid of the milk can upside down over it, or any other efficacious means; and if on any occasion when rain has fallen, the cheese-maker discovers by the use of the testing instruments that a per cent. of added water is present, he shall deduct from the weight of the milk a number of pounds equal to the quantity of added water that is revealed by the use of the lactometer.

19. The night's and morning's messes of milk shall be kept in separate vessels until the arrival of the milk waggon.

20. The milk-cans shall be kept clean and sweet; and when a cheesemaker shall discover the can of any *patron* in a state unfit for the carrying of milk without detriment to its quality, he shall notify the *patron* of that fact and report the same to the Directors. After the first offence the *patron* may be subjected to a fine of 50 cents for every time that the can shall be sent to the factory in an unclean condition.

21. The Directors or any of the *patrons* may inspect the cans on any of the waggons or milk-stands at any time and report the same to the cheese-maker or other officers of the *manufacturer*.

22. Each and every milk-can shall be washed with cold or tepid water and scalded with boiling water once a day; they should afterwards be aired.

23. All milk to be conveyed to the factory on the public milk waggons shall be delivered on the side of the public highway, (unless otherwise arranged by the directors), upon a milk-stand of convenient height, and which will afford shade from the sun and protection against rain.

24. The surroundings of the milk-stand shall be kept clean and free from bad smells; and the feeding of swine within 100 feet of the milk-stand is strictly forbidden.

25. The milk shall be delivered on the milk-stand at a time to suit the convenience of the milk drawer, who shall not leave any milk-stand before 5:30 a.m. and who shall reach the factory with his load not later than 9 a.m.

26. The whey shall be disposed of, as the *patrons* determine at the Annual Meeting.

27. The cheese-maker shall reject any milk which he considers to be unfit for use in the manufacture of the finest quality of cheese ; and his judgment in the matter shall be final.

28. Each *patron* who furnishes milk to the factory is thereby considered as having agreed to the foregoing rules and regulations.

CONSTRUCTION.

LOCATION AND SITE.

For the erection of a cheese factory and the establishment of co-operative dairying, a *location* should be selected which is central and convenient to a section of country adapted for and inclined towards dairying.

The *site* should be,

(1.) Suited for easy and effective drainage,

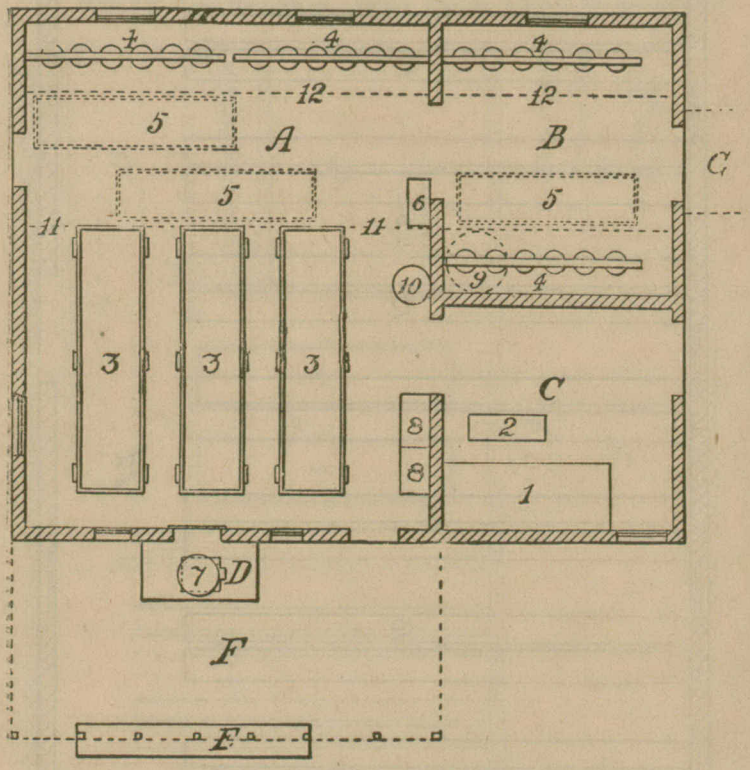
(2.) Supplied with abundance of pure cold water,

(3.) Easy of access by good roads.

PLANS.

The following sketches and plans will illustrate the size and nature of the structure required for businesses of different sizes:—

FIG. I.



Figures I and II shew the plan for a cheese factory of 500 to 700 cow capacity.

A.—Cheese Making Room, 30 ft. x 24 ft.;
B.—Cheese Press-Room, 16 ft. x 14 ft.;
C.—Boiler and Engine Room, 13 ft. x 14 ft.;
D.—Milk-Weighing Platform, 3 ft. 6 in. x 7 ft.;
E.—Shelf for empty cans;
F.—Covered Roadway for Milk-Waggons;
G.—Covered Passage to Cheese Curing-Room.

1. Steam Boiler; 2. Engine; 3. Milk Vats; 4. Cheese Presses; 5. Curd Sinks; 6. Curd Cutter; 7. Weighing Can and Scales; 8. Milk Tester and Table; 9. Water Tank, placed overhead; 10. Water Barrel; 11. Gutter, 3 in. x 4 in., with fall from 6 to other side of Making-Room; 12. The floor in A and B, between 11, 11, and 12, 12, is rounded, with a fall from the centre of 1 inch towards 11, 11, and 1 inch towards 12, 12; there is also a fall of 1 inch in the floor from the back of 4, 4, 4, to 12, 12, but there is no gutter at 12, 12, or at 11 between 6 and G.

FIG. II.

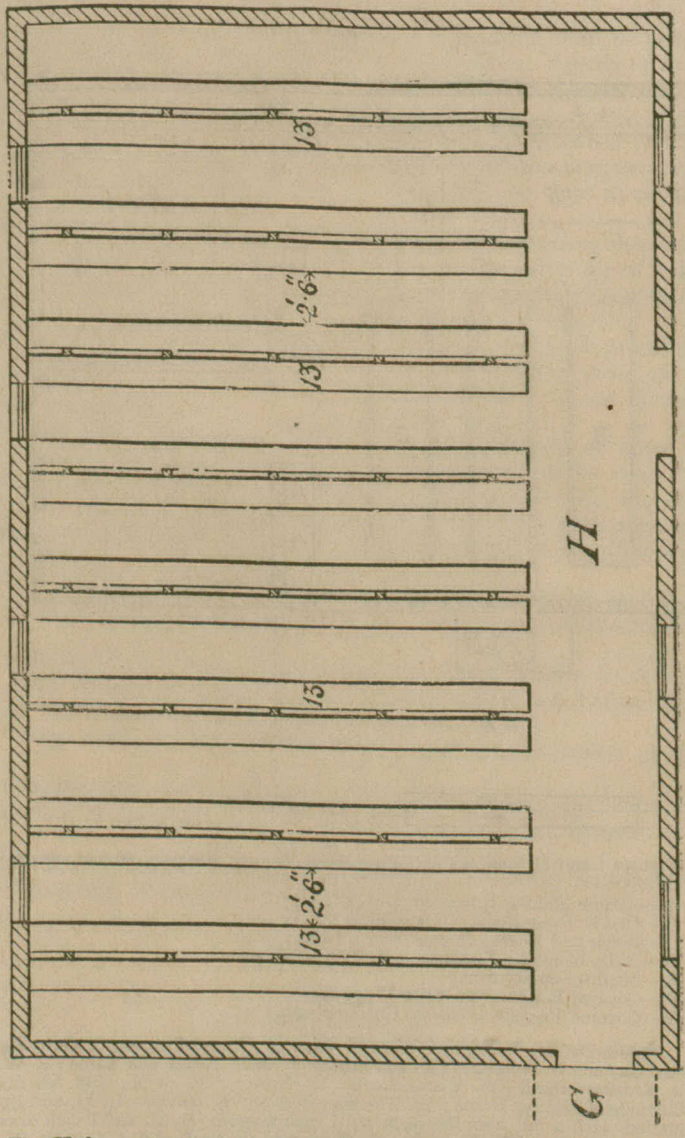


Fig. II shews the plan for a Cheese Curing-Room 48 ft. x 30 ft.

G.—Covered passage from Press-Room;
I.—Passage at the ends of Cheese Shelves;
13.—Cheese Shelves of which a detail is shewn in Fig. V.

