FIFTH REPORT

—OF THE—

DAIRY ASSOCIATION

—OF THE—

PROVINCE OF QUEBEC.

APPENDIX TO THE REPORT OF THE HONORABLE THE COMMISSIONER OF AGRICULTURE AND PUBLIC WORKS.

1886.

PRINTED BY ORDER OF THE LEGISLATURE.

QUEBEC:
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PRINTER TO HER MOST EXCELLENT MAJESTY THE QUEEN,
1887.

FIFTH REPORT

OF THE

DAIRY ASSOCIATION

OF THE

PROVINCE OF QUEBEC.

The Honorable the Commissioner of Agriculture and Public Works,

Quebec.

SIR,

The Board of Management of the Dairy Association of the Province of Quebec have the honor to present the following report of their operations during the year 1886, and of the annual convention held at Three Rivers, on the 19th and 20th January last.

J. DE L. TACHÉ,

Secretary-Treasurer of the Dairy Association of the Province of Quebec.

St. Hyacinthe, 1st March, 1887.

Officers and Directors of the Dairy Association for 1887.

President: HONORABLE P. B. DE LABRUÈRE, St. Hyacinthe.
Vice-President: ABBÉ D. GÉRIN, St. Justin.
Secretary-Treasurer: J. DE L. TACHÉ, St. Hyacinthe.

DIRECTORS:

NAME.	DISTRICT.	RESIDENCE.
F. Préfontaine	Arthabaska	South Durham.
H. Poirier	Bedford	Roxton Falls.
H. J. J. Duchesnay	Beauce	Ste. Marie.
Paul Couture	Chicoutimi and Saguenay	Laterrière.
S. A. Brodeur	Beauharnois	Valleyfield.
J. J. A. Marsan	Joliette	L'Assomption.
Adhémar Charron	Iberville	St. Sébastien.
J. C. Chapais	Kamouraska	St. Denis, en-bas.
Alexis Chicoine	Montreal	St. Marc.
N. Bernatchez	Montmagny	Montmagny.
Abbé T. Montminy	Quebec	St. Agapit.
J. Ls. Lemire	Richelieu	La Baie-du-Febvre.
Frs. Dion	Terrebonne	Ste. Thérèse.
E. A. Barnard	Three Rivers	Three Rivers.
L. T. Brodeur	St. Hyacinthe	St. Hugues.
W. H. Lynch	St. Francis	Danville.

LEGISLATION.

45 VICT., 1882, CAP. LXVI.

An act to authorize the formation of a society under the name of the "Industrial Dairy Society of the Province of Quebec."

[*Assented to* 1*st May*, 1882.]

HER MAJESTY, by and with the advice and consent of the Legislature of Quebec, enacts as follows:

1. The lieutenant governor in council may authorize the formation for the province of an association, having for its object to encourage the improvement in the manufacture of butter and cheese and of all things connected therewith, under the name of the: "Industrial Dairy Society of the Province of Quebec."

2. The society shall be composed of at least fifty persons, who shall sign a declaration in the form of the Schedule annexed to this act; and every member of the society shall subscribe and pay, annually, a sum of at least one dollar to the funds of the society.

3. Such declaration shall be made in duplicate, one to be written and signed on the first page or pages of a book, to be kept by the society for the purpose of entering therein the minutes of their proceedings, during the first year of the establishment of such society, and the other shall be immediately transmitted to the Commissioner of Agriculture, who shall, as soon as possible after its reception, cause to be published a notice of the formation of such society, in the *Quebec Official Gazette*.

4. From and after the publication, in the *Quebec Official Gazette*, of the notice of the formation of the society, it will become and shall be a body politic and corporate, for the purposes of this act, and may possess real estate to a value not exceeding twenty thousand dollars.

5. The society shall have power and authority to make by-laws, to prescribe the mode or manner of admission of new members, to regulate the election of its officers, and generally the administration of its affairs and property. The commissioner of agriculture and public works shall *ex-officio* be a member of the society.

6. The first meeting of the society shall be held in the city of St. Hyacinthe, on the 28th of November next, to proceed to its organization and the election of members of the board of directors, and discuss all matters connected with the objects of the society.

7. The society shall afterwards hold an annual meeting, at such time and place as shall have been selected by the board of management, besides those which may have been prescribed and determined by the by-laws; it, at such annual meeting, shall elect a president, and vice-president, a secretary-treasurer, and also one director for each judicial district of the province, chosen from among the members of the society domiciled in such districts.

8. The officers and directors of the society shall prepare and present, at the annual meeting of the society, a detailed report of their operations during the past year, indicating the names of all the members of the society, the amount subscribed and paid by each, the names of the factories, inventions, improvements and products which deserve public notice, and giving all the information which they deem useful in the interests of the dairy industry.

SCHEDULE.

We, the undersigned, agree to form ourselves into a society, under the provisions of the act 45 Victoria, chapter 66, under the name of the "Industrial Dairy Society of the Province of Quebec;" and we, hereby, severally agree to pay to the treasurer, yearly, while we continue members of the society, the sums opposite to our respective names, and we further agree to conform to the rules and by-laws of the said society.

NAMES.	$	cts.

33 VICT., 1870, CAP. XXX.

An Act to protect the manufacture of Cheese and Butter in this Province.

[*Assented to* 1*st February*, 1870.]

HER MAJESTY, by and with the advice and consent of the Legislature of Quebec, enacts as follows :

1. Whoever, knowingly and fraudulently, shall sell, supply, bring, or send to any butter or cheese factory, for the purpose of being made into cheese or butter, any milk mixed with water, or adulterated in any way whatever, or milk from which the cream has been removed, known as skim or skimmed milk, or shall retain any part of such milk known as strippings ;

Or, whoever knowingly, and fraudulently, shall sell, supply, bring or send to any such factory any tainted milk, or slightly soured in consequence of negligence or uncleanliness of the milk pails, strainers or other vessels, after having been informed of such taint or impurity or such neglect, either orally or in writing ;

Or, any maker or manufacturer of any cheese or butter, who, knowingly and fraudulently, shall use, or cause any person in his employ to use, for his own benefit or advantage, any cream taken from milk delivered at any cheese or butter factory ;

Shall incur, for each such offence, a penalty of not less than one dollar, nor more than fifty dollars, in the discretion of the justices of the peace before whom such offence may be tried.

2. Every prosecution for any offence under this act, may be brought within three months of the commission of the offence before one or more justices of the peace, duly authorized to act in the place where such offence has been committed, who shall hear and decide the case, on the oath of one or more credible witnesses, and shall, moreover, in default of the payment of the penalty and costs, after the expiration of the delay when the same should be paid, levy the said penalty and costs by writ or warrant of execution, signed by one or both justices of the peace, against the goods and chattels of the defendant, and the said penalty, when recovered, shall be payable one moiety to the informer, and the other moiety to the secretary-treasurer of the municipality where the offence shall have been committed, and in default of payment in full of the said penalty and the costs, by the sale of such goods and chattels belonging to the defendant, he may be apprehended and

confined in the common gaol of the district in which the offence was committed, by a warrant signed as aforesaid, for a period of not less than eight days nor exceeding thirty days, unless the penalty, the costs incurred in the trial and the subsequent costs have been sooner paid.

3. The said trial shall not, in any wise, hinder or deprive any person injured by any violation of the above provisions from obtaining redress in any court of civil jurisdiction, to recover such damages as he may have suffered, and to levy the same, together with costs, in the same manner as in other cases before such court.

45 VICT., 1882, CAP. LXV.

An Act respecting societies and establishments, in this province, for the manufacture of butter or cheese, or of both combined.

[*Assented to 27th May*, 1882.]

WHEREAS several butter and cheese manufacturing societies have already been established in the province, under the provisions of chapter 65 of the Consolidated Statutes for Lower Canada, respecting partnerships; whereas, the said act does not give them all the advantages which an act of incorporation would, and in the interest of this industry, which is being developed every day, it is expedient to give them powers of incorporation: Therefore, Her Majesty, by and with the advice and consent of the Legislature of Quebec, enacts as follows:

1. When five or more persons, in any part whatsoever of the province, shall have respectively signed a declaration that they have formed an association for the manufacture of butter or cheese (or of both, as the case may be) in a certain place which shall be designated as their principal place of business, and shall have deposited such declaration in the hands of the prothonotary of the Superior Court in the district where the society intends to do business; such persons and all such other persons as may thereafter become members of such society, their heirs, executors, curators, administrators, successors and assigns, respectively, shall constitute a body politic and corporate, under the name of the "Butter *or* cheese manufacturing society (*or both, as the case may*) of (*name the place and the number of the manufactory as mentioned in the declaration.*)"

The prothonotary shall deliver to all such companies a certificate stating that such declaration has been made, which certificate shall be enregis-

tered in the registry office of the place where such society has its principal place of business, and be also, without delay, forwarded to the commissioner of agriculture.

2. Every such society shall, for the purpose for which it has been established, enjoy all the powers vested in ordinary corporations, especially that of choosing officers from among its members, of passing by-laws, which shall not be contrary to any of the laws of this province, to determine the number of its members, the amount of the shares, and the mode of levying the same, for the internal management and for conducting its proceedings and administration of its affairs in general.

3. The first meeting of shareholders of the said society shall take place within the eight days following the deposit of the declaration mentioned in the first section of this act, after a special notice to that effect has been given to the shareholders, by at least two shareholders of the said company, which notice shall be given at least two days before the said meeting, for the purpose of electing officers and approving the by-laws of the society.

The annual general meetings afterwards and all special meetings of the society shall be regulated by by-law.

4. A book shall be kept by the society for entering the subscriptions of shares, and another for entering in detail all the transactions of the society.

5. Each of these books and the by-laws shall be constantly open to the inspection of any of the members.

6. Section 2 of the act 33 Victoria, chapter 30, is hereby amended by adding after the word: "offence," in the third line, the following words: "upon information laid by the party interested, or one of them, if there be more than one;" and by replacing, in the twelfth, thirteenth, fourteenth and fifteenth lines of said section, the words: "one moiety to the informer and the other moiety to the secretary-treasurer of the municipality, where the offence shall have been committed," by the following words: "to the informer, for the benefit of the party or parties aggrieved."

7. During the course of the month of December in each year, a statement of its operations, for the year, shall be forwarded to the Commissioner of Agriculture, by each society formed under this act.

8. This act shall apply to the butter and cheese manufactories already established; provided they comply with the rules and regulations established by this act.

9. The declaration to be made under the provisions of this act, in order

to constitute into a corporation any butter and cheese manufacturing society, shall be in the form of the schedule hereunto annexed.

10. This act shall come into force on the day of the sanction thereof.

SCHEDULE.

We, the undersigned,

agree to form a society under the provisions of the act 45 Victoria, chapter 65, respecting societies and establishments, in this Province, for the manufacture of butter or cheese, or of both combined, which shall be called "The Butter (*or* Cheese,) (*or* the Butter and Cheese,) Manufacturing Society, of the parish of , in the county of ,"

and we bind ourselves to abide by all the rules and by-laws of the said society.

Signatures.

EXTRACT

From 45 Vict., 1882, chap. 22, intituled: "An Act to impose certain direct taxes on certain Commercial Corporations," as amended by 46 Vict., 1883, chap. 7.

HER MAJESTY, by and with the advice and consent of the Legislature of Quebec, enacts as follows:

1. In order to provide for the exigencies of the public service of this Province.....every Incorporated Company carrying on any undertaking, trade or business in this Province.....shall annually pay the several taxes mentioned and specified in section 3 of this Act, which taxes are hereby imposed upon each of such commercial corporations respectively.

2.....The term "Incorporated Company" does not include companies publishing newspapers or periodicals, nor societies or establishments, in this Province, for the manufacture of butter or cheese, or of both combined, established under the Act 45 Vict., chap. 65, nor the Dairy Association of the Province of Quebec, established by the Act 45 Vict., chap. 66, nor the Mutual Insurance Companies recognized by or established under the Act 45 Vict., chap. 51, nor those established under the Act 42-43 Vict., chap. 39, and its amendments, nor the companies established for the construction and maintenance of toll-bridges, nor associations or companies established for drainage, agricultural or colonization purposes.

This Act shall come into force on the day of its sanction.

CONSTITUTION OF THE DAIRY ASSOCIATION.

(TRANSLATION.)

(*Incorporated by the Act* 45 *V., Ch.* 66, *Q.*)

1. The Society shall be called "The Dairy Association of the Province of Quebec."

2. The object of the Society is to promote improvements in the butter and cheese industry, and everything pertaining thereto.

3. The payment of a fee of at least one dollar ($1.00) a year shall entitle to membership.

4. The affairs of the Society shall be managed by a President, a Vice-President, a Secretary-Treasurer, and the directors chosen according to the Act of Incorporation, who jointly shall form the Board of Management. This Board of Management shall prepare and present, at the annual meeting of the Society, a detailed report of their operations for the past year.

5. The elections of Officers and Directors shall be held at the general annual meeting, at such time and place as shall be selected by the Board of Management; and to have the right to vote at the said election, the current annual subscription must have been paid.

6. When more than one candidate is proposed for the same office, the votes shall be taken by the number of members *standing* and *sitting*, whom the Secretary shall count, and whoever secures the majority of votes shall be declared duly elected by the President.

7. The officers shall retain office until the next election, and they may be re-elected.

8. The President shall preside at the general meeting and meetings of the Board of Management.

9. The President shall *ex-officio* be a member of all committees of the Board of Management.

10. The Secretary-Treasurer shall be the depositary of all moneys and other securities belonging to the Association, and keep minutes of the meetings of the Society and Board of Management in a special register, and such minutes shall be signed by the President, or, in his absence, the Vice-President and by the Secretary-Treasurer; he shall also keep a set of books in which

all the business transactions of the Society shall be regularly entered without delay. At the end of the fiscal year of the Society, a statement of its operations for the year shall be submitted to the Board of Management for its approval.

Any vacancy occurring among the officers or directors shall be temporarily filled up by the Board, who may also appoint directors for the judicial districts not already represented.

12. The Board of Management may, for greater efficiency, secure the services of specialists.

BY-LAWS OF THE DAIRY ASSOCIATION.

1. The annual general meetings of the Society, as well as the meetings of the Board of Management, shall be convened by notice in writing given by the Secretary-Treasurer to each member of the Association or Board of Management; notice of the general meetings shall be given at least one month in advance.

2. On the request of three directors or officers of the Society, the President may convene general meetings or those of the Board of Management. Such convening shall be made in the manner above indicated.

3. Three members, exclusive of the President, or Vice-President, shall form a quorum.

4. The Board may appoint from among its members a committee to audit the accounts and such other committees as may be deemed necessary.

5. The order of the day of the general and special meetings shall be determined by the Board.

6. Questions cannot be discussed unless they be previously submitted to the Secretary-Treasurer in writing.

7. The Secretary-Treasurer shall give $400.00 security, subject to the approval of the Board.

MEETING OF THE 19th AND 20th JANUARY, 1887.

[TRANSLATION.]

FIFTH ANNUAL MEETING, HELD AT THREE RIVERS

MINUTES OF THE MEETING.

Three Rivers, 19th January, 1887.

The members of the Dairy Association met at the City Hall of Three Rivers, at ten A.M.

The Honorable Mr. de La Bruère, President, in the chair.

The morning's meeting was devoted to matters of routine and to the reading of letters of apology from gentlemen expressing their regret at being unable to attend the convention. Messrs. Girouard and Chapais were named auditors to inspect and examine the accounts of the treasurer, when the meeting adjourned.

19th January, afternoon.

Mr. Casavant opened the meeting by delivering an address on "*Drainage*," accompanied with illustrations of a plan of the speaker's property at St. Dominique de Bagot.

Mr. Chapais subsequently spoke and described "*A plan of cultivation in connection with the dairy industry for the eastern portion of the Province of Quebec.*"

Mr. Barnard gave some details on the method of keeping manure at his experimental farm, and gave the audience a general idea of the installation of his stables, his dairy, his silos, etc.

The Rev. Mr. Chartier, procurator of the St. Hyacinthe College, communicated to the convention the results obtained from trials of ensilage by fifteen members of the Dairy Association, himself amongst the number, in the year 1886, and gave advice dictated by the experience of that year. The lecturer went over, in view of ascertained facts, the principles of ensilage, and urged dairy farmers to give their most serious attention to this agricultural method.

Mr. Chapais finally read the report of the auditors of the accounts, which was unanimously adopted.

The meeting then adjourned till 7 in the evening.

19th January, evening.

The first formal meeting of the convention opened at 7 P.M.

The President replied in a few words to His Honor the Mayor of Three Rivers, who came to welcome the members of the convention, and then delivered his opening address.

The Rev. Mr. Herbreteau, of the Society of Jesus, followed him, and treated of "*The benefits of agriculture.*"

Mr. Lesage subsequently spoke, and announced the foundation of the "*Livre de Généalogie de la race bovine canadienne.*"

Mr. Couture presented the report of the inspections which he had made up to that time, of cows entered for the competition of 1886, and gave very practical advice on "*The preparation of milch cows for competition.*"

The meeting then adjourned to the following day.

20th January, 1887.

The President took the chair at 9 A.M.

Mr. Lord explained, in a lecture, the centrifugal system of manufacturing butter.

Mr. J. Painchaud and Mr. Archambault presented their reports of their inspection of butter and cheese factories in 1886. The reading of these papers was followed by a discussion on the best means to be taken to give guarantees to the public in the engagement of manufacturers. Messrs. Chapais, Taché and Barnard took part in it.

The election of Directors and officers was then proceeded with, the following being the result:

OFFICERS.

Honorary President: Mr. S. Lesage.
President: Hon. Mr. P. B. de La Bruère, P. L. C.
Vice-President: Rev. Mr. Gérin, Curé of St. Justin.
Secretary-Treasurer: Mr. J. de L. Taché, Notary.