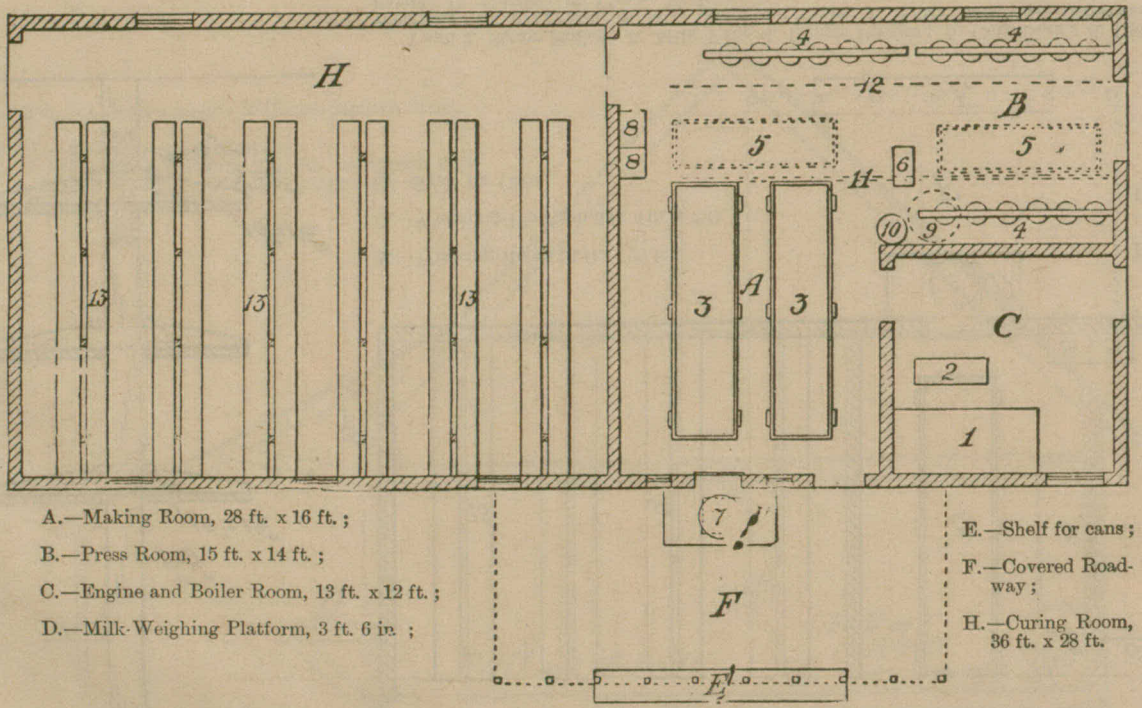


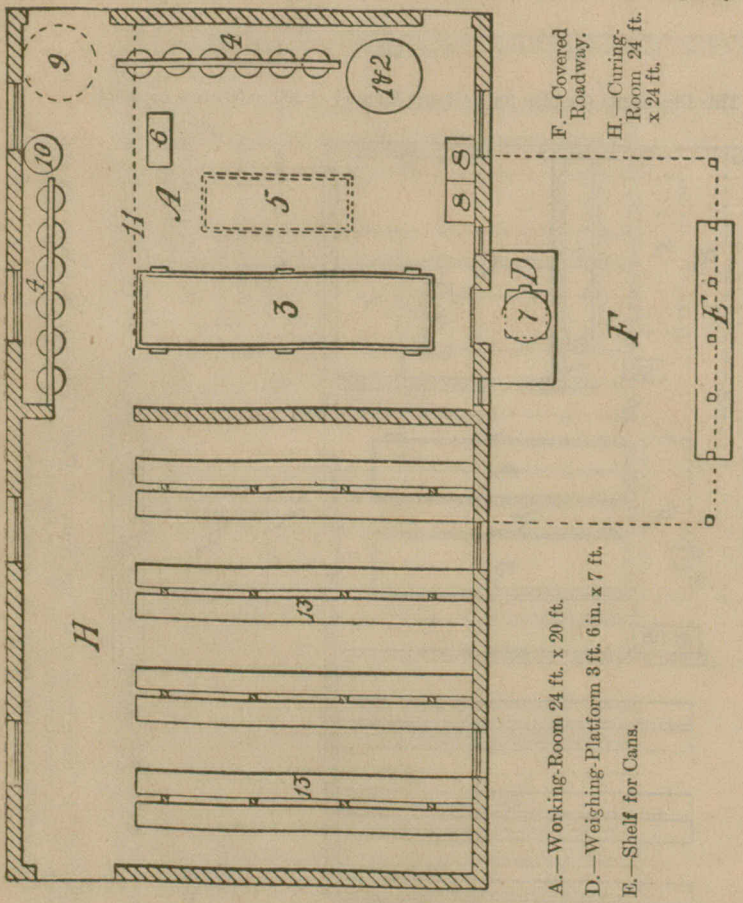
FIG. III.

This Fig. shews the plan for a Cheese Factory of 300 to 500 cow capacity.

1. Steam Boiler; 2. Engine; 3. Milk Vats; 4. Cheese Presses; 5. Curd Sinks; 6. Curd Cutter; 7. Weighing Can and Scales; 8. Milk-Tester and Table; 9. Water Tank, placed overhead; 10. Water Barrel; 11. Gutter, 3" x 4", with a fall from 3, 3, towards 6; 12. Line towards which floor inclines from both sides; 13. Cheese Shelves.

FIG. IV.

This Fig. shews the plan for a Cheese Factory of 150 to 300 cow capacity.



1 and 2. Steam Boiler; 3. Milk Vat; 4. Cheese Presses; 5. Curd Sink; 6. Curd Cutter; 7. Weighing Can and Scales; 8. Milk Tester and Table; 9. Water Tank, placed overhead; 10. Water Barrel; 11. Gutter; 13. Cheese Shelves.

FIG. V.

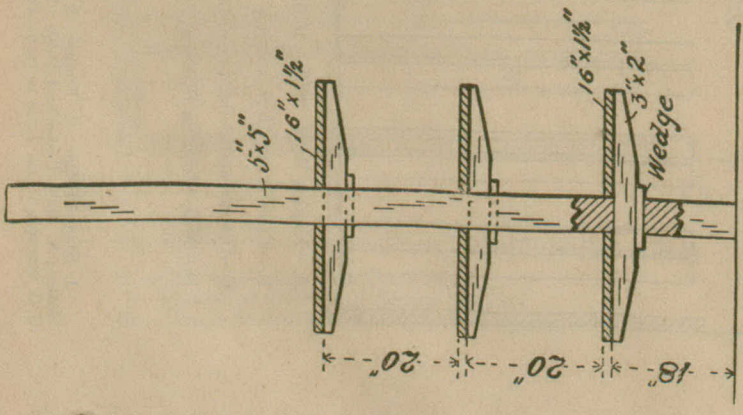


Fig. V shews the Post, the Arms, for three tiers of shelves, and the ends of the Cheese Shelves, which may be of any kind of wood that will not warp.

FIG. VI.

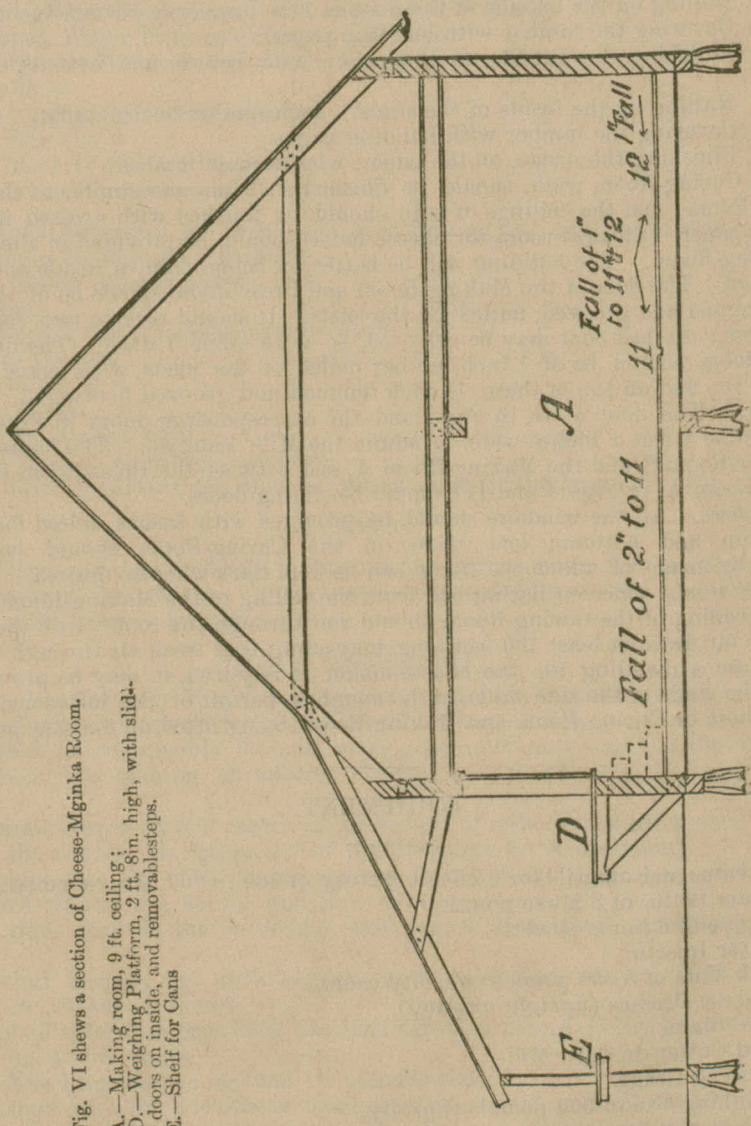


Fig. VI shews a section of Cheese-Mginka Room.

A.—Making room, 9 ft. ceiling;
D.—Weighing Platform, 2 ft. 8in. high, with sliding doors on inside, and removablesteps.
E.—Shelf for Cans

BUILDINGS.

The buildings may be constructed by the use of a frame of square timbers mortised together, or by the erection of a balloon frame of 2 in. by 6 in. studs placed on sills 8 in. by 8 in.

Walls. The walls should be finished by:—

(1.) Placing 2 in. by 6 in. scantling 16 inches apart;
(2.) Nailing on the outside of these studs 1 in. lumber horizontally;
(3.) Covering the lumber with building paper;
(4.) Finishing the outside, on the paper, with boards and battens, or with V siding;
(5.) Nailing on the inside of the studs, 1 inch lumber horizontally;
(6.) Covering the lumber with building paper;
(7.) Finishing the inside, on the paper, with dressed lumber.

The Curing-Room walls should be finished in a manner similar to those of the Making-Room; and the ceilings of both should be finished with dressed lumber on building paper. Storage room for cheese boxes should be provided in the loft over the Curing-Room. The building will be better by being painted inside and outside.

Floors. The floor of the Making-Room and Press-Room should be of 1½ inch red pine, tongued and grooved, nailed on the joists. It should receive two coats of oil, applied hot; the last coat may be coloured, so as to stain it dark. The floor of the Curing-Room should be of 1 inch lumber nailed on the joists, with tarred building paper on it; and on top of these, 1¼ inch tongued and grooved flooring.

Doors. The door at G, in Fig. I and the corresponding doors in Figs. III and IV should be 4 feet 6 inches wide, to admit the Milk Vats, etc. The doors between the Boiler-Room C, and the Making-Room A, and between the Press-Room B, and the Making-Room A, in Figs. I and III should be sliding doors.

Windows. All the windows should be provided with sashes, suited for opening at the top and bottom; and those in the Curing-Room should have close shutters, by means of which the Room can be kept dark when so desired.

Ventilation. One ventilating box from the ceiling of the Making-Room and two from the ceiling of the Curing-Room should run through the roof. Into the Curing-Room, an air drain at least 100 feet long, may admit cool fresh air through the floor.

In case a dwelling for the cheese-maker is required, it may be provided, by making the studs of the side walls, high enough to permit of the loft-story, over the Curing-Room or Curing-Room and Making-Room, being fitted up for that purpose.

EQUIPMENT.

Apparatus and utensils for a cheese factory of 500 to 700 cow capacity:—
1 Steam Boiler of 8 horse power.
1 Engine of 6 horse power.
1 Water Injector.
3 Milk Vats of 5,000 pounds capacity each.
24 Cheese Presses (upright or gang).
3 Curd Sinks.
1 Curd Cutter or Curd Mill.
1 Hoisting Crane.
1 Weighing Can of 500 pounds capacity.
1 Milk Conductor.
1 Curd Knife (perpendicular).
1 Curd Knife (horizontal).
Weighing Scales:—1 pair for Milk, 1 pair for Cheese, and 1 pair for Salt.
2 Thermometers, 2 Floating Thermometers.
Milk Testing Instruments.

1 Babcock or other Milk-Tester.
1 Graduated Measuring-Glass 8 ounces; and 1, 16 ounces.
24 Press Rings.
3 Rakes for stirring Curd.
1 Flat-sided Curd Pail.
1 Bandager.
2 Floor Brushes and Rubber Scraper.
3 Tin Pails, large Dipper, and small Dipper and Strainer.
Steam Pipes, Water Pipes and Hose connections.
Stencils, Stencil Plates, and Brush for branding.
1 Cheese Trier.
1 Water Tank of 10 barrels capacity.
1 Water Barrel.
1 Whey Tank of 55 barrels capacity.
1 Inspirator or Pump for elevating whey.

For a cheese factory of 300 to 500 cow capacity a similar equipment is required; but the following changes may be made:—
1 Steam Boiler, 6 horse power.
No Engine.
2 Milk Vats of 5,000 pounds capacity each.
18 Cheese Presses.
2 Curd Sinks.
18 Press Rings.
2 Rakes for stirring curd.
1 Whey Tank of 40 barrels capacity.
All the other apparatus and utensils, the same as for the larger factory.

MANAGEMENT.

The By-laws have set forth the nature of the management and the duties and powers of most of the officers. These notes concerning the duties of the cheese-makers and milk-drawers may be added.

Duties of Cheese-makers.

1. It shall be the duty of the cheese-maker to use his best endeavours to manufacture an article of uniformly fine merchantable cheese.
2. He shall be responsible for and make good in money, any loss that may be sustained from the making of inferior cheese through carelessness, neglect or incapacity.
3. He shall keep a correct record of the weight of milk furnished by each *patron* and deliver the same to the Secretary of the Company (or Association).
4. He shall test the milk of each *patron* from time to time, to assure himself that it is pure, wholesome, honest, and of good average quality.
5. He shall inspect the milk-cans and report upon their condition to the Directors.
6. He shall inspect the milk waggons and report upon their condition as to cleanliness, &c., to the Directors.
7. He shall enter in a pass book for each *patron*, a record of the weight of milk received in his or her name.
8. He shall keep the factory and its utensils clean.
9. He shall care for the cheese until they are cured, or until one month after the close of the manufacturing season; and he shall use every reasonable precaution to maintain the temperature of the curing-room at the points, where it is most suitable for the curing process at different seasons of the year.
10. He shall see that the whey tank is thoroughly cleaned at least once a week.
11. He shall see that the surroundings of the premises are kept free from bad odours.

12. He shall use his best endeavours to advance the interests of the *manufacturer* and the *patrons*.

13. In case any of the *patrons* or Directors shall find the weighing can, milk conductor, milk vats, curd sinks, curd cutter, cheese presses or any other utensil, or the floor of the factory, in a filthy state, whereby the quality of the milk or cheese is liable to be injured, the sum of $1.00 for every such offence and every such utensil shall be deducted from the monies coming to the cheesemaker from the *manufacturer*.

Milk Drawers.

The agreement with the milk-drawers should stipulate:—

1. That they shall keep their milk waggons clean and free from all bad smells.
2. That they shall protect the milk cans against damage.
3. That they shall use straps or ropes to prevent spilling or waste.
4. That they shall be liable for all loss incurred through their negligence or fault.
5. That they shall be liable to a fine of $1.00 for every time when they fail to reach the factory at or before the stipulated time of 9 a.m., unless they furnish to the Directors a good and sufficient reason.
6. In a case where whey is returned to the *patrons*, they shall apportion to each *patron*, and deliver upon his milk-stand such quantities as may be decided upon by the cheese-maker.

NOTE.—A table is appended to this Bulletin setting forth the quantities of whey that may be returned in each can, for a given quantity of milk received.

SUGGESTIONS.

Bulletins of instructions on the care of milk for cheese-factories, should be sent to each *patron*. Copies of these may be obtained free by application to the office of the Dairy Commissioner, Ottawa. A dodger setting forth a few points on the care of milk, may with advantage be prepared by the *manufacturer* or cheesemaker and sent to each *patron* in the milk-can once a month.

A Special Committee on the adulteration of milk should be appointed for each factory; and they should discharge their duties so as to entirely eliminate the dishonest practices of watering, skimming, or keeping back the strippings of the milk.

Milk pass-books should be sent to each *patron* once every week or once every fortnight, with a record of the quantities of milk which have been credited at the factory.

When the distribution of proceeds is made, a statement should be furnished to each *patron* setting forth the details of his or her account.

At the end of each season, an annual statement of the business of the year should be furnished to the *patrons*. It should set forth:—

(1.) The number of days during which the factory was in operation;
(2.) The number of *patrons* who furnished milk;
(3.) The total quantity of milk received;
(4.) The total quantity of cheese manufactured;
(5.) The average price for which the cheese of each month's make was sold;
(6.) The average quantity of milk required to make a pound of cheese during each month;
(7.) The total value of the cheese sold;
(8.) The total amount of money distributed to the *patrons*;
(9.) An abstract of the annual statement of the Treasurer of the Company (or Association).

Similar statements of the business of the Company (or Association), together with a summary of the Treasurer's report, should be furnished annually to the office of the Dairy Commissioner at Ottawa.

CREAMERIES ON THE CREAM-GATHERING PLAN.

NOTE.—The By-laws from I to XXXV, on pages 9 to 14, are suitable for cheese factories or creameries; to those should be added for creameries on the cream-gathering plan, the following:—

RULES AND REGULATIONS.

1. The Company (or Association), hereinafter called the "*manufacturer*," shall collect the cream, manufacture and store the butter, provide packages and all necessary furnishings, at a charge of.....for every pound of butter which is manufactured;

1*a*. The "*manufacturer*" shall charge each shareholder for the manufacturing of the cream furnished by him or her, at the rate of.....per pound of butter, up to.....pounds of butter per share of $.....in the stock of the Company (or Association) held by him or her, and shall charge all non-shareholders a rate of.....per pound of butter; in consideration of which the *manufacturer* will manufacture the butter, store it, provide packages and all necessary furnishings.

2. *Patrons* who may be dissatisfied with the measurements of their cream, must report the same to the Directors, who shall adjust and settle the matter.

3. The cream of each *patron* shall be tested at least twice during each week of the season; and the cream shall be valued according to its quality as revealed by such test.

4. Each *patron*, upon being notified, shall convey in a waggon or otherwise, his or her share of the butter which has been manufactured, from the factory to the point of delivery as agreed upon by the *Salesman*; and failure to comply with this rule will subject the *patron* to a fine of $2.00, which shall be deducted from his or her share of the receipts from the sales of butter. It is open to any *patron* to find a substitute for the drawing of the butter.

5. Each *patron* shall be entitled to the butter required for use on his or her own table at the wholesale price, but no quantity shall be put up in less than.....pounds.

6. In the case of any *patron* who does not continue to furnish the cream from his or her herd to the creamery until the close of the manufacturing season, a sum equal to.....cents per pound of all the butter manufactured from the cream furnished during the season, shall be deducted from his or her share of the receipts, unless he or she shall have first obtained the consent of the Directors to such discontinuance.

7. The *manufacturer* shall insure the butter in one or more Insurance Companies to any extent; but the *manufacturer* will not be responsible for any of the butter which may be destroyed, other than for the amount received by the said *manufacturer* from the Insurance Companies.

8. The cream shall be furnished from the milk of only healthy cows which are fed upon wholesome feed with access to plenty of pure water and salt; they shall be prevented from eating any feed which will give an injurious flavour or taint to the butter.

9. The pastures, yards and lanes shall be kept free from carrion and all decaying matter which may cause noxious smells.

10. The cream furnished by each *patron* shall be clean, pure and sweet; and, in case any grounds should exist for suspecting that the bulk of the cream as furnished by any *patron* is not in every sense similar to the sample taken for use in the *test*, a Committee appointed by the Directors shall visit the premises of the *patron* and make examination for themselves regarding such matter, and if any unfair or dishonest practice shall be proven to have existed, it shall be optional with the Directors as to whether they shall (1) prosecute the *patron* according to law, (2) effect a settle ment with him or her upon the payment to the funds of the *manufacturer* of such a sum as may be agreed upon, or (3) exclude the *patron* from the privileges of the creamery for a stated number of years.

11. Milk must be drawn from the cows in a cleanly manner; the udders should be brushed or washed, and milking with dry hands is preferable to the practice of dipping the fingers in the pail in order to moisten them.

12. Immediately after the milk is drawn from the cow, it should be strained through a wire or cloth strainer.

13. All pails and other utensils with which the milk is brought into contact must be of tin; the use of wooden pails for milking or holding milk is strictly forbidden; and any contravention of this rule will subject the *patron* to the liability of being deprived of the privileges of the creamery.

14. The milk must be kept in a place where the atmosphere is free from foul and injurious smells.

15. Vessels in which the milk is set shall be kept clean and sweet, and the tank into which the vessels are set shall be kept free from bad odours; and if a cream collector shall discover the setting vessels or water tank of any *patron* to be in a state unfit for the keeping of milk without detriment to its quality, he shall notify the butter-maker of that fact, who shall report the same to the *patron* and Directors. After the first offence, the *patron* may be subjected to a fine of 50 cents for every time that a setting vessel or tank shall be found in an unclean condition.

16. Buttermilk at the creamery shall be disposed of as the *patrons* determine at the Annual Meeting. The cream collector under the instructions of the butter-maker shall reject any cream which he considers to be unfit for use in the manufacturing of the finest quality of butter, and the butter-maker's judgment in the matter shall be final.

17. Each *patron* who furnishes cream to the creamery is thereby considered as having agreed to the foregoing rules and regulations.

CONSTRUCTION.

LOCATION AND SITE.

For the erection of a creamery and the establishment of co-operative dairying upon the cream-gathering plan, a *location* should be selected which is central and convenient to a section of country adapted for and inclined towards dairying.

The *site* should be:—

(1) Suited for easy and effective drainage,
(2) Supplied with an abundance of pure cold water,
(3) Easy of access by good roads.

PLANS.

The following sketches and plans illustrate the size and arrangement of the structure required for the carrying on of the business :—

FIG. VII.

This Fig. shews the plan for a Creamery under the cream-gathering plan of 700 to 1,000 cow capacity.