DIRECTORS.

Districts.	Directors.	Residence.
Arthabaska	F. Préfontaine	South Durham.
Bedford	H. Poirier	Roxton Falls.
Beauce	H. J. J. Duchesnay	Ste. Marie.
Beauharnois	S. A. Brodeur	Valleyfield.
Chicoutimi and Saguenay	Paul Couture	Laterrière.
Joliette	J. J. A. Marsan	L'Assomption.
Iberville	Adhémar Charron	St. Sébastien.
Kamouraska	J. C. Chapais	St. Denis, en-bas.
Montreal	Alexis Chicoine	St. Marc, Verchères.
Montmagny	N. Bernatchez	Montmagny.
Quebec	L'abbé T. Montminy	St. Agapit.
Richelieu	J. L. Lemire	La Baie-du-Febvre.
Terrebonne	François Dion	Ste. Thérèse.
Three Rivers	Ed. A. Barnard	Three Rivers.
St. Hyacinthe	L. E. Brodeur	St. Hugues.
St. Francis	W. H. Lynch	Danville.

After some remarks had been made by the President and Vice-President with reference to the insufficiency of the resources of the Association, the following motion was moved by Mr. Chapais, seconded by Mr. Barnard, and unanimously adopted :

"That the Dairy Association, assembled in convention at Three Rivers, " do appoint a committee composed of all the officers and directors of the " Society to apply to the Committee on Agriculture of the Provincial Legis- " lature, in order, through it, to get the Government to pay in full the sala- " ries of the Inspectors of the Association and for the printing of its annual " reports, and generally to consider with the said committee all suggestions " which have been or may be made at this convention."

Then followed a long discussion on ensilage. Messrs. Casavant, Taché Barnard, Frey, Girouard and Chapais took part in this discussion, which was very animated and of the greatest importance.

The meeting adjourned until 1.30 P.M.

20th January, afternoon.

The President took the chair at 1.30.

Mr. Maurice Frey, a young French farmer, read a paper entitled : "*Alimentation comparée de la vache laitière en Europe et au Canada ;*" being a comparison of the methods of feeding milch cows in Europe and in Canada.

Dr. Coulombe gave a lecture on the care to be given to milch cows.

The Secretary read a paper from Mr. A. R. Jenner Fust on Meadows and Pasture Lands.

Mr. Schmouth, a professor of the St. Anne Agricultural School, read a paper on the effect of feeding upon the improvement of milch cows.

After some remarks by Dr. Coulombe, Messrs. Barnard and Chapais, upon the number of meals per diem given to each cow, the Secretary read the detailed reports of two factories, that of Mr. Baril and that of Mr. Chicoine.

A discussion then took place between Rev. Mr. Gérin, Messrs. Clément, Taché, Barnard, Casavant and Chapais, with reference to combined manufacture, which resulted in two motions being adopted.

The first, moved by Mr. E. A. Barnard, seconded by Dr. Coulombe, and adopted unanimously, was as follows:

"It is moved and adopted by the Dairy Association, in convention assembled at Three Rivers, that the Board of Directors do spend, with economy, a portion of the funds of the Association, in purchasing every month during the next manufacturing season, samples of rich cheese and cheese made of partly skimmed milk, to be kept at the proper temperature and in a suitable place, in order to test their keeping qualities, and afterwards place such cheeses, with a report upon their qualities, before the next annual convention of the Society."

The second motion was moved by Mr. Casavant, seconded by Mr. Chapais, and adopted unanimously as follows:

"That the Board of Directors of the Dairy Association do take the necessary steps to ascertain, in an undeniable manner, the value of cheese made of partly skimmed milk, on foreign markets, and especially on the English market, and report the result of their investigation at the next convention."

After some matters of routine had been disposed of, the present convention was declared closed by the Vice-President.

REPORT OF THE DIRECTORS.

(TRANSLATION.)

To the Members of the Dairy Association of the Province of Quebec assembled in convention at Three Rivers.

GENTLEMEN,

The retiring Officers and Directors have the honor of making the following report upon the operations of the year 1886 :

SUBSCRIPTIONS.

The list of members who have paid their subscription has, this year, been brought up to 253. This figure shows an increase of 43 names over that of the year preceding, and is a tangible proof of the public appreciation of the work of the Association.

The names of the members are given in the annexed schedule.

INSPECTION OF THE FACTORIES.

Professors Archambault and Painchaud visited, in the course of the year, one hundred and twenty-eight (128) cheese factories, thirty-four (34) butter factories and three (3) butter and cheese factories. Over and above this number there were about fifteen visits repeated.

Their reports will be submitted to you.

The number of well kept factories amongst those inspected is greater than before, and it is to be hoped that all the members, without exception, will take advantage of the visit of our inspectors to keep them a day or two in the factory. The amount of the slight indemnity asked from those inspected may be gained a hundred times over in one season by putting into practice a single one of the good counsels which the manufacturers, who take the trouble to question the instructor on the difficulties of existing methods, cannot fail to receive.

FACTORY SCHOOL AT ST. HYACINTHE.

Thirty-eight persons sought instruction and studied at the Factory School of the Association. These persons collectively passed 83 days at the factory. All were manufacturers and not apprentices.

COMPETITION FOR CANADIAN COWS.

The entries of this year have not yet been very numerous. Seven entries in all and eight trials have been made. Dr. Couture, the expert appointed to inspect the cows entered for competition, not having yet finished his inspection, it is impossible to give the list of prizes. Dr. Couture will, however, submit an interim report.

PEDIGREE BOOK.

The Pedigree Book, which was the necessary consequence of the work done by the Association to draw the attention of stock-raisers to the qualities of our Canadian cows, was established by a proclamation of the Honorable the Commissioner of Agriculture and Public Works, dated the 16th of December last, published in the Official Gazette on the 24th of the same month.

We trust that the inscription of Canadian cattle, which our country contains in considerable numbers, will be proceeded with as soon as possible. Cattle accepted after preceding competitions, and those which are accepted after the year just expired, are entitled to registration in the Pedigree Book.

LONDON EXHIBITION.

Last spring there was prepared, in conformity with the decisions of the Board of Directors, a programme of the measures to be taken to exhibit our dairy products in London. We were desirous of showing the state of the dairy industry in the Province, and of giving the members of the Society a good opportunity of obtaining exact information about their manufactures.

The Board was unable to obtain the aid which it considered necessary to make the undertaking a success, but rather than allow a project, on which the late convention had particularly laid stress, to drop, it was resolved to persist in any case.

The Exhibition authorities did not second the efforts of the Association. Through lack of authorized representatives interested in superintending our exhibits, the failure was complete, and moreover left us a deficit of $116.64, which the Local Government undertook to liquidate.

REPORTS AND PRINTING.

This year the Association published, besides its ordinary report, another supplementary one containing the proceedings of the convention, held at Quebec on the 14th of April, 1886.

The first of these reports contain 135 pages, the second 55, of matters of the highest importance for the Association and its members. The Association inaugurated this year a new step : the printing for distribution by the members of circulars containing a summary of the suggestions collected on a given subject. One thousand two hundred copies were printed of a sheet shewing the care which milk should receive on the part of patrons.

We propose that, in future, bulletins treating on other subjects in the same way be printed and distributed.

FINANCES.

The Society was regularly constituted in November, 1882; but its operations only really commenced in 1883. Parliament having voted the annual grant for the fiscal year 1882-83, the Society had on hand a sum of $500 (for six months of 1882), which allowed it to do a little more than it could have done with $1,000 of annual subsidy. This reserve being exhausted, the Directors believed themselves authorized to suggest that the Association should ask an increase of the Government subsidy in such manner as it may deem advisable. Taking into account the results obtained, absolute necessity and the want of means could alone justify the Society in restricting its work.

The dairy industry being now indispensable to the prosperity of the province, the authorized organ of its interests has certainly a right to the very moderate favors which will be asked for. The constitution of the Society offers in itself the most perfect guarantees for the proper employment of the moneys which are or which may be voted.

Respectfully submitted,

THE DIRECTORS OF THE DAIRY ASSOCIATION
OF THE PROVINCE OF QUEBEC.

Three Rivers, 19th January, 1887.

LIST OF MEMBERS.

YEAR 1886.

A

Alix, Edgide ..... St. Paul de Chester.
Archambault, Louis ..... Contre-cœur.
Alix, Joseph ..... St. Césaire.
Arsenault, David ..... St. Gervais, Bellechasse.
Adam, L. S ..... St. Hyacinthe.
Allard, J. N ..... Stanstead.
Ayotte, L ..... Montreal.
Archambault, Alf ..... St. Guillaume.
Adam, Jules ..... Belœil.
Archambault, J. M ..... St. Hyacinthe.
Arel, Avila ..... St. Grégoire de Nicolet.
Arel, Léon ..... St. Grégoire de Nicolet.
Archambault, S ..... Ste. Théodosie.
Asselin, Charles ..... South Durham.

B

Blondin, F. X ..... St. Maurice, Champlain.
Bolduc, Jos., fils de David ..... St. François de Beauce.
Beauregard, Hector ..... La Présentation.
Bernard, E. A ..... Three Rivers.
Blain, Fèlix ..... Belœil.
Brodeur, L. T ..... St. Hugues.
Bernard, D. U ..... St. Flavien.
Brousseau, Louis ..... St. Hyacinthe.
Bazinet, Delphis ..... St. Hugues.
Bernatchez, Numa ..... St. Thomas.
Bélanger, Théo ..... St. Jean Port-Joli.
Beaubien, Hon. L ..... Montreal.
Brunet, J. C ..... St. Rochs, Quebec.
Bernatchez, N ..... Montmagny.
Bilodeau, J. O. A ..... St. Elzéar de Beauce.
Baril, Pierre ..... St. Justin.
Bourque, Norbert ..... Sherbrooke East
Bellisle, Achille ..... La Baie du Febvre.
Brillon, J. R ..... Belœil.
Beaudry, Pierre ..... St. Jean-Bte. de Rouville.

Bergeron, O.....St. Athanase.
Brassard, J.....St. Dominique de Chicoutimi.
Bousquet, Alb.....St. Charles.
Bousquet, Amédée.....St. Charles.
Brodie & Harvie.....Montreal.
Bourbeau, Elie.....St. Césaires.
Beaudreau, Jos.....St. Michel d'Yamaska.
Bouvier, Alexis.....St. Barnabé.
Benoit, E.....Ste. Anne des Plaines.
Bachand, Ludger.....Roxton Pond.
Bélair, Jules.....St. Jacques l'Achigan.
Browning, J. M.....Longueuil.
Bruneau, A.....Sorel.
Bergeron, Jos., fils de Jos.....St. Pie.
Barrière, Thomas, fils.....Mount Johnson.
Boutin, Louis.....St. Sébastien, Beauce.

C

Couture, Paul.....Notre-Dame de Laterrière.
Chartier, Rev. J. B.....St. Hyacinthe.
Caron, Gabriel.....Louiseville.
Chicoine, Alexis.....St. Marc.
Côté, Saul.....St. Flavien.
Côté, Louis.....L'Avenir.
Casavant, Ant.....St. Dominique.
Côté, Amable.....La Baie du Febvre.
Chapais, J. C.....St. Denis.
Chênevert, Jos.....St. Cuthbert.
Coulombe, Dr. J. C.....St. Justin.
Couture, Dr. J. A.....Quebec.
Cloutier, Sauveur.....Ste. Sophie d'Halifax.
Caron, Edouard.....Louiseville.
Champagne, Joseph.....St. Guillaume.
Caron, Georges.....St. Léon.
Campeau, Benjamin.....St. Clet.
Carignan, Thos.....St. Pie.
Chevalier, P.....St. Basile-le-Grand.
Chagnon, Antoine.....St. Dominique.
Cartier, Victor.....St. David d'Yamaska.
Couture, Octave.....Notre-Dame de Laterrière.

Camiré, Olivier .....St. Michel d'Yamaska.
Côté, O.....St. Alphonse de Chicoutimi.
Cheesman, Jas.....Toronto.
Cardinal, A.....St. Marc.
Clément, N. E.....Champlain.
Chicoine, D.....St. Marc.
Caron, Etienne.....Trois-Saumons.
Carrier, Geo.....St. Vital de Lambton.
Chaput, Adélard.....St. Cuthbert.
Charron, Dêsiré.....Ste. Anne des Plaines.
Chappedelaine, A.....St. David d'Yamaska.
Cardinal, J. B.....St. Valérien.
Cardinal, E.....Belœil.

D

Dion, J. O.....St. Hyacinthe.
Dufault, Eusèbe.....Ste. Hélène.
Dion, Frs.....Ste. Thérèse.
Dépôt, J. Bte.....St. Valérien.
Dumaine, Alfred.....St. Liboire.
Durocher, Trefflé.....St. Damase.
Desmarais, E .....St. Lin.
Dubault, Geo.....St. Gabriel de Brandon.
Désautels, M .....Ste. Rosalie.
Dufresne, G. B. R.....Banlieue of Three Rivers.
Denis, D.....St. Simon.
Désautels, A.....St. Pie de Bagot.
Dubois, H.....Ste. Thérèse.
Dugas, E.....St. Jacques, Montcalm.
Desrochers, E.....Warwick.

E

Ewing, J.....Richmond.

F

Fafard, Antoine.....St. Hugues.
Fréchette, Louis .....Ste. Madeleine.
Fontaine, Alph .....St. Hugues.
Fontaine, Alphée.....Weedon.
Fradette, Norbert .....St. Dominique.
Forest, N .....St. Jacques, Montcalm.

Fréchette, Damase.....St. Hyacinthe.
Fournier, O.....Gentilly.
Fontaine, N.....St. Basile-le-Grand.
Filiatrault, Jos.....Ste. Thérèse.
Forest, I.....St. Jacques.

G

Gaudette, Dr. D.....Ste. Anne des Plaines
Gamache, C. S.....Cap St. Ignace.
Giard, J. A.....Montreal.
Gérin, Rév. M. D.....St. Justin.
Gareau, Victor.....St. Denis.
Guertin, Alfred.....St. Casimir, Portneuf.
Gaudette, Elie.....St. Antoine, Verchères.
Grandpré, Paul.....St. Valérien.
Guise, De F.....Plessisville, Somerset.
Gendron, Frs.....Ste. Anne de Lapocatière.
Gouin, Chs. H.....Batiscan.
Gagné, Théophile.....St. Edouard de Lotbinière.
Gendron, Jos.....St. Hyacinthe.
Gingras, H.....St. Marie de Monnoir.
Gosselin, F.....St. Victor de Tring.
Gemme, Paul.....Ste. Marie de Monnoir.
Garon, Rev. M.....St. Sébastien, Beauce.
Guilmette, John.....St. Grégoire de Nicolet.
Godin, Théophile.....St. Augustin.
Gratton, Hubert.....Ste. Thérèse.
Guenette, Pierre.....Ste. Anne des Plaines.
Gaudette, Jos. E.....St. Jacques l'Achigan.
Grenier, Joseph.....Ste. Rosalie.

H

Huard, Frs.....St. Denis, Verchères.
Hould, Eusèbe.....Gentilly.
Hébert, Ferdinand.....Ste. Thérèse.
Hudon, Louis.....St. Jérôme, Lake St. John.

J

Jacques, Frederick.....St. Sébastien d'Iberville.
Johnson, C. E.....Warwick.
Jérôme, Philéas.....Ste. Thérèse.
Jalbert, Damase.....St. Jérôme, Lake St. John.

K

Kirkpatrick & Cookson.....Montreal.
Kirouac, F. X.....Warwick.

L

Lussier, Damase.....St. Hyacinthe.
La Bruère, Hon. P. B. de.....St. Hyacinthe.
Lord, Aimé.....St. Edouard, Lotbinière.
Labonté, Rev. J. O.....Ste. Thérèse.
Lambert, Jos.....St. Joseph, Beauce.
Lesage, S.....Quebec.
Lacasse, Jos.....Acton-Vale.
Lemire, Louis J.....La Baie du Febvre.
Letiecq, Alb.....Bécancourt.
Lafontaine, E.....St. Hugues.
Lamothe, Wm.....St. Hyacinthe.
Létourneau, Camille.....Ste. Madeleine.
Lecomte, E.....Nicolet.
Legris, J. H.....Louiseville.
Lambert, Léger.....Ste. Ursule.
Lupien, Samuel.....Ste. Ursule.
Leclerc, Dr. George.....Montreal.
Laplante, Wm.....Ste. Hélène.
Leduc, Pierre.....Ste. Hélène.
Lacasse, Pierre.....Ste. Anne des Plaines.
Lauzon, Israël.....Ste. Anne des Plaines.
Lafontaine, Charles.....St. Simon.
Lemonde, François.....Ste. Rosalie.
Lafrance, Arthur.....Stoke Centre.
Lemieux, F. X.....Levis.
Leblanc, Adelmard.....St. Jacques l'Achigan.
Leclerc, J. Damien.....Ste. Thérèse.
Lavallée, Hon. V. P.....St. Félix de Valois.
Lacourcière, L. Philippe.....Batiscan.
Lussier, Louis.....St. Pie de Bagot.
Lebeau, Médéric.....Charlemagne.
Lavigne, E. B.....Arthabaskaville.