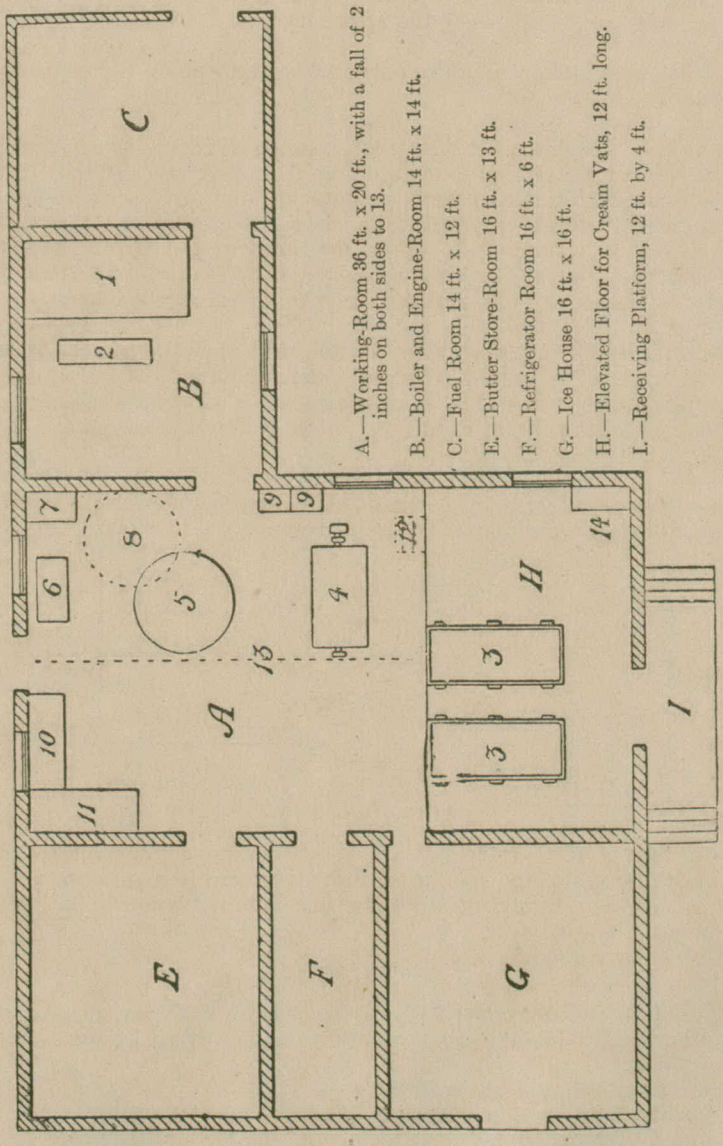
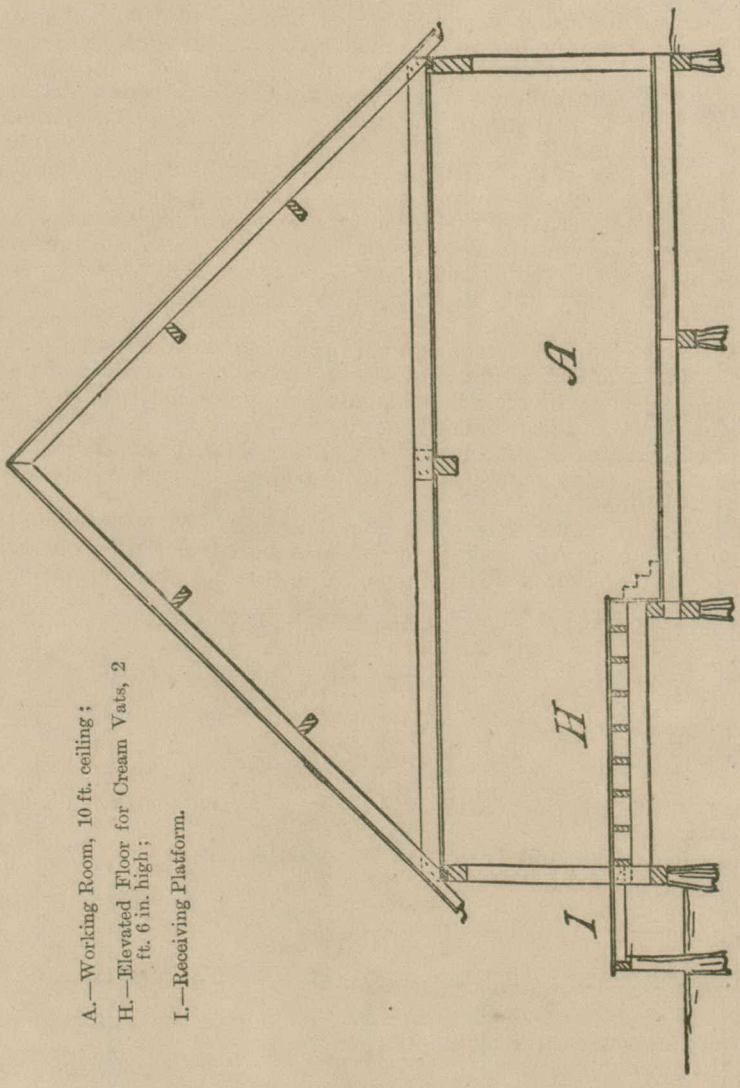


FIG. VIII.

Fig. VIII shews a section of Fig. VII.



BUILDINGS.

The buildings may be constructed by the use of a frame of square timbers mortised together, or by the erection of a balloon frame of 2 in. by 6 in. studs, placed on sills 8 in. by 8 in.

Walls.—The walls should be finished by:—

(1) By placing 2 in. by 6 in. scantling 16 inches apart;
(2) Nailing on the outside of these studs 1 in. lumber horizontally;
(3) Covering the lumber with building paper;
(4) Finishing the outside, on the paper, with boards and battens, or with V siding;

(5) Nailing on the inside of the studs, 1 inch lumber horizontally;
(6) Covering the lumber with building paper;
(7) Finishing the inside, on the paper, with dressed lumber.

The walls of the Ice-house G, Refrigerator F, and Butter Store-room E should be constructed by the use of studs 2 in. by 4 in. placed 16 inches apart. On one side of these, building paper should be tacked, and then a 2 in. by 2 in. strip should be nailed up and down the face of each stud. The further construction of the walls, both inside and outside, may be the same as for the rest of the buildings, namely,—two ply of lumber with building paper between, on both sides of the studs. The Ice Box K, over E and F, as shewn in Fig. 10, should be constructed in a manner similar to the walls of G, E and F.

Floors.—The floor of the Refrigerator and Butter Store-room should be of one-inch lumber nailed to the joists with building paper on it, and on top of this 1½ inch red pine, tongued and grooved. The floor of the Working-Room A and H should be of 1½ inch red pine, tongued and grooved, nailed to the joists. It should receive two coats of oil, applied hot; the last coat may be coloured, so as to stain it dark.

A clay or earth floor in G, B and C will be quite sufficient.

Storage room for Butter Tubs, &c., should be provided in the loft over the Working-room. The building should be painted inside and outside.

Doors.—The door at I in Fig. VII, and the doors in the corners of the Working-room A, Fig. IX, should be 4 ft. 6 in. wide, to admit the Cream Vats or Milk Vats, &c. The doors between the Boiler-room B and the Working-room A, in Figs. VII and IX, should be sliding doors, as also should be the doors between A and H in Fig. IX.

Windows.—All the windows should be provided with sashes, suited for opening at the top and bottom.

Ventilation.— One ventilating box from the ceiling of the Working-room should run to the roof and also one through the elevated ceiling of the Ice-house G.

In case a dwelling for the butter-maker is required, it may be provided by using studs for the side walls high enough to permit of the loft-storey over the Working-room being fitted up for that purpose.

EQUIPMENT.

Utensils for a creamery under the cream-gathering plan of 700 to 1,000 cow capacity:—

1 Steam Boiler of 8 horse power.
1 Steam Engine of 8 horse power.
Water Injector.
2 Cream Vats of 300 gallons capacity each.
1 Cream Conductor.
Strainers for Cream Vat, for Churn, and Hair Sieve for Buttermilk.
1 Churn of 200 gallons capacity.
1 Butter-Worker.
Weighing Scales:—1 pair Platform Scales for Butter, 1 pair of Counter Scales for Butter, 1 pair for Salt.
2 Butter Spades, 1 Butter Paddle, 2 Butter Ladles.
Oil-test Churn with cream-collectors' cases complete.
2 Thermometers, 2 Floating Thermometers.
Butter Printer.
Graduated Measuring Glass, 8 ounces.
Stencil Plates and Brush for branding.
Butter Trier.
3 Tin Pails.
1 Large Dipper, 1 Small Dipper, 1 Strainer Dipper,

Shafting, Belting, Steam Pipes and Water Pipes connected with Hose.
Floor Brushes and Rubber Scraper.
1 Water Tank of 20 barrels capacity.
1 Cold Water and 1 Hot Water Tank.
1 Butter-milk Tank.

REQUIREMENTS AT THE FARMS.

Besides these apparatus and utensils it will be necessary that every *patron* should have conveniences for the separation of the cream from the milk. Where a large herd is owned, the use of a small hand separator may be found economical. In other cases the deep-setting system will give the best returns, considering the cost of the utensils, the labour involved, and the quantity and quality of the cream obtained. The ordinary deep-setting pail is 20 inches deep and 8½ inches in diameter. It holds 35 pounds of milk conveniently. Any dairyman can reckon the number which he will require from that data, bearing in mind the fact that enough vessels should be available for holding both the morning's and evening's messes of milk. An extra pail or two should also be available for holding the cream. Two inches in depth of a can 8½ inches in diameter contain 113 cubic inches, which quantity has been called "a standard creamery inch."

Sometimes a foolish rivalry arises between the *patrons* who furnish cream to creameries, in the effort to furnish cream which will yield a large test of butter per "inch." The attention of the *patrons* should be directed to securing the *largest possible quantity of butter* from the milk which has been set, and that in conjunction with *furnishing cream in the best condition* for the making of fine butter. It is but seldom possible to obtain these, viz.:—the largest quantity of butter from the milk and cream in the best condition, if the cream which is sent to the creamery is exceedingly rich in butter-fat.

The milk should be set as quickly as possible after it is drawn from the cows. The pails or setting vessels should be placed in cold water, in order that their contents may be cooled quickly to 45 degrees or lower. After they are set they should be left undisturbed until the skimming is commenced. Ordinarily they should be left at perfect rest for over 20 hours. When the cream has been removed from the milk, it should be kept as cold as possible until the *collector* receives it or until it is delivered to the creamery.

MANAGEMENT.

The By-laws, Rules and Regulations have set forth the nature of the management and the duties and powers of most of the officers. These additional notes concerning the duties of the butter-makers and cream collectors may be added:—

Duties of Butter-Makers.

1. It shall be the duty of the butter-maker to use his best endeavours to manufacture an article of uniformly fine merchantable butter.

2. He shall be responsible for and make good in money, any loss that may be sustained from the making of inferior butter through carelessness, neglect, or incapacity.

3. He shall keep a correct record of the quantity of cream furnished by each patron and of the quality of the same, as revealed by the oil-test churn or other testing apparatus, and deliver the same to the Secretary of the Company (or Association).

4. He shall test or cause to be tested, the cream furnished by each patron at least.....times every week during the season.

5. He shall inspect the cream-collecting waggons and the cream-collecting cans or tanks, and report upon their condition as to cleanliness, etc., to the Directors.

6. He shall keep the creamery and its utensils clean.

7. He shall care for the butter until the close of the manufacturing season; he shall see that all butter which is not in air-tight packages, is brined at least once

every fortnight; and he shall use every reasonable precaution to maintain the temperature of the store-room at a point which is most suitable for its preservation.

8. He shall see that the surroundings of the premises are kept free from bad odours.

9. He shall use his best endeavours to advance the interests of the *manufacturer* and the *patrons*.

10. In case any of the *patrons* or Directors shall find any of the utensils or the floor of the creamery in a filthy state, whereby the quality of the butter is liable to be injured, a sum of $1.00 for every such offence and every such utensil, shall be deducted from the monies coming to the butter-maker from the *manufacturer*.

Cream Collectors.

The cream-collectors should be furnished with cream-collecting cans or a cream-gathering tank. Besides the inside tin of these, they should be finished with some non-conducting sides, in order to protect the cream against the influences of hot weather while in transit. Double sides with a hollow space of $\frac{3}{4}$ of an inch between, will suffice in the case of circular cans. Wooden sides with hollow spaces made by the use of paper should surround the tin lining of the gathering tanks. In both cases a float should rest on the top of the cream, to prevent agitation from effecting any churning.

Each cream-gatherer should also have a *measuring can* 12 inches in diameter. One inch in depth in a 12-inch can, contains practically the same quantity of cream as 2 inches in an $8\frac{1}{2}$-inch can; that is "a standard creamery inch."

He should also be furnished with a set of cream-testing tubes to be used in an Oil Test Churn. These tubes are numbered. After the cream has been properly measured in a pail 12 inches in diameter, its whole volume should be properly mixed by pouring from one vessel to another not less than three times. After that treatment, a sample of the cream should be taken in one of the test tubes, and the number of the same recorded opposite to the number or name of the *patron*.

NOTE.—When these samples are truly representative of the cream which is furnished by any *patron*, the butter-maker can discover and calculate the quantity of butter which that particular cream will produce, in order that an equitable distribution of the proceeds may be effected.

The cream-collector should also enter into a pass book to be retained by each *patron*, the number of inches of cream with which he or she has been credited; and a monthly statement should be furnished to each *patron* showing the quantity of butter which the cream he has furnished has produced per "inch."

BY-PRODUCTS.

The disposal of the buttermilk can be arranged according to the preferences of the *patrons* and the *manufacturer*. For pig feeding it may be estimated as having a value equal to the production of 5 pounds of increase in live weight, per 100 pounds of butter-milk.

REPORTS.

Statements to each *patron* of the particulars of his account with the *manufacturer* should be furnished to every *patron*, when a distribution of the proceeds from a sale is made. An annual return should also be made to the office of the Dairy Commissioner at Ottawa. It should set forth:—

(1.) The number of days during which the creamery was in operation;

(2.) The number of *patrons* who furnished cream;

(3.) The total quantity of cream received—in inches or other units of measurement;

(4.) The number of these required to yield one pound of butter during each month;

(5.) The total quantity of butter made;

(6.) The average price for which the butter of each month's make was sold;

(7.) The total value of the butter sold;
(8.) The total amount of money distributed to the *patrons*;
(9.) An abstract of the Annual Report of the Treasurer of the Company (or Association).

CREAMERIES ON THE CENTRIFUGAL-SEPARATOR PLAN.

NOTE.—The by-laws from I to XXXV, on pages 9 to 14 are suitable for cheese factories or creameries ; to them should be added for creameries on the centrifugal-separator plan the following :—

RULES AND REGULATIONS.

1. The Company (or Association), hereinafter called the *manufacturer*, shall draw the milk, manufacture and store the butter, and provide packages and all necessary furnishings at a charge of.....for every pound of butter which is manufactured;

or

1*a*. The *manufacturer* shall charge each shareholder for the manufacturing of the milk furnished by him or her, at the rate of.....per pound of butter, up to..... pounds of butter per share of $.....in the stock of the Company (or Association) held by him or her, and shall charge all non-shareholders a rate of.....per pound of butter; in consideration of which the *manufacturer* will manufacture the butter, store it, provide packages and all necessary furnishings.

2. *Patrons* who may be dissatisfied with the weights of their milk recorded at the factory, must report the same to the Directors, that they may adjust and settle the matter.

3. The milk of each *patron* shall be tested at any time during the season ; and at the discretion of the Directors, a statement of the quality of the milk of all the *patrons* shall be posted up in the creamery in a conspicuous place, where it may be seen by all the *patrons* and shareholders.

4. Unless milk is being tested and valued according to its percentage of butter-fat, the following shall be in force:—In case any milk furnished should be of such doubtful quality as to warrant the assumption that it has been adulterated, a committee appointed by the Directors shall visit the premises of the *patron*, see his or her cows milked morning and evening, and have the quality of such milk compared with the record of the tests made of the milk which he or she was previously furnishing; and, if a substantial difference in the quality is evident, it shall be optional with the Directors as to whether, they shall (1) prosecute the *patron* according to law, (2) effect a settlement with him or her upon the payment to the funds of the *manufacturer* of such a sum as may be agreed upon, or (3) exclude the *patron* from the privileges of the creamery for a stated number of years.

5. Each *patron* upon being notified, shall convey in a waggon or otherwise, his or her share of the butter which has been manufactured, from the creamery to the point of delivery as agreed upon by the *Salesman* ; and failure to comply with this rule will subject the *patron* to a fine of $2.00, which shall be deducted from his or her share of the receipts from the sales of butter. It is open to any *patron* to find a substitute for the drawing of the butter.

6. If any *patron* should send to the creamery upon the milk waggons engaged by the *manufacturer*, milk which is sour or unfit for use in butter-making, such milk shall be returned to his or her milk-stand and a charge sufficient to pay the *manufacturer* for the expense of drawing it to the creamery, and to the milk-drawer for returning it to the milk-stand, shall be made in every such case. The decision of the Directors in this matter shall be final.

7. Each *patron* shall be entitled to the butter required for use on his or her own table at the wholesale price, but no quantity shall be put up in less than.....pounds.

8. In the case of any *patron* who does not continue to furnish the milk from his or her herd to the creamery until the close of the manufacturing season, a sum equal

to.....cents per pound on all the butter manufactured from the milk which they have furnished during the season, will be deducted from his or her share of the receipts, unless he or she shall first have obtained the consent of the Directors to such discontinuance.

9. The *manufacturer* shall insure the butter in one or more Insurance Companies to any extent; but the *manufacturer* will not be responsible for any butter which may be destroyed, other than for the amount received by the said *manufacturer* from the Insurance Companies.

10. Milk shall be supplied from only healthy cows, which are fed upon wholesome food with access to plenty of pure water and salt.

11. The pastures, yards and lanes shall be kept free from carrion and all decaying matter which may cause noxious smells.

12. Each *patron* shall furnish pure sweet milk, to which nothing has been added and from which no part has been removed or kept back; and if any be reserved, it shall be of the average quality of milk given by the herd of cows.

13. Milk should be drawn from the cows in a cleanly manner; the udders should be brushed or washed; milking with dry hands is preferable to the practice of dipping the fingers in the pail in order to moisten them.

14. Immediately after the milk is drawn from the cow, it should be strained through a wire or cloth strainer.

15. All pails and other utensils with which the milk is brought into contact must be of tin; the use of wooden pails for milking or holding milk is strictly forbidden; and any contravention of this rule will subject the *patron* to the liability of being deprived of the privileges of the creamery.

16. The milk shall be aërated by dipping, pouring or stirring, or by the use of an aërator; during hot weather after it has been aired, it should be cooled quickly to at least the temperature of the atmosphere; the milk-can should never be left in a tub of water over night, unless the milk has been previously cooled to below 60 degrees.

17. The milk must be kept in a place where the atmosphere is free from foul and injurious smells.

18. Unless milk is being tested and valued according to its per cent. of butter-fat, the following shall be in force:—Milk that is left without the protection of some roof shall be protected from the falling of rain, either by turning the lid of the milk-can upside down over it, or any other efficacious means; and, if on any occasion when rain has fallen, the butter-maker discovers by the use of the testing instruments that a percentage of added water is present, he shall deduct from the weight of the milk, a number of pounds equal to the quantity of added water that is revealed by the use of the lactometer.

19. The night's and morning's messes of milk shall be kept in separate vessels until the arrival of the milk waggon.

20. The milk-cans shall be kept clean and sweet, and when a butter-maker shall discover the can of any *patron* in a state unfit for the carrying of milk without detriment to its quality, he shall notify the *patron* of that fact and report the same to the Directors. After the first offence the *patron* may be subjected to a fine of 50 cents for every time that the can shall be sent to the creamery in an unclean condition.

21. The Directors or any of the *patrons* may inspect the cans on any of the waggons or stands at any time, and report the same to the butter-maker, or other officers of the *manufacturer*.

22. Each and every milk-can shall be washed with cold or tepid water andscalded with boiling water once a day; they should afterwards be aired.

23. All milk to be conveyed to the creamery on the public milk-waggons shall be delivered on the side of the public highway (unless otherwise arranged by the Directors) upon a milk-stand of convenient height, and which will afford shade from the sun and protection against rain.

24. The surroundings of the milk-stand shall be kept clean and free from bad smells; and the feeding of swine within 100 feet of the milk-stand is strictly forbidden.

25. The milk shall be delivered on the milk-stand at a time to suit the convenience of the milk drawer, who shall not leave any milk-stand before 5:30 a.m. and who shall reach the creamery with his load not later than 9 a. m.

26. The skim-milk and butter-milk shall be disposed of, as the *patrons* determine at the Annual Meeting.

27. The butter-maker shall reject any milk which he considers to be unfit for use in the manufacture of the finest quality of butter; and his judgment in the matter shall be final.

28. Each *patron* who furnishes milk to the creamery is thereby considered as having agreed to the foregoing rules and regulations.

CONSTRUCTION.

LOCATION AND SITE.

For the erection of a creamery and the establishment of co-operative dairying upon the centrifugal separator plan, a *location* should be selected which is central and convenient to a section of country adapted for and inclined towards dairying.