M

Montminy, Rev. Mr.....St. Agapit de Beaurivage.
Marsan, Arthur .....St. Valérien.
Marsan, Cléophas .....St. Valérien.
Maynard, Jos.....Roxton Pond.
Maynard, Philéas .....La Présentation.
McDonald, Milton.....Acton-Vale.
Marion, Ovide .....St. Jacques, Montcalm.
Monahan, Peter.....Ste. Marthe.
Massé, Pierre.....Mount Johnson.
Mirault, Azarie .....St. Jacques, Montcalm.
Marion, Napoléon.....St. Jacques, Montcalm.
Monat, Michel.....Mount Johnson.
Marsan, J. J.....L'Assomption.
Marion, Joseph .....St. Jacques l'Achigan.
McFarlane, P.....Huntingdon.
Mignault, Charles.....St. Simon.
Monette, Cyrille .....St. Martin, Laval.
Milot, Léonard .....St. Léon, Maskinongé.
Marion, Edmond.....St. Gabriel de Brandon.
Martin, Dr. H. J.....Carleton, (Bonaventure).
Maynard, Camille.....St. Simon.
Marcotte, Joseph.....St. Thomas de Pierreville.

N

Nicole, Alphonse.....Montmagny.
Normand, Stanislas.....Ste. Julie de Somerset.

O

Ostigny, Alf.....St. Jean-Bte. de Rouville,
Ostigny, Jos.....N.-D. de B. de Richelieu.

P

Préfontaine, Alexis.....Belœil.
Painchaud, Jos .....Louiseville.
Pelletier, D.....La Présentation.
Préfontaine, F .....South Durham.
Préfontaine, H.....Roxton Falls.
Plante, F. X.....St. Frédéric, Beauce.
Pelletier, Jos .....St. Jean Port-Joli.

Paradis, Dam
Pellerin, U..
Parent, W.....
Paradis, Loui
Paradis, Firm
Paré, Camille
Paré, Louis...
Péloquin, Ch
Prince, Rev. I
Pothier, Rev.
Poirier, Israël
Plamondon, I

Quintal, Etien

Robert, Ant...
Riopel, Aimé .
Ruddick, J. A.
Racine, Chs....
Rainville, Eusè
Rouleau, Clém
Racicot, Laure
Rinfret, Dr. C..
Roy, Charles....
Remington, Ed

Soucy, Louis....
Sicard, Antoine

Turcot, J. E....
Taché, Henri...
Taché, J. de L.
Tremblay, Rev.
Trudel, Alfred .
Trudeau, Avila.
Tremblay, Tho

Paradis, Damase ..... Valletort.
Pellerin, U ..... Ste. Sophie d'Halifax.
Parent, W ..... St. Thomas de Pierreville.
Paradis, Louis ..... Valletort.
Paradis, Firmin ..... Valletort.
Paré, Camille Elie ..... St. Vincent de Paul.
Paré, Louis ..... St. Vincent de Paul.
Péloquin, Charles ..... St. Hyacinthe.
Prince, Rev. Mr. (Canon) ..... St. Maurice.
Pothier, Rev. Mr. Ls ..... Warwick.
Poirier, Israël ..... St. Pie.
Plamondon, Ignace ..... St. Raymond, Portneuf.

Q

Quintal, Etienne ..... St. Liboire.

R

Robert, Ant ..... Upton.
Riopel, Aimé ..... St. Esprit.
Ruddick, J. A ..... Lancaster.
Racine, Chs ..... St. Pie.
Rainville, Eusèbe ..... N.-D. de B. de Richelieu.
Rouleau, Clément ..... St. Hyacinthe.
Racicot, Laurent ..... Valcourt d'Ely.
Rinfret, Dr. C ..... Ste. Croix.
Roy, Charles ..... Crane Island.
Remington, Edwin ..... St. Gabriel de Brandon.

S

Soucy, Louis ..... St. Philippe de Néri.
Sicard, Antoine ..... Ste. Hélène.

T

Turcot, J. E ..... St. Hyacinthe.
Taché, Henri ..... Upton.
Taché, J. de L ..... St. Hyacinthe.
Tremblay, Rev. L. A ..... Ste. Anne de Lapocatière.
Trudel, Alfred ..... St. Prosper de Champlain.
Trudeau, Avila ..... St. Basile-le-Grand.
Tremblay, Thomas ..... Notre-Dame de Laterrière.

Toupin, Louis .....St. Hugues.
Thibault, Charles .....Ottawa.
Thérien, C .....St. Lin, Laurentides.
Trudelle, Philippe.....Ste. Geneviève, Champlain.
Therrien, Isidore.....Ste. Anne des Plaines.

V

Vigneau, J. B.....La Baie du Febvre.
Valcourt, N. S.....St. Simon.
Vadnais, Joseph .....St. Pie.
Vadnais, Henri .....St. Cuthbert.
Venne, Solomon .....St. Jacques, Montcalm.

W

Wilson, Wm.....Montreal.

My Dear Sir,

I regret ex
ing of the Dair
It is a seri
in this associat
The good done
only the foreru
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J. De L. TACH
Secy

P. S.—I ne
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To the President

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LETTERS AND REPORTS.

St. Hyacinthe, 18th January, 1887.

My Dear Sir,

I regret exceedingly that circumstances prevent my attending the meeting of the Dairy Association to be held to-morrow at Three Rivers.

It is a serious disappointment for me. You know the interest I take in this association, of which I am proud to be one of the earliest members. The good done by the Dairy Association is clear and evident. Yet it is only the forerunner of what it is destined to accomplish, both as regards its direct object and its indirect and corelative results.

Please inform the gentlemen who attend the meeting, who will certainly not miss my presence, that my concurrence is already given to what the majority may decide, whatever opinion I may hold to the contrary.

Be good enough to accept for yourself and your fellow workers, the assurance of my most profound respect, and the expression of my most sincere wish for the welfare of our association.

J. H. L. ST. GERMAIN, M.D.

J. De L. TACHÉ, Esq.,
Secy. D. A. P. Q.,
Three Rivers.

P. S.—I need not tell you to put my name down as a member; this is perfectly well understood.

To the President and Members of
the Dairy Association.

In making my report this year I have no intention to address you at length upon the results obtained during the year, because, as the milk has diminished by nearly one-third, we have made only two-thirds of last year's quantity of butter, that is to say, we have made only 31,600 pounds of butter, instead of 45,600 last year. As to the prices realized, they were about the same. In the month of May butter sold at twenty-one cents a pound; in June eighteen and nineteen, July twenty; August twenty-one; September and October twenty-three.

Now I must reply to some objections which were raised last year at Quebec about the apportionment, according to the yield of the cream, based on samples with the centrifugal machine. Some people claimed that a cor-

rect percentage could not be obtained when the morning's and evening's milk are mixed. I must tell you that this year I made five comparative trials during this season, first with mixed milk, and on the same evening and following morning with the milk of each milking, separately. All this milk came from the same patrons. I obtained the same result; I found the evening's milk less rich than the morning's, but the average of both tallied exactly with the trial of the mixed milk.

I cannot close this report, gentlemen, without making one remark about butter-making with the centrifugal system. Several dealers in butter asked me, in the course of last summer, "How is it that the butter made by the centrifugal system has generally less aroma and often less body than the butter made with the *pans*?" This question requires careful study. However I ask your leave to give my opinion on this point, as follows: In almost all the centrifugal butter factories there is only one vat for the cream. This compels the butter-makers to churn their cream too fresh and too sweet, whereas with four vats there would be ample time for the cream to take that acid taste which imparts to the butter the aroma so highly valued by the traders. This is my humble opinion; I do not wish to force it upon any one. But what I would like is to have the opinion of butter-makers who have experience in such matters, and who can give us information on all these points, which to my mind are rather delicate, and which present no difficulty to factorymen acquainted with the business of butter-making.

Thanking you for your kind attention,

I remain, gentlemen,
Your obedient servant,

ALEXIS CHICOINE.

St. Marc, 18th January, 1887.

NOTE.—The readers of our reports must have noticed that Mr. Chicoine has always furnished most useful information to the association, on every occasion. It is hoped that all the members of the association will follow his example, and embody in a few lines the solutions they may have found to debated questions, or submit for the study or examination of their fellow-members such doubtful questions or difficulties as they may meet with. Our reports should be read over often, observations be noted and sent to the Secretary, to be laid before the general meeting and then published in the yearly report of the association. "*Light comes from the shock of ideas*," is a proverb which can well be applied to our dairying industry, in which there are so many questions to be solved.

THE SECRETARY.

OPENING ADDRESS

BY THE HONORABLE MR. DE LA BRUÈRE, PRESIDENT OF THE ASSOCIATION.

GENTLEMEN,

We meet to-day for the sixth time in convention for the purpose of discussing matters connected with our dairying industry.

The meetings in former years were held in the town of St. Hyacinthe, which is, as you know, situated in the beautiful farming district where the cheese business of this province first commenced. We have also held two meetings at Quebec, during the session of the Legislature, in the interest of the farmers dwelling in the counties of the Lower St. Lawrence, and to call the attention of our legislators to the importance of the work done by our association.

These meetings have had a beneficial result, by the practical knowledge which has been diffused, upon the method of feeding milch cows, of improving pasturage, upon the very special attention required for the milk to be made into butter or cheese, and on the process to be used. They have been followed with an ever increasing interest and have exercised the most beneficial influence upon the members of our association and the persons present at the meetings. As the Dairy Association has always been desirous of extending the field of its operations and spreading agricultural education as widely as possible, it was decided to choose the city of Three Rivers to hold there this year the general meeting of 1887.

We have come here to pay what I call a debt of gratitude to the worthy farmers on the north of the St. Lawrence, for our association has, since its foundation, always had their sympathy and their active co-operation. Many of them have come to St. Hyacinthe to assist it with their advice, and have even carried off the prizes given by our association for the best cow of Canadian breed. We could not refuse to comply with the request made in their name by the zealous *curé* of St Justin, the Abbé Gérin, and I trust the citizens of Three Rivers will approve of our decision.

We have invited several practical and skilled farmers to address the meeting. You will have the pleasure of hearing Mr. Antoine Casavant, Dr. Coulombe, the Abbé Chartier, Messrs. Schmouth, Jenner-Fust, Lord, J. C. Chapais, Taché and others, who will speak to you of drainage, pasturage,

the success of ensilage, the result of feeding upon the improvement of herds, the care to be given to milch cows, centrifugal butter-making, management of butter and cheese factories, of a system of cultivation producing milk, etc. You see that the programme comprises subjects of the highest interest, and I have no doubt that they will be treated clearly and scientifically.

During the last season, two inspectors, Messrs. Archambault and Painchaud, went through the different sections of the province to inspect the butter and cheese factories. They visited 165 establishments.

Although a few persons are met with, here and there, who question the usefulness of this inspection, experience proves that it is a matter of absolute necessity.

The visits of these inspectors have been productive of much good, and the instructions they gave have saved considerable sums of money to the heads of these factories. The result is so evident that every year the number or factories visited increases, and the inspectors are invited to parishes where, two or three years ago, nobody would have wanted their services.

By means of this inspection, the number of inexperienced manufacturers is being lessened, and sound information on the subject is being diffused.

An establishment which contributes in a great measure to improve the process of manufacturing, is the cheese-factory and school at St. Hyacinthe, under the direction of Mr. Misaël Archambault. In the course of last year forty-two students passed through this school, and received the instruction they needed. At present, ten pupils have secured their places for next Spring.

One of the most valued results of our meeting last year was the establishment of silos in several parts of the province. All those who were present at St. Hyacinthe remember the brilliant conference of the Honorable Louis Beaubien on this subject. You will have the pleasure of hearing the report which the Abbé Chartier, the Procurator of the Seminary of St. Hyacinthe, has kindly undertaken to make on the success of the silos in 1886. Great interest is attached to this question of agricultural economy, and I am sure that we will be witnesses of a very interesting discussion among those who have made some experiments of silos.

The cheese and butter sent by our association to the London Exhibition were favorably appreciated, as you may satisfy yourselves from the letters of Messrs. Ayer & Co., which the Secretary will read to you.

Unfortunately our means are so limited that we were not in a position to send to the exhibition an agent to take particular care of our samples and to bring them into notice. The result was that our cheeses were taken out of the boxes and exhibited without any marks to indicate where they came from or to enable purchasers to identify them. This is doubtless a matter of regret, but the blame cannot be imputed to our association. For all this, the articles exhibited were found excellent.

You are aware that the Quebec Government has lately published the regulations for the Pedigree Book, and Golden Book of Canadian Cattle, and that the Honorable Mr. Ross, in his quality of Minister of Agriculture, has proclaimed the said Pedigree Book and Golden Book to be opened.

We should be glad of this, for our Canadian cow possesses excellent milking qualities, and her milk, rich in butter, makes her highly valued.

I will take the liberty of saying that the work of the Dairy Association is in no small measure due to the praiseworthy initiative of the Government. The competitions opened and the prizes granted by us during two years for the Canadian cow whose milk gave the most butter within a specified time, have, I believe, hastened this result.

The official statistics shew, gentlemen, that the supply of cheese is increasing, every year, in the country. This production has increased by ten millions of pounds from 1884-5 to 1885-6, or, one million of dollars, in round numbers. We exported last year 79,655,367 pounds, valued at $8,265,240.

This is not the case with butter, the exportation of which has been diminishing for several years. In 1885-6 our exportation amounted to 7,330,788 pounds, against 9,086,477 pounds in 1881. It seems to me, gentlemen, that in your beautiful Northern mountains, where limpid water is found in abundance, the soil should be suitable for butter-making, and with fine herds of Canadian cows entered in the Pedigree Book and the Golden Book, and good centrifugal machines, you could make butter which would be favorably appreciated abroad.

The Province of Quebec cannot neglect Agriculture, and its farmers will be wanting in their duty if they do not use all their efforts to make themselves acquainted with the questions which concern them, and do not give to their children an agricultural training to put them in a position to compete advantageously with the English or Scotch farmers.

The different provinces which compose Confederation are progressing, and our province must keep pace with them. We must take our share in

the export trade and see that the produce of our land acquires a reputation in foreign markets. Why is our grain in less demand than it should be? Because some careless farmers did not wish to give themselves the trouble to clean it, while others attempted to cheat the dealers by resorting to proceedings of questionable honesty, and the innocent have been punished for the guilty. When an article is sold for exportation it should be our duty to supply a first-class one, so as to satisfy the buyer. And what I say of grain applies equally to butter and cheese.

The total exports, in 1885, were $89,238,361, against $57,567,888 in the first year of Confederation. Of these 89 millions, the exports of cattle, butter, cheese, eggs, wool and furs, represent $25,337,104.

The exports of grain, as barley, oats, peas, wheat and other grains, amount to $14,518,293, so that agriculture alone has supplied nearly $39,855,397, or nearly the half of our total exports.

These figures show the importance of Agriculture, and what profit a farmer may make out of a well managed and well tilled farm.

DRAINAGE.

LECTURE BY ANTOINE CASAVANT, ESQ., MEMBER OF THE COUNCIL OF AGRICULTURE.

The subject I have undertaken to treat before you to-day, gentlemen, is one of extreme importance, and I claim for it your kind attention. The results which have so far been obtained, make drainage a very important matter, and no where is such a subject more suitable than here. You are well aware, gentlemen, in what position are most of the lands in the Province. Water is too plentiful and lies there too long to allow of any hope of their producing any good crops. On the other hand it is no secret to you that several farmers impose heavier and more considerable sacrifices upon themselves to improve our cattle. It is then a matter of the utmost necessity that we should not, on the other hand, remain idle, but that we should assist with all our might the efforts that are being made to render our agriculture more prosperous.

The meaning of the term drainage, and the object of its operation, are certainly not unknown to you. Before entering definitely upon the study of the subject, which now occupies our attention, I wish particularly to point out to you that for a number of years past, drainage has been practised in Europe, and that the results have everywhere surpassed the expectations. Several Governments have, from the outset, fully realized the importance of this improvement, and have imposed considerable sacrifices upon themselves in order to make this process as general as possible. The following are some figures, applying to Belgium, which show clearly, how rapidly drainage has spread. "In 1850, when it was introduced into this country, it was applied to an extent of 450 arpents only ; the following year upwards of 1,800 arpents were drained, and in the course of 1852 a superficial extent of 4,464 arpents at the least was drained. The number of persons who purchased drain tiles was 205 in 1851, and it was as high as 599 in 1852! Moreover, at the end of 1850 there were only nine establishments in which drain tiles were made, while there are now (the author writes in 1867) as many as 33, among which 12 were started entirely at the cost of private persons. These establishments delivered to agriculturists in the course of the year 1852, 4,585,565 tiles. On the other hand, the amount of money which the Belgian proprietors have devoted to drainage, during the same year, reaches the high figure of 60,000 dollars." From this it appears that the practice of draining moist lands makes rapid progress, as the farmers learn to appreciate its importance and merits. Even England, which abstains almost invariably from any interference in private business, thought proper to vote, on several occasions, large sums of money for draining lands, especially for those in Ireland.

If we consider the word *drainage* in its narrowest meaning, we can say that it constitutes the sum of the processes followed for removing from the soil all injurious waters which have a tendency to lie there and to prevent the growth of plants.

Water fills a most important and most active role in the phenomena of vegetation. It does not suffice that a soil should contain the mineral matter necessary to feed plants ; there is also required the presence of a certain quantity of water to dissolve all these elements and afford them as it were the means of conveyance to the interior of the plant.

The quantity of water which plants require for their growth is not always the same ; it varies with their nature, their degree of their development, the climate, the nature of the soil, &c. It is thus impossible to determine

it with mathematical precision. We will merely remark that the degree of moisture of the soil cannot go beyond a certain limit, without the soil and the plants suffering from it.

It becomes important, therefore, to determine as clearly as possible, the point at which the water is too abundant to allow vegetation to continue its normal state.