The *site* should be,—

(1.) Suited for easy and effective drainage,

(2) Supplied with an abundance of pure cold water,

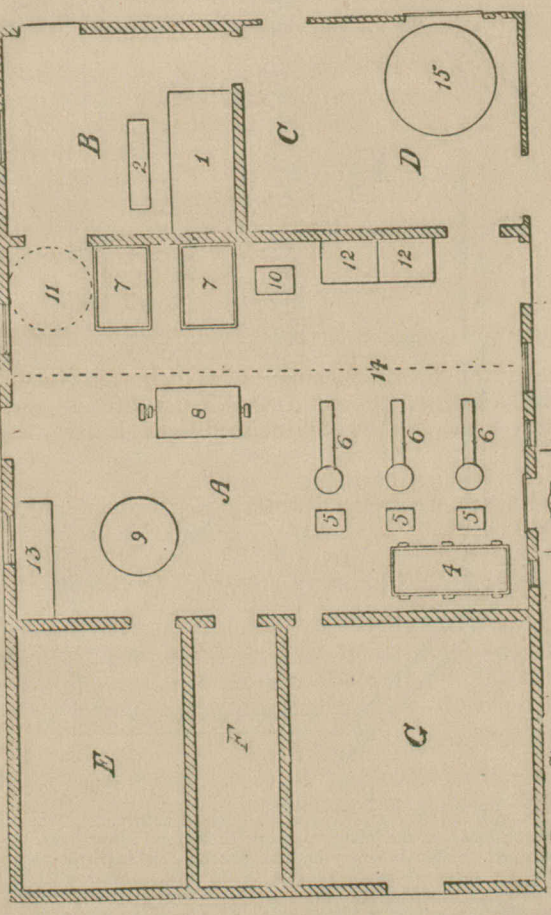
(3) Easy of access by good roads.

PLANS.

The following sketches and plans illustrate the size and arrangement of the structure required for the carrying on of the business:—

FIG. IX.

This Fig. shews the plan for a Creamery under the centrifugal separator plan of 500 to 700 cow capacity.

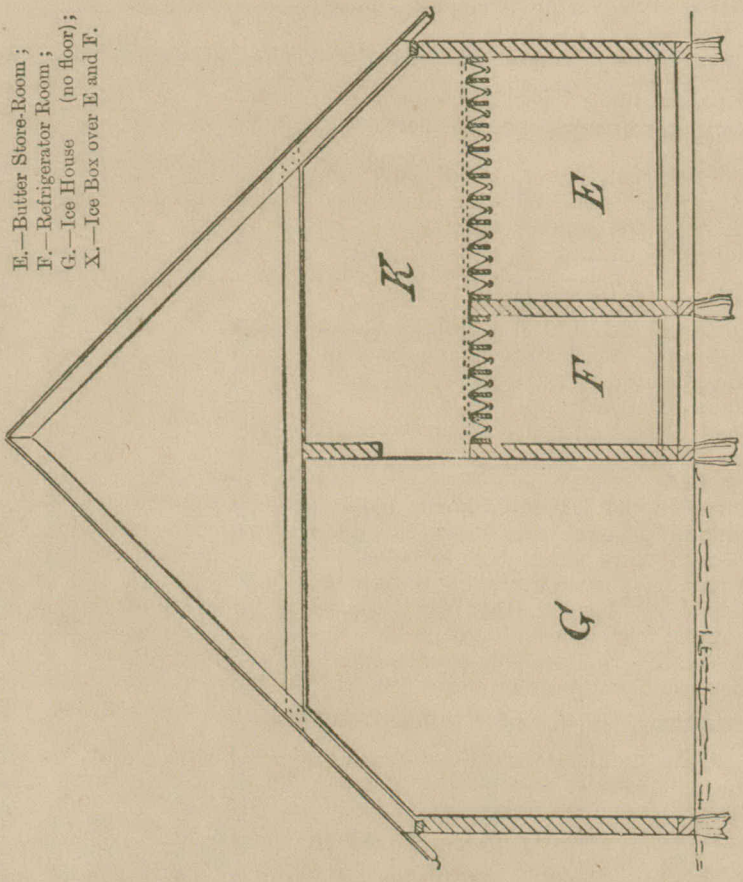


A.—Working Room, 36 ft. x 26 ft.;
B.—Boiler and Engine Room, 16 ft. x 14 ft.;
C. and D.—Shed for fuel and Skim-milk Tank, 19 ft. 6 in. x 14 ft.
E.—Butter Store-room, 18 ft. x 12 ft.;
F.—Refrigerator Room, 18 ft. x 6 ft.;
G.—Ice House, 18 ft. x 17 ft.;
H.—Milk-weighing Platform, 3ft. 6 in. x 7 ft. and 4 ft. 6 in. high.
I.—Covered Roadway.

1. Steam Boiler; 2. Engine; 3. Weighing Can and Scales; 4. Milk Receiving Vat; 5. Heaters; 6. Centrifugal Separators; 7. Cream Vats; 8. Churn; 9. Butter-worker; 10. Milk Tester; 11. Water Tank, placed overhead; 12. Hot and Cold Water Tanks; 13. Table; 14. Line in floor towards which it falls from both sides; 15. Skim-milk Tank; 16. Butter-milk Tank in D.

FIG. X.

Fig. X shews a section of Figs. IX and VII.



NOTE.—The ceiling in E and F is 7 ft. 6 in. high and is finished with joists, 2 in. x 10 in., placed 12 inches apart ; between the joists, V-shaped galvanised iron troughs are laid ; they are soldered over the top of every joist to prevent leaking ; to the troughs at the lowest points are attached small troughs, 1½ in. wide, to receive the drip from the condensation of water which takes place on the E and F side of the galvanized iron ; the troughs all have a fall of 1 inch to one side of the building, where the water from melted ice, and the water from the drip in the small under-troughs is received and conducted out. One door between G and K serves for the putting of ice into the Ice Box K. The partition between E and F prevents the butter in the Store-Room E, from being affected by the changes in temperature, which are consequent upon the frequent openings of the door, between F and the Working-Room, during working hours.

BUILDINGS.

The buildings, floors, doors, &c., may be constructed in a manner similar to the described for a creamery on the cream-gathering plan, at pages 34 and 35.

EQUIPMENT.

Utensils for a creamery under the centrifugal separator plan of 500 to 700 cow capacity:—

Steam Boiler of 10 horse power.
Steam Engine of 10 horse power.
Water Injector.
1 Weighing can of 500 pounds capacity.
1 Milk Conductor.
1 Milk Receiving Vat of 3,000 pounds capacity.
Centrifugal Cream Separators of total capacity of 3,000 to 4,000 pounds per hour.
1 Babcock Milk Tester, or 1 Fjord's Controller.
Strainers for Cream Vat, for Churn, and Hair Sieve for Butter-milk.
1 Churn of 200 gallons capacity.
1 Butter Worker.
Weighing Scales—1 pair Platform Scales for Butter, 1 pair of Counter Scales for Butter, 1 pair for Salt.
2 Butter Spades, Butter Paddle, 2 Butter Ladles.
2 Thermometers, 2 Floating Thermometers.
Butter Printer.
Graduated Measuring Glass, 8 oz.
Stencil Plates and Brush for Branding.
Butter Trier.
3 Tin Pails.
1 Large Dipper, 1 Small Dipper, and 1 Strainer Dipper.
Shafting, Belting, Steam Pipes and Water Pipes connected with Hose.
2 Floor Brushes and Rubber Scraper.
1 Water Tank of 20 barrel capacity.
1 Cold Water Tank, 1 Hot Water Tank, and 1 Buttermilk Tank.
1 Skim-milk Heater and Cooler.
1 Skim-milk Tank of 6,000 pounds capacity.
1 Inspirator or Pump for elevating Skim-milk.

MANAGEMENT.

The By-Laws, Rules and Regulations have set forth the nature of the management and the duties of most of the officers. These notes concerning the duties of the *butter-makers* and *milk-drawers* may be added:—

Duties of the Butter-Maker.

1. It shall be the duty of the butter maker to use his best endeavours to manufacture an article of uniformly fine merchantable butter.
2. He shall be responsible for and make good in money, any loss that may be sustained from the making of inferior butter through carelessness, neglect, or incapacity.
3. He shall keep a correct record of the weight of milk furnished by each *patron* and deliver the same to the secretary of the Company (or Association).
4. He shall test the milk of each *patron* from time to time, to assure himself that it is pure, wholesome, honest, and of good average quality.

NOTE.—A testing apparatus ought to be in every creamery operated upon the centrifugal-separator plan, whereby the quality of the milk for butter-making may be determined. The use of the Babcock Milk Tester is an efficacious, exact, simple, and cheap way of discovering the per cent. of butter-fat in milk.

5. He shall inspect the milk cans and report upon their condition to the Directors.
6. He shall inspect the milk waggons and report upon their condition as to cleanliness, &c. to the Directors.

7. He shall enter in a pass book for each *patron*, a record of the weight of milk received in his or her name.

8. He shall keep the creamery and its utensils clean.

9. He shall care for the butter until the close of the manufacturing season; he shall see that all butter which is not in air-tight packages, is brined at least once every fortnight; and he shall use every reasonable precaution to maintain the temperature of the store room at a point where it is most suitable for the preservation of the butter.

10. He shall see that the skim-milk tank is thoroughly cleaned at least once a week.

11. He shall see that the surroundings of the premises are kept free from bad odours.

12. He shall use his best endeavours to advance the interests of the *manufacturer* and the *patrons*.

13. In case any of the *patrons* or directors shall find any of the utensils or the floor of the creamery in a filthy state, whereby the quality of the butter is liable to be injured, a sum of $1.00 for every such offence and every such utensil shall be deducted from the monies coming to the butter-maker from the *manufacturer*.

Milk-Drawers.

The agreement with the milk-drawers should stipulate:—

1. That they shall keep their milk waggons clean and free from all bad smells;
2. That they shall protect the milk-cans against damage;
3. That they shall use straps or ropes to prevent spilling or waste;
4. That they shall be liable for all loss incurred through their negligence or fault;
5. That they shall be liable to a fine of $1.00 for every time when they fail to reach the creamery at or before the stipulated time of 9 a.m., unless they furnish to the Directors a good and sufficient reason;
6. In a case where skim-milk is returned to the *patrons*, they shall apportion to each *patron* and deliver upon his milk-stand such quantities as may be decided upon by the butter-maker.

BY PRODUCTS.