Considered mechanically, the soil is made up of an infinite number of *particles* of very variable forms and size, from the large grains of sand to the almost impalpable parts which compose clay. These particles, united to each other as they are in the earth, leave, however, small spaces between them, little channels, which are called *interstices* to distinguish them from the other spaces which are found in the inside of the particles themselves, and which are called pores. When rain falls upon a dry soil, composed as we have just stated, it first filtrates into the interstices, and then it passes slowly into the pores. The earth in this state has lost none of its porosity, for the interstices are empty again. It is called *moist*, and it is under this form that it is most suitable to plants. When taken up in the hand and kneaded a little, it should cake without soiling the hand. Put in the fire and dried it loses a quantity of water, varying from 15 to 23 per cent.

If now another shower of rain falls on a moist soil, the liquid must lodge in the interstices, without the latter being able to empty themselves as before, owing to the pores being already saturated. The constitution of the earth will then be greatly altered. From *moist* it becomes *wet*. In this last state it is no longer porous. The air cannot penetrate through it, and all the evil consequences of want of air soon make themselves felt. This is not all. The constant presence of this water in the soil prevents it from becoming heated ; all the heat absorbed by the earth is in fact employed in the partial evaporation of the moisture. As a consequence, any field whatever, under such conditions, cannot receive any dew, because during the night the different bodies placed on its surface do not give out any heat upwards, the layer of air in contact with these bodies does not cool, and the moisture it contains cannot condense.

The following are the two first consequences of an excess of air in the soil :

1st. Want of air.

2nd. Cooling.

If matters remain long enough in this state without any remedy being devised for their relief, other and more palpable effects do not fail to show

themselves. Not only does the vegetation change in color; it gradually changes its nature. In a meadow, for instance, instead of seeing clover grow (a plant which plays one of the chief roles in feeding milch cow at pasture as well as in the stable) and timothy, and other plants of as good quality, it will be noticed that rushes, sedge and fox-tail grass invade the land and finish by completely displacing the former occupants. Farmers know very well what influence the quality of the hay has upon the supply of milk given by milch cows. Nobody will therefore doubt that the quantity will be considerably diminished. On the other hand the cattle pastured there are not in as good hygienic condition; sickness makes more ravages among them because they are more feeble and their food is less succulent. In support of what I assert I will merely cite one single fact shewing clearly what is the influence of drainage upon the quality of the milk or its products. About 1870, the Granby market was supplied with butter coming from the adjoining high-lands and with butter made in the low lands. The butter from the hills was worth as much as six cents more than that from the farms in the lower localities. I have myself sold on that market for 10 cents higher than many others. It is true to say, at the same time, that the style of making it counted for something in the matter.

Here in Canada, and especially in the Province of Quebec, the need of drainage cannot be denied. I am not afraid to say that at least one tenth of the cleared lands give little or no returns because they have too much water. Yet proprietors could not invest their money at better interest. In France and in Belgium drainage on lands moderately moist has always yielded a return of twelve to fifteen per cent. What it would then be on lands of good quality which are almost entirely submerged. At St. Jacques (Montcalm) I know several farmers who have in this way changed inferior farms into real gardens. Mr. Cochrane, at Compton, has rendered all his lands equally productive by means of drainage. I have seen at his place the most beautiful crops of hay, grain and grass that could possibly be seen. The uniformity in the vigor of the vegetation was particularly remarkable. In the environs of Montreal, the Messrs. Drummond, Louis Beaubien and others have drained their lands and found them very much improved by it.

Let us now see what kinds of soil particularly want draining. They can be divided into three principal categories:

1st. Wet, cold, marshy meadows;

2nd. Argilo-silicious, cold soils;

3rd. Slightly hilly lands.

In the first the hay is scarce. We have already seen what are the causes which impair its quantity and quality. Drainage properly executed has a remarkable effect on it. The meadow lands on my farm have all been deeply drained as shewn on the plan. I have obtained first quality hay at the rate of two tons and a half per arpent. This quantity was kept up from eight to ten years without the meadow requiring to be renewed. During all this time I put manure supplemented with lime to hasten the decomposition of the plants and neutralize the acidity always found on soils of this sort after they are drained. Considered as a speculation I succeeded well, for previously I had not obtained a half ton of bad quality hay.

In clayey cold soils, the results of drainage are not so evident, yet they are not negative. The seeding in these lands is generally made late, and vegetation is slow. The result is that the crop is often lost because it does not ripen in great droughts. Drainage here allows these lands to be tilled at least two weeks earlier, an immense advantage when we bear in mind the shortness of the season of vegetation, and that the supply of cultivated plants is always proportionate to the time they have been in the ground. Finally I must not forget to add that by draining an excess of moisture in the ground is not to be feared, principally in the month of May, at which time the rains are often so abundant.

We now come to the lands which we have called slightly hilly. At first sight it might be believed that owing to their slope they could be easily drained. Yet such is by no means the case, and without drainage it is impossible to obtain good crops. These lands dry but slowly in the Spring time because the water from the higher parts descends and filtrates between the soil and the sub-soil. The sub-soil is generally composed of an argilaceous or flinty gravel. On the contrary the arable layer is nearly always formed of vegetable detritus kept almost intact, owing to the permanency of the water. In the early heats this land dries up, the crop suffers, the plants turn yellow and give a return which scarcely pays the cost of cultivation.

Dryness of the soil rapidly supervenes, because these lands are generally shallow. Drainage improves them greatly by making them deeper. It is true that on the other hand, the water takes away with it some fertilizing matter held in suspension or dissolution, but, by making the drainage deep, this objection can be remedied to a certain extent. From the surface of the ground the water descends slowly, and so has time to deposit all the elements it contains.

If a meadow or pasture land covers the soil, the effects of the frost and of the premature thaws in the Spring, are disastrous. The earth being soaked with water, swells up; the long roots, such as those of the clover, for instance, do not follow the stem by rising with it, and the latter is broken at the bottom. All that these have is torn roots and the soil is quite bare.

I have drained these lands myself. I had noticed in them all the drawbacks I have described, and I succeeded in obtaining from them paying crops of wheat, hay, and even lucerne. I mention the last plant as one of the best suited for feeding milch cows. I have had as much as two crops a year. Notwithstanding its great abundance, lucerne hay is far from exhausting to the soil. Its roots, like those of clover, are long, tap roots, and seek their nourishment deep down in the soil. The top of the soil, therefore, keeps all its nourishment, and this is why wheat, barley, and all plants that have spreading roots succeed so well after it. But it thrives only in good and deep soil. The first thing to be done here for its cultivation will be to see to its drainage.

I have endeavored, in this lecture, to sum up, to concentrate, as far as possible, all the benefits of drainage, and all the injurious effects of allowing water to remain in the ground. In conclusion, I recommend the drainage of the soil to all farmers who have at heart the success of our rural industry.

I commenced draining nearly 33 years ago, so that I think I can speak of it with some experience, and I say unhesitatingly that all who wish to do it carefully, without neglecting their previous studies, and taking into account the information given in works devoted specially to the subject, will be amply repaid for their trouble and outlay. They will also have the credit of introducing into their parish or county a useful improvement, and thus contributing within their ability and means to the welfare of their country.

With your permission, gentlemen, I will now give you some explanations as to the plan of my farm, which you see before you. I have drained on this farm considerable spots of sufficient importance, which were utterly unproductive before I used the only means to reclaim them. I have no pretention to show you a model work. When I started, thirty-three years ago, drainage was but little known, and I had to make up for my want of knowledge by greater initiative. So that I am not ashamed to tell you that I learned experience at my expense, and if I was sometimes mistaken, I at least always did my best, so that others as well as myself might profit by my lessons.

Here are some details about making ditches generally:

If you have a long ditch, you should make it wider. If it is short, you should make it narrower, so that it may hold whatever goes through it. In wooden drains, scantlings are put in such a way as to overlap the edge, so as to be able to nail planks on top. This forms a sort of trough turned upside down, with the joints cut. Thirty-three or thirty-four years ago the wooden drain was put in field No 1. I looked at it last fall, and it was good and sound as when I made it.

The drain on the west part of the same field is made of wood, with poles of round cedar, two beside each other and the third on top so as to form a cover. It is always well to put turf on when it can be had easily. Before reaching the drains the water filtrates through this turf, and deposits in it the earthy particles which it holds in suspension. The obstructions are then much less frequent. All the drains should be covered with turf, bark, or other substances, if turf cannot be had easily, so as to retain the earth which is carried along.

The south-east part of field No. 1 is composed of sandy soil, and the land dried late, as late even as the month of June. Before being drained I could never get but one single good crop, of oats; of hay there was none. I drained it in eighteen hundred and sixty-eight.

The whole of the north-western part of that field, where the ditches are very close together, was a sort of unproductive marsh. To drain the water off, I had to dig down eight feet; the land was completely flooded. I must tell you that the soil is very uneven. This is why the several lines are under very different forms. It is one of the first parts I drained. We afterwards come to the foot of the hill, where there was a spring. The ditch was four feet deep. The water could not run off, because there was already an abundance of it lower down, so that it reached a certain height on the hill. I drained not only this part, but twenty feet at least, and enough to rejoin the heights which did not suffer from the moisture. In this way I have actually obtained, from a land which was utterly unproductive, hay which succeeded well after this draining. I must state that I have not succeeded in draining it completely; only when the snow melts, a little water lies on it, for this field is at least four feet lower than those adjoining it. I then decided upon making another ditch across it, towards the south, to empty the main ditch. During the remainder of the year, in the summer and fall rains, even if it rains for the whole day, I never find a drop of water. There is neither trench, nor surface drain, and the ground

is not damp. In the whole upper part of the field the land is always fit to till; it is a mixture of calcareous soil with some sand. It is a rich earth which dries easily because it contains a great deal of lime.

Let us now pass on to the other fields. In No. 3 the soil is grey. You see, I have made there all the ditches required to gather in the centre all the water there may be. Here I open a parenthesis and I will enter into some details upon the way to ascertain whether the drains give full satisfaction. When you have made a drain, if you wish to know easily whether the land is dry enough for sowing, go to your field in the morning. This is the time to see the parts which suffer from the water. If you go later in the day, the sun has dried up the ground and it is not so easy to discover. Now, for another process, if you wish to study lands that are uneven, where there are some spots that are more moist than others. A small hole is made here and there, to judge not only to what height the water has risen, but to ascertain the plan of the water bed. On the east of the field where we were a while ago, you see no drain; yet I have neither side-canal nor itch. I have only cut off the water. This field is three hundred feet wide, something more than an arpent and a half, and there has never been a drop of water in it. I have no need of doing anything, and the vegetation does not suffer, because the water from the hills has been cut off. The ground is easily dried by the air. It has become as good as the higher places. The drainage done here has also drained the lower lands. After I had got this far, I noticed that there was still one place where there was too much water. I then dug a drain below the former ones, to the south-east of the main drain, so as to carry off the water into the creek and to drain the whole south-eastern part of the field. In this way the drains which are such as you see them have acted upon all the parts directly drained. My drains empty into the creek.

West of the main drain there is another system. The lands there are somewhat sloping, as I have stated in my remarks above. The ground suffered, being flooded with water. But by sowing somewhat later I obtained good returns. After making a pasturage and a meadow of it the first year, I obtained a good crop. The second year the water rose to the surface and kept the ground always too moist. I sowed clover, which fared well enough the first year, but the second year the water raised the ground up and tore out the roots of the clover, because, when the ground thaws at the surface and is not thawed at the bottom, the roots remain caught at the bottom and are cut at their base by the next Spring thaw. Since I drained it, I have got as fine crops of wheat as can be wished for, twenty-two bushels to the

arpent. However, in the middle, at the foot of a hill I was obliged to make a ditch which ran inwards, because the slope was not heavy enough to tap the water on this hill. Here again I succeeded in effecting a partial drainage. I hoped to succeed all through. The drain reaches a depth of eight feet. But at the end of the year I found that there were still some spots rather moist. I decided upon making a ditch, the course of which is traced in dotted lines on the plan. I have not then been able to reach the lower part with this immense ditch which is eight hundred feet in length. I have still six lengths of ditching to finish all this drainage which would make about eighty arpents. It is in field number one that the greatest number of them are placed. In field number two there is only a small number. In field number three there are many, and in field number six, scarcely any at all. In field number three, as you see, there are a great many small ditches, because it is a hill that slopes very gently downwards. To receive the water from all the higher grounds, ditches had to be made which received the water in different ways.

When the ground is slightly sloped, the drains are dug in the direction of the slope, so that the water may go on one side and the other with the same advantage. If you put them otherwise, the lower parts will suffer. By putting the drains in the direction of the slope, the drain works better and more easily, and runs less risk of getting blocked up.

I have a ditch fifty-four feet long. It is at the foot of a hill in field No. 3. The hill is quite steep. By running the ditch at the foot of the hill, the space between it and the open ditches is thoroughly drained, as is also the one separating the ditch from the hill. There used to be formerly at least eighty feet of land which was lost.

I should tell you that the last two fields were drained not long since, in 1878. It is now thirty-four years that I am on this farm, and before they were drained I could never get a single good crop from any of these fields. The ground was so wet that the cattle drowned there. By draining them I now get the best hay and grain crops that can be desired. I can cultivate any kind of plants with as much facility and advantage as any other land. I will go further and say, with even more advantage, because anybody will understand that a land which has been wet for several years contains more nutritive substances, more vegetable detritus than another which has always been exposed to the air.

In draining land, it is important to put lime on it for the first year, to decompose the nutritive substances. By taking this precaution you will at once obtain the best results.

On the North of field No. 3 the ground is wet. In the valley it is argilaceous and marshy, because the lands which are below the limestone quarry contain a great deal of marl and of lime. I noticed this by drying a little earth, then taking a clod of it, and letting it soak slowly in water. As the earth touches the water it crumbles away and falls to the bottom of the vessel.

South of field No. 6 there is a shallow creek. This is the hardest part to drain because there is not enough depth. This year I finished the West part of the same field, and succeeded in making a ditch of four feet deep. But on starting from the creek it was a level plateau, and I was obliged to make it with planks and I have only a foot and a half of soil on my cedar planks. Hemlock planks placed almost on the ground do not last long enough. With forty feet long of cedar I had enough to reach a small height, which allowed me depth enough to make a good ditch. The remainder is of stone. This is how I used it. Stones are put in a ditch of about eight inches in width. This may depend upon the stone that can be had. Flat stones are selected, in cones, with a round stone on each side to strengthen the first ones, then lay a row of small stones, and finish by using the finest so as to close the openings as much as possible. Eighteen inches is the thickness suitable for making a good stone ditch. When stone drains are used, the slope or fall must be greater than with tiles, because the holes are more liable to be blocked, and with a gentle slope there is risk of more inconvenience than with tiles. The following are the figures generally adopted in practice for the inclination to be given to drains: tile drains, 4 inches per arpent; stone drains, 8 to 10 inches per arpent. This is also the reason why I made a portion of my ditch in planks; the remainder was of stone. On the plateau to the East I adopted still another system. I found a soil easier to drain, and I made a special plan. My drains go to tap the water on the slope. Here there was a sort of spring, and I was obliged to turn my drain off in such a way as to cut the water below that height. For this land I do not think it is necessary, at least for the present, to incur any more expense.

On the North I have a small gully which will always be hard to drain. I consider that the cost of draining would be too considerable for the importance of the land which is fit for pasturage. On the south of the said gully water remains continually. Cattle cannot go there. It is a sort of marsh. On the plan my drains are run so as to go around this marsh and arrive at the same place, where I have height enough to make them connect with the creek. It is always a matter of great importance to have a sufficient fall to empty the drains.

All the blue lines which you see on the plan are open ditches. I made the outlet at the head of my stone drains, and at a great cost. This, however, I found out to be useless, for the frost disarranged everything. For several years past I have made the head of my ditches of cedar. I take three inch planks, wide enough for the quantity of water to be drained. This I prefer to stones, which get loose and obstruct the water-course. I make these remarks with a view to prevent persons who wish to make drains, from making the same mistakes and being obliged to begin again.

The few observations I have just made to you are of small consequence, yet they may be of use to any one undertaking drainage. If any person present has any remark to make or any question to put I will be happy to answer him to the best of my ability.

QUESTIONS.

Mr. Girouard: What average distance do you put between your drainage ditches?

Mr. Casavant. Forty feet.

Mr. Girouard: What are the dimensions of the scantlings you put with the planks?

Mr. Casavant: If you have but little water, two inch scantlings and six inch planks will suffice to leave a passage of two inches and a half to three inches.

Mr. Girouard: Do these scantlings rest on the ground only?

Mr. Casavant: Yes.

Dr. Couture: Will you have the kindness to tell me why I have not succeeded with my drainage in one field. I made my ditches two feet deep. I have made my drains as you say. I then put from twelve to fifteen inches of stone over the drain, and not one of these drains is now in working order.

Mr. Casavant: What fall did you allow per arpent?

Dr. Couture: I allowed one inch for every ten feet.

Mr. Casavant: This comes exactly to what I said just a while ago. The fall is enough, but the drains are too shallow. Instead of two feet and a half, it would require at least four feet. The drainage would not have cost much dearer, and it would have been much better.

Dr. Couture : I had two other fields drained with tiles. I also allowed one inch of fall for every ten feet. In one of the two I put drains twenty feet apart. The head of the drain was only two feet and a half. By allowing a slope of one inch for every ten feet I succeeded in getting three feet and sometimes three feet and a half. I drained another field with tiles, and placed the drains forty feet apart, only I put them from four to five feet in depth. In the last field the drainage is splendidly done. The land was one of the most marshy, and it was scarcely possible to pass over it, even in the dry season. The drains are four feet and the drainage is perfect. In the first field the drains are two feet and a half, and the drainage is very badly done in some places. Now it is plain that the reason of the failure is that the drains were not deep enough. The deeper the drains are, the fewer of them are required. On two lands that I drained, I did the greater portion of the work with horses, and a plough whose perch, instead of being bent towards the ground, was pointed upwards. The perch is raised to the required height, according as it becomes necessary. A horse was put on each side of the drain, and a depth of three feet was dug with the plough. The earth is always thrown up on the same side of the surface. Then a long handled shovel is used to dig a depth of one foot. So that the bottom of the drain is only as wide as this shovel, namely, four inches. After laying the tiles, the drains are filled up in the same way by using the horses. For all this drainage we did not use a shovel at all.

Mr. Casavant : You did not put any clay or pieces of tile on each side of the drains ?

Dr. Couture : No, we put a plank.

Mr. Casavant : From one end to the other ?

Dr. Couture : Yes.

Mr. Casavant : That is, you covered your tile with a plank ?

Dr. Couture : Yes, and when the tiles are laid down they cannot be displaced when the drains are made in this way. When the tiles are laid, the whole is ploughed over so as to fill up the ditch rapidly. The first drains of stone cost us thirty cents a foot. The second at two feet and a half in depth and twenty feet of distance, cost us ten cents a foot. The third cost us six cents a foot, and the last is much preferable to the two others.

Mr. Casavant : I answered some one just now who put me a question about the advantages of draining, and I said to him : The more deeply you drain, the more guarantees you have for the drainage being good, and it will not cost you any dearer, because it takes the same materials. A drain

four feet deep will be able to drain land for a distance of forty feet, because you will have double the depth of bed to aid vegetation. Then there is another reason. The further the water has to go to reach the drains, the less matter it carries with it to fill up the drains. And I repeat again that the lower the drains are the more guarantees you have for their stability. Such are the chief advantages of deep drainage. But, as I said, before commencing to drain it is necessary to study the authors who treat of the subject specially, and to take into account the advice of people who have acquired experience at their cost.

System of Cultivation in view of the Dairy Industry of the Eastern Portion of the Province of Quebec.

BY J. C. CHAPAIS.

INTRODUCTION.

MR. PRESIDENT AND GENTLEMEN,

I attend the present convention as a director of the Dairy Association, to represent, in the Board of Directors, the District of Kamouraska. This amounts to telling you that I belong to the eastern portion of the Province of Quebec. Now, this eastern portion of our Province, which for the purposes of the present conference, I consider as commencing at Three Rivers, is, by the geographical position which it occupies, in climatic conditions totally different from the western part which constitutes the upper portion of the Province. This difference of climate has a great influence upon the agriculture of the region in which I dwell. I have had an opportunity of proving, by my own experience, having been engaged in farming in both parts, east and west, what an enormous difference exists, concerning farming operations, between these two regions. Thus the eastern portion sees its operations commence in Spring time at least three weeks later than they have commenced in the west. The late Spring frosts are often felt there to the 15th of June, and this to a degree sufficient to compromise the prospects of the harvest; moreover, towards the end of August or the commencement

of September, early Fall frosts occur which ruin the crop at the moment it is just ripening, as happened in 1885, which was a year of scarcity for the east of the province. Lastly, severe frosts sometimes take place in October, at the time the crops are scarcely housed, and leave the farmer no time to do his fall ploughing. For all these reasons it happens that the farmer who devotes himself to the

RAISING OF GRAIN CROPS,

which, up to these last years, was the great, the principal, farming business of everybody, finds himself, owing to a bad Spring time, with an immense area to till, before he can entrust his seed to the earth. Late sowings are the result of this, (I have seen wheat sowed on the 28th of June), and, as a consequence, crops which the early Autumn frosts find yet unripe, and injure more or less, but almost always to a certainty. Hence follow bad crops from year to year, the impoverishment of the farmer, who finally comes to the conclusion that Agriculture does not pay, and becomes disgusted at his calling. In the end crowds of farmers, and principally farmers' sons, abandon farming and go in quest of what they think easier and better paying work, in the factories and workshops of the United States. To the disadvantage caused by the climate, which I have mentioned above, is added, owing to the numerous and disastrous

EMIGRATION

of our rural population, a scarcity of labor. To-day this labor commands an extravagant price, and the farmer who must hire the services of others, sees his poor and scanty profits go to pay for this necessary help, which he can only get at exorbitant cost. Struck by this state of things, I asked myself, as several others have done, whether there was no way to adopt a system of cultivation other than the old routine and the ruinous system of grain crops upon grain crops, which has been practised for so many years past in our province. Some practical farmers have sought to replace this system by a plan of cultivation having for its aim the

RAISING OF CATTLE FOR THE MARKET,

but they have not succeeded in faring any better. I will tell you, in a few words, the reason of it. In our parts, the wintering of cattle commences virtually on the 15th of October, and only ends on the first of June. By wintering, I mean here the time during which cattle must be fed in the stable. Now it is no exaggeration to say that cattle pass seven months and a half completely in the stable, and must also receive at least one meal in

the stable every day during the first fifteen days they go to pasture, from the 1st to the 15th of June, and the last fifteen days they pass there, from the 1st to the 15th of October. This makes nearly eight months of permanent and costly stabling out of twelve.

The system followed by farmers who wish to raise cattle for the markets consists in raising cattle to the age of two years and a half as best they can, and then sell them to the cattle dealer who prepares them for the slaughter house. Let us now see, for a moment, what is the cost of raising an animal of two years and a half, and what price it brings:

The calf, on calving, is worth	$ 1 00
During the first summer it drinks milk for	4 00
In the first summer's pasturage it drinks for the value of	0 60
During the first winter it eats 100 bundles of hay worth at a low price	3 00
During the second summer its pasturage costs	2 00
The second winter it eats 150 bundles of hay worth at $3 a hundred.	4 50
In its third year's pasturage it eats for the value of	4 00
Making a total cost at two years and a half, of	$19 10
At which age it sells for	15 00
Leaving a deficit of	$ 4 10

These are the prices in the part of the country of which I am now speaking. They show plainly that whoever expects to improve his farming and get better profit from it by this system, is mistaken.

In fact we cannot make any profit out of cattle raising upon sales of this kind, because they cost too dear and sell too cheap. These low prices are due to the ruinous competition we have to maintain in the markets against the cattle raisers of the western prairies, who can sell their meat at a profit in the market for 4 cents a pound. They have no stabling for their cattle, which pass the winter in the open air on the prairies. The cattle breed by themselves and live there until they are three years old. Then they are picked out and taken to some of the great centres, where they are fattened on Indian corn for some weeks, and put on the market at $4.00 per hundred pounds, which is almost all clear profit for the owner. Even had we large cattle, it would be utterly impossible for us to struggle against this competition. The proportion of loss or the cost of wintering would still be the same.

We must then seek something else, for it is clearly proved that neither the growing of grain crops nor cattle raising for the meat market can pay. There remains farming in view of the dairying industry, that is, having for its principal aim, the production of milk, butter and cheese. After going all through the Province of Quebec, and taking the figures of the best practical farmers, I have come to the conclusion, and this is in keeping with my own experience, that the only style of farming to be followed in the eastern part of the Province of Quebec is the

STYLE OF FARMING SUITED TO THE DAIRY INDUSTRY,

which I am now about to explain to you.

In the first place we must not lose sight of the class of farmers for whom I submit my plan. I am now speaking of farmers who have exhausted their lands by a bad system of farming, a routine system which consists of always taking from the earth some of its elements, and never restoring any to it. This means that I address myself to impoverished farmers who have no means to make any heavy outlay in money to restore their exhausted lands. What I want to show these farmers is, that by carrying on their farming business with the same animals and the same implements which they now have, and by following the rotation which I am now going to explain to them, they will see their land commence to improve and do so gradually afterwards, so as to afford them such profits as will put them in a position to enter upon greater improvements, which will render their business really paying.

I will not be expected, then, to speak of drainage, ensilage, purchase of costly implements, improved breeds of cattle, &c. I merely assume that the farmer owns two arpents of land in front by forty in depth, with two horses, some cows, ploughs, harrows, &c., such as are generally found amongst us. I lay down as a principle that the farmer commences by draining and clearing up his land, for, if it is encumbered with stones, brushwood, &c., without drainage, and with a quarter, and sometimes even more, of the land wasted in embankments of ditches which retain the water, in piles of stones, in heaps of brushwood, &c., it is utterly impossible to follow any system of tillage so as to make it pay.

I propose to this farmer, whose land is thus put in order, a system of cultivation, which I must say at the outset will not perhaps absolutely suit all lands, but which, from the knowledge I have of the eastern portion of the Province of Quebec, will suit the greater part of the lands in it. Besides,

the system itself allows of making such changes as may be required for certain special lands, without destroying the principle of the general order of rotation which I have just proposed, which is a

ROTATION

of twelve years. I now arrive at the details of that rotation, and in case I am asked why a rotation is considered necessary, I will state at once that it has especially for its aim the destruction of weeds, the enriching and breaking up of the soil in the best possible condition, and the succession of plants which draw off from the soil elements which a single kind of these plants would not take from it. This allows of utilizing all the strength of the soil and prevents the complete removal from it of certain elements of which it would be deprived in the end, while it would contain others which could not be utilized, and which would be lost. Our rotation would then be a

ROTATION OF TWELVE YEARS,

with twelve pieces of land of six arpents and a quarter each, forming in all seventy-five arpents, and leaving five arpents for buildings, yards, gardens, orchards, lanes, &c.

We then take the first piece in pasturage, to commence the rotation, and we say:

FIRST PIECE.—OATS AND PEAS.

FIRST YEAR.—Plough in the previous fall. In the spring, break up the ground with the harrow, and sow oats and peas, or a mixture of peas and oats together.

If only oats are sowed, sow an average of two bushels and a half per arpent, and, if the ground has been well prepared, there will be a crop of 40 bushels, weighing on an average 34 pounds, which will make for the 6¼ arpents, 8,500 ℔s. of grain, and 17,000 of straw, allowing that, in the crop of oats, the straw weighs double the grain.

If peas are sowed instead of oats, an average of a bushel and a half per arpent should be allowed. This, with good cultivation, will give an average of sixteen bushels, weighing 60 ℔s. each, or, for the 6¼ arpents of peas, 6,000 ℔s. of grain, and 15,625 of straw, at 2,500 pounds for each arpent.

Supposing, as I do to base certain calculations that I will make later on, that it is preferred to sow a mixture, there will be 4,250 ℔s. of oats, and 3,000 ℔s. of peas, besides 8,500 ℔s. of oat straw and 7,812 ℔s. of peas straw.

SECOND PIECE.—HOED CROPS WITH MANURE.

SECOND YEAR.—The half of the piece will be sowed with potatoes, and the half in Indian corn to be fed green to the cattle. For this there will be required for each arpent an application of 40 loads of stable manure representing from 15 to 16 tons in weight. I mention the cultivation of

THE POTATO

in preference to root crops, such as beets and turnips, because it is the easiest made and it is the hoed crop which requires least labor. With a plough, a harrow and a horse hoe which costs but little ($7.00) and which is commencing to come into general use amongst us, the work is done easily and without much outlay. The ground being well prepared and well manured, an average of two hundred bushels an arpent can easily be got, by sowing under the furrow at 27 inches distance between the rows and twelve inches apart in the rows, ten bushels of tubercles. This will allow for 3½ arpents 625 bushels of potatoes, which at 60 ℔s. a bushel gives 37,500 ℔s.

INDIAN CORN FOR FODDER.

For Indian corn, sow at the rate of 1½ bushel an arpent. It requires the same manure as the potato. A harrowing, when it commences to rise, and a hoeing when it is 4 or 5 inches high, are about all the care it needs before being taken up. It is sowed in lines, under the furrow, in rows 24 inches apart, and an average return of 20 tons an arpent can be counted on, or, for 3⅛ arpents, 63 tons or 126,000 pounds.

THIRD PIECE.—BARLEY AND CLOVER.

THIRD YEAR.—Our ground is prepared to receive a sowing of barley and clover. About two bushels of seed barley are sowed for each arpent, and an average of 30 bushels at 50 ℔s. each may be expected, or 187 bushels, or 9,350 ℔s. of grain and 18,232 ℔s. of straw, the proportion of grain to straw being in barley 100 of grain to 195 of straw.

CLOVER.

I have spoken of clover seed being sowed with barley. In fact the fourth year will be for our piece a year of clover for green fodder. To get a good crop of clover, fifteen pounds of seed must be sowed for each arpent. It is better to mix the three kinds of clover which I am going to mention, as follows;

Red clover	8 lbs.
White "	4 "
Alsike "	3 "
	15 lbs.

Complaints are often made that the clover seed does not come up. This is owing, in almost every case, to its being sowed too deep. On a soil well prepared and not too wet, one good rolling is sufficient. In any case a light harrowing is all that is needed to make it deep enough.

Another complaint is often made that the clover freezes; this is in some cases unfortunately true. Thus every time there is a heavy thaw in the winter, which lays the ground bare, a coating of ice is formed on its surface when the cold comes back and destroys the roots of the clover. It has been noticed, in this case, that along the

FENCES

where the snow was deeper, and in consequence the ground was not laid bare, the clover did not freeze. This led to the conclusion that if, instead of putting a fence only at each arpent, as is the custom, one was put one at every half arpent, the heaping up of the snow would be assisted, and in consequence the uncovering of the ground would be prevented, and, with it, the freezing of the clover. Practice has confirmed this theory, and now, wherever fences are multiplied in this way, the crop of clover has been doubled and its success assured, only these numerous fences are objected to on account of their cost. But, as in this part of the country timber is not yet very scarce, and a good cedar fence lasts from 40 to 60 years, according to the ground, the slightest calculation will show that this extra fence for every half arpent will soon pay for itself.

FOURTH PIECE.—CLOVER CROP.

FOURTH YEAR.—We are now for this year with one piece of land in clover. This clover, for the first crop, ready to be taken up with us, about the second week in July, will give, whether it be used for fodder, fed green to the cattle or turned into hay, 250 bundles per arpent, 1,562 bundles for 6¼ arpents, or 23,430 lbs. As for the second crop, it will be ploughed in by the farmer rather than have it eaten. It is claimed, and rightly I think, that the crop gives more profit, if used by the cattle, than if ploughed in as manure. But it must be borne in mind that I speak here of a class of farmers who have a prejudice against buying any chemical manure. Now to get

from the second clover crop a profit which may not be injurious to the land, by having it consumed by the cattle, we must restore, by means of a chemical manure, what this second crop has taken from the soil. While by having it ploughed in, the ground is prepared for a good wheat crop, as experience has amply proved, and in this way one can avoid clashing with, a prejudice which with many people is unremovable.

FIFTH PIECE.—WHEAT AND FORAGE SEEDS.

FIFTH YEAR.—We find our soil prepared by the fall ploughing of the previous year, which served to bury the clover, for a crop of

WHEAT.

A bushel and a half is sowed for every arpent, and with the care required for the present system of rotation, an average crop of twenty bushels of 60 lbs. each can be raised, or, for the 6¼ arpents, 7,500 lbs. of grain, and 15,000 lbs. of straw, which latter, in wheat, is in the portion of 1 lb. of wheat for 2 of straw, in weight.

With our wheat, we also sow

FORAGE SEEDS

for meadows, as the land should be left in meadow the next year. In the eastern part of the province, no other forage grains are known than timothy and the three kinds of clover I have already spoken of above. As in explaining my system of rotation, I endeavor to speak as little as possible of innovations, I will mention the quantity of these four kinds of grain, which is required for a good arpent of meadow, while I state for the information of farmers who have courage enough to go in quest of the unknown, that there are other forage plants which give a fuller and better return of superior hay than the timothy seed and the three clovers sowed alone can produce. Here is the mixture of timothy and clover in question:

Timothy (3 gallons).....	15 lbs.
Red clover.....	5 "
White "	4 "
Alsike "	2 "
Total.....	26 lbs.

These quantities, as well as those of clover given above, may appear exorbitant to many, and yet they are necessary to ensure success. Besides,

any intelligent farmer can raise upon his own land the seed he requires, and in this way avoid an outlay which he may not always be in a position to make.

MEADOWS.

SIXTH, SEVENTH, EIGHTH AND NINTH YEARS.—The meadow formed on our piece of land, by sowing the forage seed mentioned already is intended for four years. During these four years care must be taken not to allow the meadow to become bare, for any spot on which good grass ceases to grow gives shelter to weeds. The frost sometimes raises up the roots, which afterwards wither. To avoid this, heavy rolling must be done as soon as the land is firm enough in the Spring. If the ice has left some bare spots, they must be broken up with an iron toothed harrow, we must sow forage seeds in it and then roll it. If weeds appear they must be weeded out by hand, and if that is done as soon as they show themselves they will not spread. Above all, cattle must never be allowed to graze on the meadow.

MANURE ON MEADOWS.

After the third year's crop of hay, the meadow must be covered with rotten manure, in the proportion of ten tons to the arpent, equivalent to about 16 tons of green manure. This will ensure an excellent hay crop for the fourth year's meadow land.

Meadow land treated this way will easily yield an average of 250 bundles to the arpent, or 1,562 bundles for 6¼ arpents, which, multiplied by four for the four acres of meadow, gives a total of 6,248 bundles, or 93,720 lbs. of hay.

PASTURES.

TENTH, ELEVENTH AND TWELFTH YEARS.—During the last three years of the rotation, the soil, which has been four years in meadow, is given up to pasture. To have this in good condition the dung dropped on it by the cattle must be carefully spread, to prevent the grass from being burned at the place where the excretions fall. The blades of grass which, from one reason or another, the cattle leave untouched here and there, must also be mowed. These blades, if allowed to grow, ripen and exhaust the soil. In Spring, the care I have mentioned above for meadows, must be given to pasture lands.

The question of the fences, about which I spoke in connection with clover, also applies to meadow and pasture lands.