The skim-milk and buttermilk may be disposed of according to any mutually satisfactory agreement between the *patrons* and the *manufacturer*. Skim-milk and butter-milk may be counted as having a feeding value equal to the production of five pounds of increase in live weight of swine per hundred pounds of milk. Where the skim-milk is returned to the *patrons* for the feeding of calves, it may be treated by a heater and cooler, so that it will be preserved sweet for 12 or 20 hours after it is returned.

REPORTS.

Statements to each *patron* of the particulars of his or her account with the *manufacturer* should be furnished to every *patron* when the distribution of the proceeds of the sale is made. At the close of the season, an annual statement of the business of the year should be furnished to the *patrons*. It should set forth:—

(1.) The number of days during which the creamery was in operation;
(2.) The number of *patrons* who furnished milk;
(3.) The total quantity of milk received;
(4.) The total quantity of butter manufactured;
(5.) The average price for which the butter of each month's make was sold;
(6.) The average quantity of milk required to make a pound of butter during each month;
(7.) The total value of the butter sold;
(8.) The total amount of money distributed to the *patrons*.

These facts should be supplementary to the information given in the annual statement of the Treasurer of the Company (or Association). Similar statements of the business of the Company (or Association), together with a summary of the

Treasurer's report should be furnished annually to the office of the Dairy Commissioner at Ottawa.

TABLE showing the number of inches in depth, of Whey to be allowed in Milk Cans of different sizes, for Quantities of Milk from 30 to 360 pounds. The figures in the columns denote the inches of whey.

WEIGHT OF MILK IN POUNDS.	DIAMETERS OF MILK CANS IN INCHES.								
	20 in.	19 in.	18 in.	17 in.	16 in.	15 in.	14 in.	13 in.	12 in.
30	2	2	3	3	3	3	4	5	6
35	2	3	3	3	3	4	5	6	7
40	3	3	3	4	4	5	6	6	7
45	3	4	4	4	4	5	6	7	8
50	**3**	**4**	**4**	**5**	**5**	**6**	**7**	**8**	**9**
55	4	4	5	5	6	7	8	9	10
60	4	5	5	6	6	7	8	9	11
65	4	5	5	6	7	8	9	10	12
70	5	5	6	7	7	8	10	11	13
75	**5**	**6**	**6**	**7**	**8**	**9**	**10**	**12**	**14**
80	5	6	7	8	8	10	11	12	15
85	6	6	7	8	9	10	12	13	16
90	6	7	7	9	9	11	12	14	17
95	6	7	8	9	10	11	13	15	18
100	**7**	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**19**
105	7	8	9	9	11	13	15	16	19
110	7	8	9	10	11	13	15	17	20
115	8	9	10	10	12	14	16	18	21
120	8	9	10	11	12	14	17	19	22
125	**8**	**9**	**10**	**11**	**13**	**15**	**17**	**19**	**23**
130	9	10	11	12	13	16	18	20	24
135	9	10	11	12	14	16	19	21	
140	9	10	12	13	14	17	20	22	
145	10	11	12	13	15	17	20	23	
150	**10**	**11**	**12**	**14**	**15**	**18**	**21**	**24**	
155	10	11	13	15	16	19	22		
160	11	12	13	15	16	19	22		
165	11	12	14	16	17	20	23		
170	11	12	14	16	17	20	23		
175	**12**	**13**	**15**	**16**	**18**	**21**	**24**		
180	12	13	15	17	18	22	24		
185	12	14	15	17	19	22			
190	13	14	16	18	19	23			
195	13	14	16	18	20	23			
200	**13**	**15**	**17**	**18**	**20**	**24**			
205	14	15	17	19	21				
210	14	16	18	19	21				
215	14	16	18	20	22				
220	15	16	18	20	23				
225	**15**	**17**	**19**	**21**	**24**				
230	15	17	19	21	24				
235	16	18	19	22					
240	16	18	20	22					
245	16	18	20	23					
250	**17**	**19**	**21**	**23**					
260	17	19	22	24					
270	18	20	22						
280	19	21	23						
290	19	22	24						
300	**20**	**23**	**24**						
310	21	23							
320	21	24							
330	22								
340	23								
350	**23**								
360	24								

XIV.—REPORT OF THE ASSISTANT DAIRY COMMISSIONER.

(J. C. CHAPAIS, ESQ.)

ST. DENIS, QUE., December 31, 1890.

To Prof. JAMES W. ROBERTSON,
Dairy Commissioner,
Ottawa.

SIR,—In compliance with instructions which I have received from you, I beg to submit the following report, regarding the work which I have accomplished in my capacity as Assistant Dairy Commissioner for the Dominion. I was appointed to that position on the 1st of April, 1890; hence, my report covers a period of only eight months.

For the sake of clearness I have arranged this report in two distinct parts. The first contains a brief summary of my work since the date of my appointment. The second part presents the outline of a plan, of which a part has already been carried out, showing what is required to be done to promote the interests of the dairy industry.

1.—SUMMARY OF WHAT HAS BEEN DONE.

During these eight months, I devoted a large portion of my time to the delivery of lectures on dairy subjects in various parts of the Provinces of Quebec and New Brunswick in response to invitations which were received by me. Most of the lectures were given in the Province of Quebec, at the request of the Dairymen's Association of that Province, and in New Brunswick at the request of the Secretary of the Department of Agriculture there. They were delivered in the French language in the two provinces, mainly for the reason that I had been appointed Assistant Dairy Commissioner to meet the needs and wants of the French-speaking population of the Dominion, in connection with the development of that important industry. In all, I delivered 36 lectures, in 35 parishes or towns, situated in 17 counties. Of these, 26 parishes and 13 counties are in the Province of Quebec, and 9 parishes and 4 counties in the Province of New Brunswick. In the course of delivering these lectures, I met about 7,000 farmers, which gave me an average audience of 195 at each lecture. Below I have submitted the details of my visits:—

PROVINCE OF QUEBEC.

COUNTIES.	PARISHES.	COUNTIES.	PARISHES.
Beauce.	St. Ephrem.	Portneuf.	Cap-Santé.
"	St. Victor.	"	Deschambault.
"	St. Mary.	"	Portneuf.
Champlain.	St. Maurice.	"	St. Raymond.
Chicoutimi.	N.-D. de Laterrière.	Richelieu.	Sorel.
"	St. Alphonse.	Rimouski.	Bré.
Compton.	Cookshire.	"	Sacré-Cœur.
Dorchester.	St. Isidore.	"	St. Fabien.
"	St. Marguerite.	"	St. Mathieu.
L'Assomption.	L'Assomption.	"	St. Simon.
L'Islet.	St. Eugène.	Stanstead.	Ayers Flat.
"	St. Jean Port-Joli.	Témiscouata.	St. Arsène.
Lotbinière.	St. Pat. de Beaurivage.	"	St. Epiphane.

PROVINCE OF NEW-BRUNSWICK.

COUNTIES.	PARISHES.	COUNTIES.	PARISHES.
Kent.	Buctouche.	Victoria.	Edmundston.
"	Cocagne.	Westmoreland.	Fox Creek.
"	St. Louis.	"	Memramcook.
"	St. Mary.	"	Shediac.
Northumberland.	Rogersville		

I was very much gratified by the interest and friendly attention with which my lectures were listened to upon all occasions. Everywhere, the farmers seemed to be anxious to learn how they could best succeed in getting out of the ruts of routine work, which in too many places has caused agriculture to become unprofitable.

Besides the time occupied in travelling and lecturing, I prepared a translation into the French language of the Report of the Proceedings of the Second Convention of the Dairymen's Association of the Dominion of Canada, which was held in Ottawa. I also translated the Dairy Bulletins issued by the Dairy Commissioner from Ottawa. My correspondence with farmers is continuously growing, and through that means I am able to give a great deal of direct information to correspondents, in reference to the best way of promoting a development of the dairy interests in their localities.

2.—PLAN FOR THE PROMOTION OF DAIRY INTERESTS.

What I am about to write in this second part of my report, refers particularly to the French settlements in the Provinces of Quebec and New Brunswick—the two provinces which I was able to visit during the year. The farmers and business men of the Dominion with whom we have to do, in the discharge of duties arising from our position, may be referred to as of four different classes:—

1. Farmers who are settled on new lands, to whom it is important that such methods of cultivation and husbandry should be taught as will prevent them from exhausting the virgin fertility of the soil;
2. Farmers on lands which have been under cultivation for long years and which have been in a measure exhausted by improper methods of culture, to whom it is important that a knowledge should be imparted of a system of agriculture whereby the lost fertility of the land can be restored to it;
3. Farmers living upon exhausted lands and who are already seeking to restore their productiveness, to whom it is most important that a knowledge of the best methods of how to do so should be made known, in order to assist them in that work and at the same time to enable them in the meantime to realise the largest possible profits from their labor and lands;
4. Business men, owners of butter and cheese factories, and butter and cheese makers, to whom it is important that there should be made known from some authoritative source the best methods for carrying on the manufacturing industry in dairying, in reference to all parts of the practice from the handling of milk to the preparation of the finished product for the market, and also how and where to dispose of these products to the best advantage.

I will now say a few words about each of these classes and mention the work which I consider should be undertaken to make their position better.

1. *Farmers,—Settled on New Lands.*

There are three important things which ought to be taught to that class of farmers. The first is,—that all lands from which we draw crops of grain year after year continuously, without giving them rest, and from which the grain is all sold on the market, are inevitably doomed to a rapid exhaustion of fertility. The second is,—that in the Provinces of which I am now speaking, the modification of the system of continuous grain-growing and grain-selling into another system, which would consist in the rearing of cattle for meat production, is not yet profitable to the farmers, because the feed which they must gather to feed cattle during the seven months of stabling in winter, costs too much, to leave any profit from the sale of fattened cattle at the actual prices that may be obtained, since they have to compete with cattle breeders and feeders of the west, who can obtain the feed required for the fattening of their cattle at a very low cost. The third is,—that dairying which admits of the carrying on of mixed farming on the land and of consuming on the farm all of its coarse products, and of manufacturing from them through the medium of milking cows concentrated products, (which are profitable to sell on the market

while leaving for the soil the by-product of manure for the enrichment of the land), is the only husbandry which enables the farmers occupying new lands to cultivate them at a profit without exhausting the soil. At the same time dairying yields a sufficient profit to permit the return to the land, of some chemical fertiliser to replace that portion of its fertility which has been removed by the sale of milk and cheese. I have been called upon to demonstrate, that that can be done in one or two places; and there is no doubt that, through the medium of Bulletins like those which we began to publish this year,—and in which the question may be thoroughly and as simply as possible discussed and presented,—we may prevent a large number of settlers from falling into the mistakes of their forefathers, who from having followed the old system, have been obliged to leave their exhausted lands and emigrate.