The three years of pasturage furnish in grass for the cattle as much as the three years of meadow, or 70,290 lbs.

OBJECTIONS.

Such then is the system of rotation which I recommend for the eastern portion of the Province of Quebec. Some persons to whom I took occasion to declare that this system or something like it is the only one I think fit to improve the farming in this section, objected that it was bad for two reasons.

The first is that only a few farmers can practise this regular rotation, because they have not suitable lands. Notwithstanding this, any farm, large or small, can be adapted to the rotation, if not wholly, at least in part. A hilly or rocky land will always remain a pasture, because it is good for nothing else. Another piece of land, forming a natural meadow, enriched every year by the rich sediment deposited on it by the overflowing of a river, will always remain a permanent meadow; and the other parts of the farm which are suited to rotation, will be subjected to it.

The second objection urged is that it would have a tendency to allow the farmer to put on the market only one product, milk, and the articles derived from it. It is asserted that in the years when the products of milk, whether butter or cheese, do not sell, the farmer has nothing else to offer for sale, and is at a loss. Evidently those who have made this objection have not studied the system, for, as we shall see, it puts in the farmer's hands instead of only the products of milk, various other kinds of produce, with which he can always meet the requirements of the market.

Thus, for instance, one year hay will sell dear and oats will be cheap, and the farmer, instead of giving his cattle a complete ration of hay, will lessen that feed by one third, sell the third of his hay, buy the equivalent of this third of hay in oats, to replace the hay sold, and make a handsome profit, while feeding his cattle well. He will, in the same way, be in a position to profit by any other fluctuation of the market, as he will always have, as I have just said, various kinds of produce at his disposal.

SUMMING UP OF THE HARVEST.

Let us now sum up what is produced by the farm of 80 arpents in superfices, on which we have just applied a rotation of twelve years. Here is a list of its products:

Pieces.	Produce.	Lbs.	Lbs. of Straw.
No. 1	Oats	4,250	8,500
	Peas	3,000	7,812
No. 2	Potatoes	37,500	.....
	Indian corn	126,000	.....
No. 3	Barley	9,350	18,232
No. 4	Clover	23,430	.....
No. 5	Wheat	7,500	15,000
Nos. 6, 7, 8, 9	Hay	93,720	.....
Nos. 10, 11 and 12	Pasturage	70,290	.....

VALUE OF THE PRODUCTS COMPARED WITH HAY.

Now that we know what our plan of cultivation has given us, I suppose that the produce of the farm is hay, and is used only to feed the milch cows.

According to the best agricultural chemists, it may be estimated approximately that, taking a relative value of 100 of ordinary good hay, it takes the following proportion of each of the products which we have taken from our soil to give the equivalent of one hundred pounds of hay.

Hay	100 lbs.	Indian corn	287 lbs.
Oats	55 "	Barley	47 "
Peas	37 "	Clover	90 "
Potatoes	200 "	Wheat	40 "

According to these equivalents we have then:

Produce.	Weight.	Value in hay.	Produce.	Weight.	Value in hay.
Oats	4,250 lbs.	7,727 lbs.	Clover	23,430 lbs.	26,033 lbs.
Peas	3,000 "	8,101 "	Indian corn	126,000 "	43,902 "
Barley	9,350 "	19,893 "	Hay		93,720 "
Wheat	7,500 "	18,750 "	Pasturage		70,290 "
Potatoes	37,500 "	18,750 "			

The whole harvest is then equivalent in hay to 307,166 lbs., or, in round numbers, to 153 tons.

COMPLETE TABLE OF THE SYSTEM OF ROTATION.

To be able, later on, to establish the net profits of our method of farming, deducting the outlay for labor required to realize them and for the earth for producing them, I will now establish the amount of nitrogen and phosphoric acid, the two most costly elements taken from the soil, by the plants contained in our 307,166 lbs. of hay. I establish this amount in the annexed table containing the full details of our system of rotation, of its produce,

of their value in hay, as also their chemical value in nitrogen and phosphoric acid.

On referring to the 12th and 13th columns of this table, it will be seen that the 307,166 lbs. of hay have taken from the soil, by the plants which have grown on it, 3,384 lbs. of nitrogen, supposing that the agriculturists, who assert that clover derives a great portion of its nitrogen from the air, are mistaken, and 1152 lbs. of phosphoric acid.

Pieces.	Arpents.	Produce.	Bushels per Arpent.	Pounds per Bushel.	Total Bushels.	Total Pounds.	Equivalent of 100 lbs. of hay.	Total value in hay.	Nitrogen per 1,000 lbs.	Phosphoric acid per 1,000 lbs.	Total Nitrogen.	Total of phosporic acid.
1	3 1/8	Oats.	40	34	125	4,250	55	7,727	18.0	5.8	76.5	24.7
1/2	3 1/8	Peas.	16	60	50	3,000	37	8,101	35.5	7.5	106.5	22.5
1	6 1/4	Barley.	30	50	187	9,350	47	19,893	20.0	8.7	187.0	81.3
1	6 1/4	Wheat.	20	60	125	7,500	40	18,750	21.0	9.0	157.5	67.5
1/2	3 1/8	Potatoes.	200	60	625	37,500	200	18,750	4.5	1.0	168.8	37.5
1	6 1/4	Clover.	. . . .	. . . .	. . . . .	24,430	90	26,033	17.0	4.2	398.3	98.4
1/2	3 1/8	Indian Corn fodder.	. . . .	. . . .	. . . . .	126,000	287	43,902	3.2	1.3	403.2	163.8
7	43 3/4	Hay & Pasturage	. . . .	. . . .	. . . . .	. . . . .	100	164,010	11.5	4.0	1886.1	656.1
12	75							307,166			3383.9	1151.8

As I wish to convey as exact an idea as possible of the net profit to be derived from the method of farming which I have just explained, I will begin by assuming that the whole produce of the land is applied to the

PRODUCTION OF MILK.

It is now agreed on all hands, from the experiments made by different farmers, in several countries, that 100 lbs. of hay eaten by a good milch cow produce 40 lbs. of milk, after allowing the animal her supply of food. At this rate 307,166 lbs. of hay will produce 122,866 lbs. of milk.

VALUE OF THE MILK.

Let us now ascertain the value of our 122,866 lbs. of milk. Taking, as the basis of this calculation, the average profits obtained by the patrons of

a combined cheese and butter factory during six years, in the country where I live, it will be found that 100 lbs. of milk give an average of produce, in butter and cheese, of 85 cts., leaving, besides, 107,850 lbs. of whey worth ten cents per 100 lbs. The 122,886 lbs. of milk can thus give a return of

Butter and cheese to the factory.....	$1,044 36
Whey for feeding animals.....	107 85
Total return.....	$1,152 21

MONEY VALUE OF THE PRODUCT.

We will now calculate the value of the product of the land as reduced to hay, so as to see what is the net profit left by our system, to the farmer, deducting this value of the hay. We have just seen that 307,166 lbs. of hay contain 3,384 lbs. of nitrogen and 2,152 lbs. of phosphoric acid.

Taking nitrogen at the price it is worth in the sulphate of ammonia, for instance, which contains 20 per cent of it, its real value is found to be 15 cents a pound, calculating sulphate of ammonia at $50.00 a ton.

In the same way, calculating phosphoric acid at the price it is really worth, for instance, in bone powder, its value is ascertained to be $5\frac{1}{8}$ cents, supposing that bone powder contains 23 per cent of it, and that it is worth $26.00 a ton.

These figures give us, then :

3,384 lbs of nitrogen at 15 cents a pound.....	$507 60
1,152 lbs. of phosphoric acid at $5\frac{1}{8}$ cents a pound	65 53
or, value of the hay as to what it removes from the soil.....	$573 13

As 307,166 pounds of hay make in round numbers 153 tons, it will be seen that our hay is worth, outside of what it costs for labor, $3.25 a ton, or $2.82 for a hundred bundles.

LAW OF RESTITUTION.

To find the net profit from these figures, it must not be forgotten that if we wish the land to continue producing, without becoming exhausted, we must return to it what we take from it. Now, we have seen that our crop has taken from the 75 arpents of land, 3,384 lbs. of nitrogen and and 1,152 lbs. of phosphoric acid.

How then, must we do to restore these elements to the soil? First of all, we have the manure produced by the cattle. We have seen that 100 lbs. of hay produce 40 lbs. of milk. There remain 60 lbs. of nourishment, which go partly to feed the animal, and the remainder is turned into manure.

MANURE.

We are now going to examine what the produce of our land gives us in manure. Farmers are pretty nearly all agreed in admitting that the weight of stable manure produced on a farm is equal to twice that of the food consumed and of the litter put into the manure, the great quantity of liquid contained in animal excretions forming the apparent abnormal excess of weight between the food consumed and the manure produced. It is also admitted, that, for cattle, the litter should be in the proportion of one-fourth of the food given, to allow the absorption of all the urine. But, it must be remembered that if we have calculated our crop in its equivalent of hay, on the other hand this equivalent will be eaten during nearly five months in the field where it will not require any litter. The 49,544 lbs. of straw which our crop has given us, as will be seen in a little table which we give below, are amply sufficient for all the litter we require.

To show our richness in manure, we say, then:

Hay	307,166 lbs.
Straw litter	49,544 "
Total litter and straw	356,710 lbs.
Multiplied by	2
Gives, for the weight of manure produced...	713,420 lbs.

or 356 tons. But let it be remarked at once that more than the third of this manure will be applied by the cattle themselves on the soil, while they are grazing. This accounts for the difference there is between these figures and that given as the quantity to apply on the ground when hoed and when it is in meadow.

Let us now see the

CHEMICAL VALUE OF THE MANURE,

thus obtained, on the score of nitrogen and phosphoric acid. Farmers and chemists tell us that the manure of the different cattle on a farm, if mixed and well kept, contains for every 1000 lbs., 4.0 of nitrogen, and 1.5 of phos-

phoric acid, which, for 713,420 lbs. which we have, gives us a total of 2,854 lbs. of nitrogen, and 1,070 lbs. of phosphoric acid, from which must be deducted the

CHEMICAL VALUE OF THE STRAW

which enters into the manure, and whose richness in nitrogen and phosphoric acid has not been added to the quantity of these same elements, which we have found in the hay, in the calculation made above.

Produce.	Lbs. per arpent.	Total in pounds.	Nitrogen per 1,000 lbs.	Phosphoric acid per 1,000 lbs.	Total in Nitrogen.	Total in phosphoric acid.
Oat Straw	2,720	8,500	2.8	1.3	24.8	11.0
Peas "	2,500	7,812	17.9	2.4	140.0	18.7
Barley "	2,925	18,232	2.3	1.2	41.9	21.8
Wheat "	2,400	15,000	3.5	1.5	52.5	22.5
		49,544			259.2	74.0

Taking always the calculations of the chemists, which we have already used, we find on examining the above table, which gives the quantity and chemical value of each kind of straw obtained in our rotation, that the total of 49,544 lbs. of mixed straw gives 259 lbs. of nitrogen and 74 lbs. of phosphoric acid, which are valued at $43.06 according to the prices mentioned above.

If we deduct from the 2,854 lbs. of nitrogen and 1,070 pounds of phosphoric acid of the manure, the amount of 259 lbs. of nitrogen and 74 lbs. of phosphoric acid of the straw, we restore to the earth 2,595 lbs. of nitrogen and 966 lbs. of phosphoric acid, by the manure which is found to be worth $444.19, or $1.25 a ton.

FERTILIZING ELEMENTS TO BE RESTORED TO THE SOIL.

By comparing these quantities with those taken from the soil by its produce, we find that the manure does not (and it is impossible that it should) restore to the soil all that it has taken from it. In fact,

The crop has taken from the earth,

In nitrogen..... 3,384 lbs., and in phosphoric acid, 1,152 lbs.
And the manure has only restored 2,595 " " " " 966 "

Leaving a deficit of nitrogen... 789 lbs., " " " 186 lbs.

which must be restored to the earth in some way or other, if we wish it to continue giving the same return, without becoming exhausted.

If we calculate the nitrogen to restore at 15 cents, and phosphoric acid at $5\frac{11}{16}$ cents a pound, as we have done above, the farmer must take on the profits that we have mentioned :

For 789 lbs. of nitrogen, at 15 cents a pound.....$118 35
For 136 " of phosphoric acid at 5 11/16 cts. a pound..... 10 60

Or a total to be restored in nitrogen and phosphoric acid.....$128 95

As to this restoration, the second crop of clover ploughed in will suffice to do it during the first and second year of the rotation. The clover, owing to its deep roots, plunges down into the soil, far below the space where the plants of the rotation find their food, in quest of the great quantity of nitrogen which it contains, and its ploughing in benefits the upper layer of the soil. We have seen that the first crop of clover produced nearly 400 lbs. of nitrogen, and the roots also furnish a great quantity of it. But, if the land to be dealt with is already exhausted, restitution must be made at once.

We may say, without fear of contradiction, that many agricultural chemists maintain that clover, instead of drawing its surplus of nitrogen from the soil, takes it from the air, owing to its leaves, utterly unlike those of the graminaceous species, by electric influence or otherwise. Let us not forget, however, that the lands in which clover is cultivated too often, finish by refusing to grow it any longer, despite the application of powerful manures, which seems to prove the first theory that it finds all its nitrogen in the soil.

After the second round of the rotation, it will probably be necessary, in my opinion, to recommence to restore the nitrogen and phosphoric acid in a certain proportion, varying with the greater or less primitive richness of the soil.

Now that the question of manure is explained, let us continue our calculation so to arrive at the conclusion, namely, the net profit, and for this purpose let us examine what is the sum invested as capital by the farmer

in its cultivation, and what is the sum represented by the work done by the farmer and his cattle.

First of all, let us establish the amount of the

CAPITAL INVESTED IN THE FARM.

In our section of the country land is worth, on an average, $30 an arpent, including the value of the farm buildings, or, for one farm of 80 arpents, $2,400.

With the 307,166 lbs. of hay, the farmer can keep 34 cows, weighing on an average, 600 lbs., supposing that each of them eats 4½ tons, or 60 bundles of hay a year. These 34 cows are worth, on an average, $20, or, in all, $680.

To do his farming, the farmer requires implements to the value of $200, to which I add $20 for unforeseen items.

This makes a total capital of $3,300, which requires, at 6 per cent, an interest of $198.

Let us now see the cost of

LABOR

to utilize this capital. The work to be calculated is that of sowing and harvesting, and of the care of the cattle only; for, as to the work required to make the milk into butter or cheese, we have, in the calculation that we have made of the money value of the milk, given the net produce sold from the creamery, after paying all the costs of making, selling, etc.

For the farm of 80 arpents, for which our calculations are made, the labor of two men is sufficient, and this labor is worth, with us, $18 a month, namely: $10 for wages, and $8 for board, say $216 for each man, or $432 for the two men for the year.

We must also calculate the work of two horses of 1,000 lbs. each, which counting their full ration of 3½ per cent of their weight, in hay, every day will eat about 6¼ tons of hay each, or 12½ tons for both, every year. The hay, estimated as above, at $3.75 a ton, represents for the work of the horses, $46.88.

These calculations are based on the assumption that the farmer employs strangers for his hired labor. If he does the work himself, with his son, as is generally the case, he will have in hand the $10.00 a month, say $120.00 a year for each man, or $240.00 for the two men, which sum he will have earned with his son.

If we further suppose that he is arrived at the period when he must restore to the soil, in chemical manure, the deficit left by the animal manure, which we have shewn to be $128.95, we balance our accounts as follows:

Expenditure.		Receipts.	
Interest at 6 o/o on the capital of $3,300.00	$198 00	Value of crop in hay	$ 573 12
Price of the labor of two men.	432 00	" " milk produced	1,152 89
" " " " horses.	46 88	" " manure "	444 49
Value of the manure put on the land	444 49	" " litter straw	43 06
Value of the litter straw	43 06	Total receipts	$2,213 56
Surplus of chemical manure furnished	128 95	" expenditure	1,865 60
Value of feed consumed	573 12	Balance of net profit	$ 347 96
Total cost	$1,865 60		

If to these $347.96 of net profit, we add the $128.95 of chemical manure which is perhaps not necessary during the two first periods of the rotation, and the $240.00 of wages which the farmer will earn with his son, and consequently keep as profit, in most cases, we arrive at a net profit, when the rotation has been fully successful, of $716 91.

MANURE TAKEN FROM OUTSIDE OF THE FARM.

We now have a possible result. I will here remark that in the eastern part of the Province of Quebec, starting from the upper end of the County of Kamouraska, going downwards, for the parishes along the shore of the River St. Lawrence, the profits may be more considerable, because the farmers there have two precious sources of manure, which are within their reach nearly every Spring, I mean the small fish called capelin, which comes up to spawn on the shore as soon as the ice is gone, and the sea-weed, which is cast up in great quantities on the beach by the high tides of the month of May. These two supplies of manure, if well employed, enable the farmer to increase his harvest enormously almost every year.

COMPARATIVE VALUE OF FISH, OF SEA-WEED AND STABLE MANURE.

If we compare fish and sea-weed with stable manure, we see that these substances contain per 1,000 lbs.:

	Fish.	Sea-weed.	Stable manure.
Nitrogen	28.0	5.4	4.0
Phosphoric acid	2.5	0.6	1.5

The only inconvenience offered by these substances, which cost scarcely anything to get, apart from their conveyance, is that they must be used immediately; for, otherwise, one of them, fish, putrifies and is lost; the other, sea-weed, dries up, or it heats when piled up and loses its qualities. As to the sea-weed, it must absolutely be buried in the ground while fresh or when it commences to heat. But fish can be made into a powerful manure if it is mixed in a compost with earth dried black and plaster. This allows of its being gathered in great quantities and kept for future use.

PUTTING THE SYSTEM IN OPERATION.

Need I tell you that the farmer who wishes to reform his bad tillage, and enter on the path of improvement suggested by the present work, must not undertake to carry out this reform at one stroke and in a radical manner. No. Every one will understand that the returns I have indicated, although they are not the highest that may be obtained, and the rotation which allows of their attainment, cannot, from the first year of commencing this reform, be considered as certain of success. The farmer must consider his means, and commence his rotation on only a single portion of his farm, if there is not manure enough to undertake more. Little by little he will extend his rotation over a greater space, and finally succeed in applying it to the whole farm, as his cattle, and manure, and consequently his profits, increase.

NECESSARY EXPLANATIONS.

It is well understood that farming is not usually devoted entirely to hay, and that milch cows alone are not kept on the farm. We have made this supposition in the present work, so as to be able to give approximate figures only. According to the figures given, the farmer will see, that for the region now in question it is better to refer everything, as far as possible, to the production of milk. It is understood, then, that only the number of horses and pigs necessary to utilize the waste milk and grain will be kept, sheep for pasturage unsuited for anything but sheep and also fowl to consume so many things, which, without them, would go to loss. But the greater portion of the cattle, which will be the base of every system of cultivation, will be made up of good Canadian milch cows. This can readily be understood, as they are the best breed for our country.

RULES TO FOLLOW FOR OBTAINING SATISFACTORY RESULTS.

Before finishing my work I have yet to lay down for you certain strict rules which must be followed out exactly in order to attain the results

already indicated. These rules, moreover, contain nothing new. They contain principles applicable to all good cultivation, whatever may be the system in vogue.

CLEANING THE LAND.—The first thing to be done by a farmer who wishes to alter his method of farming and enter upon the true path of progress, is to clean and to clear up his land. Piles of stones, roots of brushwood, banks of ditches, broken bits of fences, such as ends of stakes, posts, withes, pins, etc., all must be removed. The piles of stones will be disposed symmetrically, as far as possible, in rows, instead of being heaped up in the middle of the field. Instead of ten small piles let there be only one or two large ones. Later on, if the land is suitable, that is, if it does not lift with the frost, these stones can be piled into walls for fences. If the land is bad, and there is no useless land close by, where these stones can be got rid of, it must buried in deep trenches made in rows, and which will serve to drain the land. But this will only be done when the farmer has realized profits enough to enable him to pay for this work, out of the money made out of the farm.

Any shrubs or brushwood must also be removed. They occupy ground which they render useless, cast a shadow over the vegetation which surrounds them, and contribute as much as the piles of stones to diminish the quantity of the harvest.

Any piece of wood lying on the ground is in the way of the proper working of the farm implements, and a mowing machine which cost fifty or sixty dollars, has been broken by an end of a picket left carelessly in the field. Therefore, let there be a complete clearing up of the land.

DRAINAGE.—A badly drained land cannot give good profits. The crops are drowned in the pools of water. Water lies stagnant in the meadows, and develops moss, the sorrel plant spreads all over, and in winter the ice destroys the roots of the grass. What is required to drain it properly? Good ditches, with sloping edges, so as to prevent their giving away, and being filled up by the frost; good wide ridges, not less than 16 feet, well rounded off, furrows well drawn, trenches well made, the edge of which is spread upon the ridges, instead of forming a rim near the trench wherever the water threatens to lie, embankments of ditches also spread over the middle of the ridges; a good drain ditch at every half arpent, water courses or gulleys always well cleaned, deep enough not to overflow in heavy rains. With this, there will be no need of the numerous cross ditches, which are only too often to be seen in our region.

Above all, the farmer must be sure of the water course, so as not to make ditches, such as we see only too often, in which the water can only circulate by running upwards.

FENCES.—I have already mentioned fences when speaking of clover. The fences should be made without sparing. A bad fence is always more costly than a good one. Has not the farmer who neglects his fences, on one or more occasions, seen a beautiful field of grain destroyed by his herd of cattle, escaping, on some fatal night, from the adjoining pasture. Cedar, if it can be had, although somewhat costly, is the most suitable timber. The pin is now replaced by wire, and the change is very much for the better. The pickets are less broken by the wire than by the large hole required for the pin. If care is taken to have the wire galvanized, and every Spring the precaution of steadying the posts displaced by the frost is attended to, a cedar fence can now be made which will last sixty years. I know some that are as old and which are still in good enough condition.

WEEDS.—The curse of our agriculture. Nobody can deny this assertion. The plan of rotation which I have just proposed, has the great advantage of securing the easy destruction of weeds. In fact the manure put on the ground in the Fall after hoed crops, consists of manure which has fermented, and in which consequently the seeds of the weeds are destroyed. Hoeing prevents the weeds natural to the soil, or those which have come from elsewhere, from spreading. The manure put in the Fall on the meadows is also decomposed, and contains no bad seed.

If care has been taken to sow only fodder and grain seeds, well cleaned and containing no foreign seeds; if, moreover, people observe scrupulously, and see that others do the same, the law about weeds along the roads and elsewhere; if care be also taken to destroy, as soon as they appear, the weeds which grow generally in heaps of stone, and those which always find their way, notwithstanding the greatest attention, here and there, on the meadows, it is certain that the land will never be infested by weeds.

CHOICE OF THE GRAIN.—The success of the harvest, depends, in a great measure on the judicious selection of these.

The first rule to observe is to sow only fodder seeds or others scrupulously cleaned. To my knowledge, a parish has been invaded by the daisy, the chicory or thistle, for having taken part in a distribution of fodder seed sold by an unscrupulous dealer who sold uncleared seed. A special law should be enacted, to send the author of such a fraud straight to the penitentiary.

The second rule is to sow only such grains as suit our climate. A certain kind of grain may succeed well in Ontario, and come to nothing here.

The third rule consists in avoiding the bastardizing, the degeneration of the seeds. This is done by renewing them. By force of circumstances, a variety of wheat, which, when first imported, gave great crops now gives only slender ones. People wonder at this, and yet it is not strange. A bad year has come ; the grain has ripened badly, has perhaps been touched by the frost, been gathered in a bad state, perhaps damp. The result is that the seed is weakened, and will in turn give but a poor crop. This is a cause of degeneracy, which will be more and more felt from year to year, if the weakened seed is not changed for another in good order, whose value is unimpaired.

I will now proceed to enumerate a choice of varieties of different seeds comprised in our system of rotation, which, in this section, has given general satisfaction.

Oats .....Black Tartary oats.
Peas.....Golden Vine.
Potatoes.....Early Rose (if the seed is good ; with us it has degenerated and now only gives poor crops.) Beauty of Hebron, for ordinary crops. White Elephant for abundant crops.
Indian Corn.....Canadian yellow. Western.
Barley .....Chevalier's barley, (two rows.)
Fodder plants.....Timothy, with the three kinds of clover mentioned above.
" " .....Mixture recommended, which gives much better results.

Names of the seeds.	Light soil. pounds.	Medium soil. pounds.	Heavy soil. pounds.
Timothy	4	5	6
Red clover.....	1	1	2
White "	2	1½	2
Alsike.....	1	1½	1
Orchard grass.....	4	6	6
Red top.....	3	5	6
Blue grass.....	10	3	4
Ray or rye grass.....	0	1	1
Meadow fescue.....	2	3	3
Hard "	1	1	1
Yellow oat grass.....	1	1	1
Meadow fox-tail.....	1	1	1
Total.....	30	30	34

Mixture of about 30 lbs. for an arpent, and worth from 15 to 16 cents a pound, or $4.80 an arpent.

FARMING IMPLEMENTS.—The wheel plough yet holds its sway in many places in the eastern part of the province; let us hope that before long it will disappear. Good ploughs can be had almost anywhere, for moderate prices and within the reach of any one's means. The wooden toothed harrow is rapidly disappearing. It should everywhere be replaced by the iron toothed harrow. Every farmer should also have a good roller, a horse hoe, &c.

As for the mowing machines, horse rakes and reapers, these are costly implements, and are not within the means of farmers who wish to commence the reform I suggest, without making any outlay upon their lands. They can do as is done in a great many localities. Farmers who own such implements, go to their neighbors, and for a price of so much per arpent, mow and reap for those who have none. At our place, the price is 50 cents for mowing and 80 cents for reaping. There should also be in each range a good fanner for separating and cleaning the seed.

Lastly, whenever a farmer buys any one of the implements indispensable to his business, he should aim at buying a good one, for a bad implement never does good work.

CHOICE OF CATTLE.—As we are now considering farming for the production of milk, cows will be the most numerous cattle on the farm. The Canadian cow improved by careful selection, or crossed with the Jersey breed, is the most suitable, not only for our district but for the whole Province of Quebec. She is hardy, easily fed, a good milker, stands ill-treatment, and supports the hardship of the seasons better than the imported cows of any breed whatever. And, as I believe I have shown you that the heavy cattle for the slaughter-house cannot be profitable for us, I maintain that the Canadian cow is, above all, the cow for us.

As for sheep, the trials we have made with the Cotswold, have shown that this breed does not suit our climate. It is subject to many drawbacks and degenerates very rapidly. In fact, by the third generation it has lost more than half its value. Besides, long wools are no longer sought after. We must therefore turn our attention to the short wools, which are the most hardy, and, consequently, the best suited to our climate. The breeds most suitable for us are the Southdowns and Shropshiredowns.

For pigs the Berkshire seems to be the best breed, although the white Chester also gives good results. As to fowl, the Plymouth rocks are the real

fowl for the farmer. A good layer, hardy, large enough, not too good a sitter, not a rambler, such is this hen which is very pretty in appearance. Geese with us are in their real element. A Quebec goose is always better that a Montreal one. The duck is also specially suited to our climate. As for the turkey, I do not recommend raising it amongst us, especially below, from the county of Kamouraska downwards. The climate does not suit it, and it does not succeed well there.

I have not spoken of horses. They will not be numerous on the farm. We should strive to restore our breed of small Canadian horses, lively, active, hardy and untiring. They suit us much better than heavy horses for our deep winter snow, and for our roads during the long muddy season in the Fall and Spring. They do better on our clayey lands than too heavy a beast.

MANURE.—If we take for the farmer's motto, "No manure, no crop," we can easily convince ourselves that the question of the preservation of manure is one of the most important which claims our attention. The greatest fault with our farmers of the eastern part of the Province of Quebec, and this they share with many of those of the western, is that they allow one half, and even three fourths of the manure produced on the farm, to go to waste. What do we see, in fact, with nearly all our farmers? A heap of manure, put directly under the edge of the roof, so as to receive all the rain that falls from it. This heap, exposed to the winter's snow, to the rain, etc., is composed in the spring time of alternate layers of snow, manure, ice, which, from the first thaw, commence to melt, to become diluted, and to allow the continuous escape, under a liquid form, of all the fertilizing elements of the manure. At intervals, the heap is frozen into a solid mass; at others, it becomes so heated that the air is saturated with the ammonia which it allows to escape.

How can these evils be remedied? The thing is quite easy: First of all, the manure must be put under shelter, in such a way as to receive neither rain nor snow, and not be exposed to the drying rays of the sun. Then it must be kept from becoming too much heated, and the best way to do this is to press it down well. A good way is to leave several pigs in the building or cellar where it is kept. The bottom of this building or cellar should be so arranged as not to let any liquid escape. In this way the manure keeps all its value, and instead of carting on the fields loads of washed out and useless substances, the farmer will have a good manure by which the plants will benefit in such way as to amply repay the care bestowed on the manure heap.

I conclude these remarks on manure, by laying down as a principle,

that the farmer should avoid the use of green manure, not heated, on the field in the spring time. It is the worst way of producing weeds.

CARE OF CATTLE.—The question of manure is important, but that of the care of cattle is not less so. They require food and shelter. We must give them four things which are indispensable to them: good air, light, suitable warmth and proper food. Good air can easily be had by ventilators. Light is necessary, and easily procured. The temperature, without being too warm, should be even, and it must not be forgotten that cattle suffer from cold as well as from heat.

Now as to their food. The farmer thinks that the animal which receives a good feed of hay has all that it needs, except a little oats for the horses. The horse readily suits itself to this diet, but not so the milch cow. A feed composed partly of hay, partly of ground peas, oats and barley or of a mixture of these, and partly of roots such as potatoes, is what milch cows require to make them give milk during the winter, and enable them to retain their good milking qualities. Hay, alone, makes cows run dry. Dry hay of any kind increases its value by one-third if it is chopped up, a little in advance, moistened and piled in a heap a couple of days before being used, so as to let it undergo a slight fermentation.

Cattle should be fed in proportion to the return which it is desired to obtain from them, and it is better to keep fifteen cows well fed than to keep thirty suffering from want of food.

EMPLOY OF THE PRODUCTS.—I have said that all the products of our system of rotation should, as far as possible, concur in the production of milk, except during years when dairy produce commands little or no price on the market. Let us examine briefly what is the most profitable way to dispose of the milk produced on the farm. It may be done in four ways: 1st. Keep a dairy and make butter in it; 2nd. Send the milk to a butter factory; 3rd. Send it to a cheese factory; 4th. Send it to a combined butter and cheese factory.

Let us examine, for a moment, each of these ways:

1*st. Dairying and making butter at home.*—Dairy butter is to-day depreciated by the presence in the market of factory butter, which is nearly always superior to it. It follows that dairy butter is always worth a fifth, and often, one-fourth less than factory butter. Again, at the dairy, the milk generally yields one-fourth less of butter than the same milk would

have given at the factory. Lastly, the making of good butter in the dairy is very difficult, owing to the general absence of ice, to the ignorance of the proper way to make butter, and to the difficulty of keeping the butter good, when it is made. And, moreover, if we take into consideration the labor saved by sending the milk to the factory, it will not take any long discussion to prove that it is not profitable for the farmer to keep his milk at the dairy when he has a factory within reach.

2nd. Sending the milk to the butter factory.—For all the reasons mentioned above, there can be no hesitation about giving the preference to the butter factory, as compared with the dairy. But there still remains the question: which is better for the farmer, the butter or the cheese factory? There are arguments in favor of both, but I will say that for the farmer who has a prejudice against giving the milk left from the cheese to his young cattle, which prejudice, by the way, is groundless, it is better to encourage a butter factory, because it leaves him buttermilk, which seems to be better suited to his young stock.

3rd. Sending the milk to the cheese factory.—In average years I think that the cheese factory will pay somewhat better than the butter factory. In fact, if we take the prices of butter and cheese for the last six years, we find that factory butter was worth, on an average, 18 cents net to the farmer, or, for the 4 lbs., which is the average produce of 100 lbs. of milk, 72 cents. Cheese, on the other hand, gave an average of 7 cents a pound net to the farmer, which, at 11 lbs. of cheese for 100 lbs. of milk, gives 77 cents. This leaves a balance of 5 cents in favor of the cheese. It is true that the residue from the cheese is worth far less than that from the butter, but some pounds of ground grain mixed with that from the cheese soon restores the equilibrium. There would remain the calculation whether this ground grain costs as much as the surplus of five cents per 100 lbs. which the cheese gave.

4th. Sending the milk to the combined butter and cheese factory.—And, first of all, what is a combined butter and cheese factory? It is a factory which has the apparatus required to make either butter or cheese, or butter and cheese from the same milk. During years when butter sells much better than cheese, only butter is made. When cheese sells much better than butter does, cheese alone is made. Finally, if both these products are about on the same footing, as the milk of the whole region we are now treating of is much richer in fatty matter than that of the western portion of the province, we get, from 100 lbs. of milk, from 1 to 1½ lbs. of butter,

then from this milk is made an excellent cheese, partly skimmed, which, though known to be skimmed, is often sold at the same price as ordinary rich cheese. This system, put in practice under my superintendence, at St. Denis, where I reside, has given an average of 85⅛ cents for a 100 lbs. of milk, a magnificent result, especially if we consider the low price obtained in 1885, owing to the crisis, as appears from the following table, and moreover, the fact that the milk is conveyed at the cost of the factory.

Year.	Milk.	Net profit.
1881.....	100 lbs.	$0 90
1882.....	" "	0 99 5/11
1883.....	" "	0 88½
1884.....	" "	0 97½
1885.....	" "	0 54⅛
1886.....	" "	0 81 9/10
Average.....	" "	$0 85⅛

Let us remark here that the whey which comes from the combined factory has the same value as that from the cheese factory. I must state, however, that the combined system has many enemies. But the superiority of the system is yet an open question, and is far from being decided in the negative. So far, it has always been the most profitable on an average.

CONCLUSION.

I have now reached the end of my task, gentlemen. I have been somewhat lengthy, perhaps a little dry. I have only to thank you for the attention you have paid me. The subject is one of those which deserve the attention of a meeting like this one. My plan is open to discussion. As good, perhaps better, can be submitted. But the basis of the system cannot be changed, namely, farming in view of the production of milk. You, gentlemen, should encourage this idea. Gathered together from all parts of the country, we have had the pleasure of finding you eager for information, anxious to educate yourselves. If you desire to do so, you may now take home with you the ideas you have acquired here, and labor for the prosperity of our dairy association, which, though young, is full of

life, while striving for the common good of the farming class whom you worthily represent.*

J. C. CHAPAIS.

Mr. CASAVANT: In our part of the country, people think that the soil can be tilled forever, without ever restoring what is taken away from it. This is a mistake. We have here our mines of phosphate, which can replace what is taken off the land. There are several ways of using these phosphates. In France by spreading the phosphate fine, it can be assimilated to the soil. Why would we not try to do the same, without having the phosphate pass through the hands of the manufacturers. Experiments have been made in this direction, and they have not succeeded, but one must never despond.