2. *Farmers,—Owners of Exhausted Lands.*

There is no doubt that it is more difficult to induce a farmer of this class to accept a new method, than one of those mentioned under the last heading. Indeed, he who has come to the verge of ruin through routine and ignorance, feels the bad effects of his continued ignorance without seeking to account for the causes. Too often, he imputes to bad years, unfavourable seasons, the use of poor seed, an evil of which he himself is the only author. He must, therefore, be brought to make a thorough study of his own case in order to recognise his mistakes. We must make him know the value of manure; the necessity of producing and of keeping it in good condition for application to the land; and the methods of obtaining large quantities of it by manufacturing on the farm all coarse products of crops, instead of selling them. The inexorable law requires that we should give back to the land an equivalent of what has been taken from it. Lastly, he must be convinced that dairying is the only industry which in the actual state of markets, is competent to regenerate agriculture for him, for the reasons which have been set forth in the preceding paragraph.

If, to demonstrate these things to the farmers, lectures be given in clear, concise and unpretentious language, there is no doubt but that Bulletins explaining the same principles and corroborating the teachings of the lecturer are useful for carrying on the good work. Their influence is felt specially in those places where the farmers unite in one common endeavour to form associations, clubs or institutes, in which they can discuss together the new aspects of questions which have been put before them by the lecturer or the Bulletins.

3. *Farmers,—Owners of Exhausted Lands but who are engaged in the work of Restoration.*

It is much easier to help this class of farmers to improve their condition. Having reached the conviction, through their first efforts towards improvement that there are new methods which provide a means for restoring to the land its lost fertility, they desire to acquire further knowledge of these methods and also to put them into practice. An important matter for the lecturer, when he is before this class of farmers, is to proceed by way of demonstration and illustration. There is no place, no matter how far behind the age it may be, where there is not at least one farmer shrewder than the others, who farms—if not to perfection—better than his neighbours. To explain why he has more success, to show how he can do still better by improving the methods by means of which he has commenced to ameliorate his condition, is sufficent to induce others to strive to do like him, that they may also with certainty succeed. The first things to be remedied are want of drainage, want of manure, want of cattle. As a rule, farmers of this class are those who come most willingly to hear the lectures given, who desire to get the Bulletins, who take an agricultural paper, and who are most easily convinced of the advantages that arise from uniting in associations, such as the agricultural clubs, which exist in large numbers in the Province of Quebec. They consist of Parish Associations, and are similar to the Farmers' Institutes which have been organised in the Pro-

vince of Ontario in the form of county associations. These associations or clubs are of great benefit, by making the experience of many available for each, by providing for discussions of the different methods of farmers in the neighbourhood, by procuring Bulletins and agricultural papers, by making provision for clubs through which to buy new seeds, improved agricultural implements, and cattle of good breeds. By these and other ways, they help to promote great and rapid progress towards improvement in agriculture.

Those farmers who have already realised the benefits from association, are those who are most easily brought to form such associations for the manufacturing of butter and cheese. They open co-operative factories, bring their milk to them, take care to engage first-class makers to manufacture their products, are desirous to secure a good market, and from that time on they are sure to succeed and see prosperity taking the place of ruin. An example will find its place here. In 1880, there was not a single butter or cheese factory in the eastern part of the Province of Quebec. Nearly everywhere in that region, agriculture was at the lowest possible condition. In that year a cheese factory was opened in one of the parishes situated below Quebec. That parish, being about 6 miles by 3 miles in area, contained about 200 cows of which the milk was available for the factory. At that time each cow gave for 6 months of the year enough milk to yield an average of 40 pounds of butter for the season. That butter, generally of poor quality, was worth from 12 to 15 cents per pound. It is easy to calculate what poor returns were realised, or rather what real loss was sustained by the farmers under such a condition of things. The factory experienced some drawbacks. There was much prejudice to uproot, but the days of trial passed over, and to-day in that same parish, where there were only 200 cows 10 years ago, we find 600, which instead of yielding each about $6.00 worth of butter, realise $20.00 each. For the whole parish the yield, from sales of butter and cheese, instead of being $1,200 per year as it was 10 years ago, is now $12,000. This is a result obtained by intelligent farmers,—a result which can be obtained by all farmers who will adopt the same measures and methods.

4. *Business Men, Factory Owners, and Cheese and Butter Makers.*

Where the farmer has adopted the safe principles for the improvement of agriculture, which have just been mentioned, and has realised the necessity for engaging in dairying, he must be furnished with the means for drawing from that industry first-class products and of getting from them the largest possible profit. To reach such a condition of things, we must look for another class of men, who, although they are not farmers, are nevertheless one of the most important factors in the system of dairy farming. After the farmers have been brought to produce a large quantity of milk, it is necessary to prove to them that more profit may be derived from that milk when manufactured in a factory than when it is handled in a private dairy. Many places still need to have that matter presented and proven to them. To make it clear, one of the best ways is to promote the opening of first-class factories in sections where there are none; even if it be necessary for the Government to grant some money, to insure the opening of a first-class factory, it would be a good policy to do so. In fact, it has been done already and with the best of results. Indeed, when farmers are not sufficiently enlightened concerning the benefits of the system as represented in lectures and bulletins, there is no other way than to enable them to put their fingers on the profits. When a factory is opened and a few farmers have decided to bring their milk, the attention of the others is quickened. The wife of a neighbour is no longer obliged to spend one-third of her time, and often more, in a dairy. Butter and cheese made at the factory are of first-class quality; the price paid for them is higher, the money comes in every month, instead of at the end of the season; the quantity of butter or cheese obtained from 100 pounds of milk is larger; and finally, the veil is torn, the blind see, and everybody is soon a believer in the benefits from co-operation. The first step has been made, but it is only a first step, and unfortunately it is followed very often by a retreat;

and why so? Because after a good start, the thing has been managed badly. The first year a good maker had been engaged, but a false idea of economy prevailed, and the following year a less skilful maker was engaged at cheaper wages; and the result has been an inferior product. Hence, well-grounded complaints have arisen, recriminations have been made, and the end has been a ruined enterprise. Factory owners and butter and cheese makers must, therefore, be equal to their tasks. They must know the nature of a model factory, and they must strive to make their own a model in every respect. They must be instructed in the best methods for the erection and equipment, informed of what are the most improved apparatus, the most successful methods of manufacture, and the best tests whereby to discover the true value of milk, in order to pay for it according to its true value for butter-making or cheese-making. They must also learn to test milk, so as to prevent the frauds which are too often committed by the patrons who furnish adulterated milk.

Besides, from a general point of view, not only must they have a first-class product in every factory, but they must attain a certain uniformity of quality and appearance in the product of a whole county, a whole district, a whole province. Further, they must know how to put up the product in such a way that it may be as the markets want it. The market must be well known and supplied with what it requires at the time it is required.

To attain all that, butter and cheese makers must learn their business quite thoroughly; and to learn it, they need schools of some sort, that they may be able to go to these schools and get practical and theoretical instruction. Instructors must be trained in the Experimental Dairy Stations, and they should afterwards go and teach in the dairy schools what they have learned themselves. After the makers have left the schools, they must keep up with the progress of science and be looked after, in order that they may not become careless. Consequently, travelling inspectors are necessary to visit their factories, to keep them well posted respecting new methods coming into use every year and to detect any negligence that may exist. I will illustrate by an example how such instructions are useful and give good results. Last June, the Dairy Commissioner for the Dominion had called together at St. Alphonse, Chicoutimi County, Province of Quebec, 20 cheese-makers of that district, to give them a practical and theoretical lesson in the manufacture of cheese. A whole day was spent in that work, after which everybody went home. Last October, I had occasion to meet a patron of a cheese factory, the maker in which was present when the above mentioned instruction in cheese-making was given. I inquired from that patron if cheese had sold for a good price in his district during the last season. He replied: "Prices have been satisfactory every way at our factory, the cheese of which has been sold since July for 1 cent a pound higher than those of all the other factories in the neighbourhood. I asked what was the reason of that. "It is" said he "because our maker was present last June at St. Alphonse, where a lesson in cheese-making was given there by the Dairy Commissioner; and that lesson has been of such service to me that I have improved my method of manufacturing, enough to enable us to get that advance in price of 1 cent per pound of cheese made since. This is enough to illustrate what may be the result from a system of instruction and inspection regularly carried out.

To attain uniformity in quality and appearance in the cheese of a county, of a district, and of a whole province, we must get uniformity in the method of manufacture, which can be secured by the formation of syndicates of factories, having at their head an inspector over each Syndicate; these inspectors having over them a general inspector for each province. Those general inspectors can derive guidance for their work from the information collected and disseminated from the Dairy Department under the superintendence of the Dairy Commissioner. And to unite all those having some interest in dairy matters, it is important to organise district associations of dairymen, where farmers, butter and cheese makers, factory owners, inspectors and instructors may meet together in local or general conventions.

I desire to recapitulate this last part of my report, this programme which is followed in many of its parts, in a few districts of the Dominion and which

is still unknown, but should be known and followed in a greater number of districts; lectures to be given before farmers' meetings to teach to those having new lands, how to maintain their fertility; to those who have exhausted lands, how to improve them; to those who have begun the work of amelioration, how to avail themselves of the co-operative system, to attain progress and profits more quickly and surely by means of agricultural clubs, farmers' institutes and associations, through which they may receive sound practical directions; and to owners of factories and to butter and cheese makers, theoretical and practical instruction to keep them well posted respecting the progress of their industry; the creation of dairy schools to train first-class makers; the establishment of experimental dairy stations to make analyses, tests and to gather all the information necessary to keep the instructors and inspectors to the front in a knowledge of the best methods in dairying brought to light every year through the help of scientific research; the publication and diffusion by the Dairy Department of bulletins treating on all matters of interest to those who are engaged in dairying; investigations to find an opening in foreign markets to dispose of the products of the dairy industry in the most advantageous manner; encouragement to the development of dairy interests by grants judiciously distributed to those who will labour in that direction.

This programme is one that requires the co-operative help of everybody, from the most backward farmer to the most prominent of our legislators, in order that it may be carried out successfully. It has been presented in part upon former occasions—and one might think it is useless to repeat it in this report—but, if it is a well known programme amongst the farmers who are foremost in making progress in their work, it is very little, if at all known by those who have greatest need of the help which it seeks to render, and it is in order that it may reach them, that I have entered upon these long details of it in the present report.

I have the honour to be, Sir,

Your obedient servant.

J. C. CHAPAIS,

Assistant Dairy Commissioner.

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