Mr. J. C. CHAPAIS: On the Lower St. Lawrence, as I have already stated, we are fortunate enough to have every Spring an immense quantity of small fish cast up on the shore, forming an excellent manure. In some years there is enough to cover the shore, in other years there is much less. I have bought it myself at two dollars a cask, that is six bushels. Even at that price I consider it a very cheap manure, because it is very rich. Unfortunately, this fish does not keep, because it decays very rapidly. I believe, however, that by mixing it with dry muck and plaster, it could be made into a manure that would keep. The bad smell would be absorbed, and the plaster would have the effect of preventing the waste of the elements composing the manure. I think this question would be well worth the study and consideration of the people living below Quebec.

Dr. COUTURE: Mr. Chapais has suggested the employment of portable fences. I tried a sort of fence made of laths, and which, with some modifications, would, I think, exactly suit the requirements. It is very light and very portable. We make every year from seven to eight thousand feet

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* As regards the chemical questions, in the present work, the author has introduced them only incidentally, to have a basis for arriving at approximate figures. He does not assume to give the chemical quantities indicated as indisputable, for he is well aware that agricultural chemists often differ in their conclusions. The differences that might be established in the valuation of the substances mentioned by different farmers would, in the present instance, amount to no more than a variance of from 6 to 8 tons of hay. It is for the same reason that the lecturer has omitted speaking of potash and lime, which are as indispensable to the life of plants as nitrogen and phosphoric acid. These elements are much more common and less costly than the others, and this is why, in order to establish his figures, the author has spoken only of those which require a considerable outlay on the part of the farmer to obey the law of restitution. Bones, sulphate of ammonia, superphosphates cost dear, whereas ashes and plaster are relatively very cheap, at least in the eastern part of the province in question in this work.

J. C. C.

of portable fences. It has the drawback of costing dear. This is the reason why I ask Mr. Chapais, if he can shew us any way of making a portable fence which would be suitable and which would be comparatively cheap.

Mr. J. C. CHAPAIS: This fence would be for winter use only. I am unwilling to increase the quantity of fences on the land except to retain the snow. What I want is to find a fence which can be put up easily in the Fall and taken away easily in the Spring. From what I have seen of the lath and iron wire fences mentioned by Mr. Couture, I think the fence we require is not so long or so strong as them. I think that a portable fence can be made cheap enough, at 25 or 30 cents a length. If these fences were made shorter than the one usually sold now, I think that in careful hands it would last a great many years, so that it would cost very little.

Mr. MARSAN, Professor at the Agricultural School of L'Assomption: Mr. President, I tender my most sincere congratulations to Mr. Chapais, for the interesting and useful lecture he has given us. Mr. Chapais has this merit, that he suggests a plan which commences at the beginning. As a general rule, in the plans of farming offered to us, the actual condition of our farmers is not taken sufficiently into account. Systems of farming are suggested, which apply only to a more advanced state of farming than ours actually is. Our country is pretty nearly in the same state where Europe or at least certain parts of France were a century ago. At that time plans of farming prevailed in Europe which would to-day appear to be behind the age. The present one is what we want. I approve of the system just recommended by Mr. Chapais. The varied plan of farming is the one we have followed for some years past, and the results we have obtained are satisfactory. We have doubled the yield. The rotation plan applies to the whole farm.

We must teach our farmers to sow seed, the efficacy of which is acknowledged. I think, too, that to commence at the beginning, before teaching our farmers to employ fertilizers which they have not on their farms, we should recommend them to economize carefully the manure of the farm, for there are farmers who allow a third of it to be lost. If we teach these people to buy phosphate, it will not be commencing at the beginning.

From this point of view there are real improvements to note amongst us. We do not use the least mineral manure, and yet the crops increase, and I am sure they will increase still more during a period of rotation. Will they always increase? This is something I cannot say, because it is evident that the soil is becoming poorer, and we must restore what we have

taken from it. Farmers have manure at hand which they must use. We should commence by using what we have before going to seek it abroad. This is the whole secret. But when the diminution of the produce will make itself felt, we can then have recourse to mineral manure. When its consumption increases, the price will be lower, and its use will be more profitable than it is now.

Mr. Chapais raised another question: that of portable fences. For us, who live in the District of Montreal, this question may have less importance, because there is less snow at Montreal than at Quebec. However, the question is very important, and is worthy of notice, for I believe that this fence can be made very economically.

In conclusion, I again tender my most sincere thanks to Mr. Chapais, and I would make a motion to that effect, if it were in order.

Mr. BARNARD: During the thirty years that I have been farming, I have felt the absolute need of having manure, as I have not the advantage of farming in rich soils. For thirty years past, I have tilled in the poorest soils in the country.

As Mr. Marsan stated, the first thing a farmer has to do is not to buy manure when he has it of his own. He must first use what he has. There is 96 °/₀ of soluble matter in all animal manure. I take horned cattle for instance. In the whole of the manure given by the cow, there is 96 °/₀ of soluble matter. That is to say, that if you put water on these matters and shake them up, the water will carry off matter perfectly soluble, and when you have done shaking there will only be 4 °/₀ of insoluble matter left; all that was of any good is gone away with the water. Everywhere through the country we allow our manure to be washed away. It is a matter of absolute necessity to prevent the water from reaching the manure. To show you the importance of this I will make a comparison. I have a vessel full of alcohol. If I put water into the vessel, it would overflow, and part of the alcohol would be spilt. The proportion of alcohol which escapes is absolutely identical with that which remains in the glass.

We have manure and we let it overflow and waste away freely. The loss we suffer is considerable, and we do not even try to prevent it. This principle made such an impression on my mind, that I sought some plan to keep manure from being washed away. The difficulty is to find a means which is economical.

I have been sent into Europe by the Federal and Local Governments. I have traversed different parts of Europe. There the seigniors are, for the most part, the owners. The owners are rich and educated, they know the value of manure, and do not fear to sacrifice capital so as to let nothing go to loss. I tried this plan at my place, and I think I have succeeded. My cattle pass eight months of the year in the stable and I lose none of the manure.

Dr. COUTURE: I had the pleasure of visiting Mr. Barnard's establishment yesterday, and I can tell you that I was the most agreeably surprised man in the world. Unless you saw it you would not believe how simple everything is there and how cheap. Nor could you believe the state of cleanliness in which it is possible to keep cattle lying on the ground. I repeat it; you must see it, to believe it. Besides, nobody would imagine that the cattle lie on the ground.

The bed on which these animals rest is to all appearance a flooring of cement or solid wood. It emits no foul odor. Notwithstanding that we take the greatest care of our stables, at the Levis Quarantine Station, that we keep them in the greatest state of cleanliness possible, cleaning them four, five, and ten times a day if need be; notwithstanding that our system of ventilation is one of the most perfect, I venture to say that there more gas escapes with us than in Mr. Barnard's stable. The latter is dry, clean, free from any bad smell. It is impossible to find a stable costing less.

I recommend you strongly to profit of the opportunity now offered you to visit the best and cheapest stable in the country.

ENSILAGE.

NOTE.—After the lectures given before the Association, by the Honorable Mr. Beaubien, and by Messrs. Lemire and Bourque, and upon the recommendation of the "Journal of Agriculture," several members of the Association made an experiment of ensilage, to test for themselves the value of this important innovation about which so much good had been said. In 1886 about twenty-five silos were made in the Province, of which three-fourths were by members of the Association. The Reverend Mr. Chartier, Procurator of the Seminary of St. Hyacinthe, who had studied this question and who had made ensilage himself, undertook to make a summary of the results obtained, as shewn by the answers of the parties trying it, to the following questions sent to them, and to submit the whole in the shape of a report to the meeting at Three Rivers.

The questions are given first, the answers only refer to them under their numbers, so as to avoid repetition. We publish these answers, and after them the Reverend Mr. Chartier's lecture.

These answers were given in January, 1887.

QUESTIONS.

1st. Since how long have you tried ensilage? Please state, in the following answers, what changes your experience would suggest to you to make in your plan of proceeding.

2nd. How is your silo built: (*a*) materials, (*b*) dimensions, (*c*) foundations, (*d*) sides, (*e*) means of excluding the air?

3rd. What is the cost of your silo?

4th. What fodder have you stored in it?

5th. How do you fill up the silo: (*a*) Cutting in the field, (*b*) conveyance, (*c*) what length did you cut it with the machine, (*d*) storing in the silo?

6th. How was the fermentation conducted; (*a*) Time occupied in filling, (*b*) interruption in the work, (*c*) heaping up?

7th. How did you cover up your silo?

8th. What weight to the square foot?

9th. When did you finish the silo, and when did you open it?

10th. In what state was the ensilage: (*a*) Color, (*b*) smell, (*c*) loss on top and sides of the silo?

11th. What is the weight of a cubic foot of your ensilage, heaped up?

12th. In what way did you use the ensilage to feed cattle and especially milch cows: (*a*) Quantity per head per day, (*b*) with what fodder was it mixed, (*c*) did you let it heat, (*d*) what was the result?

13th. What was the yield of fodder to the acre, in tons?

14th. At what paying price do you estimate the value of ensilage per ton? Estimate (*a*) cultivation, (*b*) cost of ensilage, (*c*) interest of the land, (*d*) of the silo.

15th. What variety of Indian corn have you grown?

16th. Please describe the mode of cultivation.

17th. What is your general opinion upon the influence of ensilage upon the dairying industry?

ANSWERS.

Reverend J. O. Prince, Priest, Canon, St. Maurice.

1st. This is the first year.

2nd. My silo is built with posts four inches square, three feet apart; covered with tongued and grooved boards inside and rough planks on the outside; saw-dust between the walls with a little lime to keep out vermin, ten inches of saw-dust at the bottom, with a row of planks above the saw-dust; dimensions nine feet square, eleven feet high.

3rd. Between ten and twelve dollars.

4th. Western Indian corn.

5th. Cut with a reaping hook so as not to mix it, conveyed in a hay cart, placed lengthwise in the silo, all in the same direction.

6th. Two days' work, eight days' interruption between each time.

7th. With six doors of tongued and grooved planks.

8th A half toise of stone for the whole silo.

9th. On the 20th of September. Opened on the 20th of November.

10th. Beautiful color, smell of alcohol, no loss.

11th. From 40 to 45 ℔s. per cubic foot.

12th. 20 ℔s. for each cow, once a day, without any mixture, very satisfactory results.

13th. 30 tons.

14th. Cost $11.56.

15th. Western Indian corn.

16th. Manure spread when ploughing, well mixed with the harrow, sowed in rows 2 feet apart, 4 bushels to the arpent.

17th. Very good, excellent.

Mr. Norbert Bourque, East Sherbrooke.

1st. Two years.

2nd. My silo this year is in one of my barns. It is 12½ by 13 feet, by 11 in height. It is made with planks placed lengthwise and nailed on sleepers and cross-beams. These latter must not be more than two feet apart from each other, for the pressure makes the planks bulge. I make small openings to let the air in.

3rd. About ten dollars.

4th. Indian corn.

5th. Cut with the scythe and removed at once in a hay-cart.

6th. The filling is done in a day, and after 48 hours stoppage we fill it anew. The pressure was put on only two days after the second filling.

7th. From 12 to 15 inches of bad fodder; two rows of planks; 18 to 20 inches of thickness of stones picked off the land.

8th. I cannot state exactly.

9th. On the 21st of September. Opened on the 24th of October.

10th. Good color; smell of yeast. Loss two inches on the sides. The top was protected by the fodder.

11th. I did not verify it as to the weight.

12th. Twenty-five pounds per head in the morning; the same in the evening, and 6 lbs. of good hay at noon.

13th. About 10 tons. I believe that double the quantity could be got in.

14th. I know nothing of it.

15th. Western Indian corn. I had to sow twice, the second time 12 days after the first; the land was moreover not so well prepared. I attribute my weak crop to this delay.

16th. I sowed with a harrow, as for wheat and peas, 2½ bushels to the arpent. Sweet Indian corn requires hoeing and manure. I sow along with it a mixture of timothy and clover. I succeed very well.

17th. Indian corn is very profitable for cattle, whether green in summer or dry in autumn or ensilaged for the winter. It allows of keeping more cattle and feeding them more suitably. My cows remained in the stable with green Indian corn until the end of September; from the end of September to the end of October they had dried Indian corn, and from the end of October up to now they have received ensilage. They did not go out at all since the 15th of August, and yet they are fat, give me milk and butter enough for the season, and a good pile of manure of excellent quality. I must, however, remark that cows must be milked morning and evening before letting them eat their ration of ensilage. Otherwise the milk and butter will be affected by it and have an unpleasant taste.

Mr. L. Timothé Brodeur, St. Hugues, Bagot.

1st. One year.

2nd. A good drain of stone one foot in thickness. Bed of stone and one foot thick of sand, over the whole surface of the silo. Two inches of cement. A foundation two feet in thickness and three feet in height. Plastered with lime mortar outside and cemented inside. My silo is 20 x

12 feet, by 13 in height, with supports of two feet. The stringers are 9 x 9, of red spruce. The corner and middle posts are 8 x 9. The others, spaced two feet apart, are 3 x 8. The wall-plates are 7 x 8. The interior lining is 1½ inches, and is planed and grooved. The one on the outside is made up of 2 thicknesses of common planks planed and separated by a sheet of paper. The clap boards are put cross-wise, and the empty spaces are filled with saw-dust well pressed. The door is 2½ feet, with a lining of one-half inch inside and saw-dust for the same purpose.

3rd. About seventy dollars.

4th. Western Indian corn.

5th. Cut with the sickle. Carted with horses and carts. The Indian corn is not bound, and is placed across the vehicle to render the work of the man who must pass it through the corn cutter less difficult. This instrument cuts to ¾ of an inch. One man threw it pell-mell into the pit and two others pressed it. A scaffold and a fifth workman were required at the end of the ensilage.

6th. The filling was done in 6 days: Monday, 5 feet; Tuesday, 4 feet; Thursday, 4 feet; Saturday, 4 feet, and on the Monday following I put on the pressure. The temperature during the filling varied from 80 to 110. When full, the silo was 14 feet high; it gradually sank down to 10 feet.

7th. Six inches of wheat straw and double doors three feet square.

8th. About 100 lbs.

9th. 1st September, opened 18th October.

10th. Yellowish green, somewhat sour; 2 to 3 inches loss on the top, none on the sides.

11th. Forty-five pounds.

12th. First of all, 40 lbs. a day for each head, during 15 days; result satisfactory. I mix now in equal proportions, straw, hay and ensilage. I let it heat. This last way is the best.

13th. Twenty tons.

14th. One dollar, twenty-five cents. I might have spent only a dollar by cutting it with the reaper and having one man to fill it. It would have been as well. The mass would have heated more quickly and would have settled itself.

15th. Western Indian corn.

16th. In clean land, a thick layer of manure is put on in the Spring. The ploughing is done afterwards, and the earth heats to the end of May or the commencement of June. It should be well harrowed at the time of

sowing ; the furrows are left 18 inches apart. I put two bushels to the arpent ; harrow and roll, and when the Indian corn is 3 or 4 inches high hoe it with the machine. There is no need to hoe up again. If the plant grows yellow, you must apply plaster repeatedly. This is the only remedy.

17th. I am convinced that this is a very economical way of wintering cattle for producing milk.

REMARKS.—My framework is somewhat weak. The posts should be 5 x 9, instead of 3 x 8. The wall-plates should be 9 x 9, instead of 7 x 9. I would advise making the silos of 15 x 15, for the frame work will have more strength than if it is only 12 x 20 for its dimensions.

Mr Belhumeur, of St. Hugues, made a silo, as pointed out by Mr. Lemire, last year, with the bottom of saw-dust. He succeeded as well as I did, while spending far less.

I believe that if, before filling it, I let the thermometer reach 130 or 140, the acidity would have been less. Mr. Belhumeur cut it with the reaper, and chopped it to $\frac{3}{8}$ or $\frac{1}{2}$ an inch in length.

MR. PAUL BELHUMEUR, ST. HUGUES.

1st. First year.

2nd. Twelve feet by twelve and thirteen feet in height. Inside is a lining of pine boards grooved but not planed. Outside is a covering, and the space between them was filled up with saw-dust mixed with slacked lime. The foundations are six inches of stone, three inches of earth, and as much of saw-dust ; the flooring is made of planks.

3rd. Thirty dollars.

4th. Indian corn.

5th. Cut with the reaper and sickle. The vehicles were loaded and piled up, the corn cutter cut the corn to $\frac{3}{8}$ of an inch. The first day we raised the pile to 5 feet in the silo ; next day the temperature rose already and I put in three feet well pressed. Two days after, the thermometer marked 120, and at the end of the ensilage, that is a half day after, it reached 130.

7th. I covered it up two days after, the temperature was still the same. I put three inches of oat straw, double doors and stones.

8th. About one hundred pounds to the square foot.

9th. The 18th of September, opened the 20th of October.

10th. Color somewhat greenish on the top; deeper and sourer below. Slight loss on the top and in the corners, about three inches.

11th. Fifty pounds.

12th. In the same way as Mr. Brodeur, same result.

13th. Twenty tons.

14th. A dollar a ton.

15th. Western Indian corn.

17th. Ensilage was a great saving to me.

REMARKS.—As you may have noticed, the commencement of the filling is not done in the same way as the end. The mixture is much better on the top than below. For this reason I prefer heating to 130 degrees, or rather more than less.

I recommend making the floor with more care. There is loss between the joints. The corners should be rounded off that the settling may be better done.

MR. JOSEPH MATHIEU, ST. HYACINTHE.

1st. This is the first year that I tried ensilage.

2nd. My silo is made of wood. Dimensions, 15 x 20 feet, and 12 feet in height. The framework is of red spruce. The posts are 7 x 7, the cross-pieces 5 inches square. The distance between the cross-pieces is two feet and a half. Distance between the posts is three feet. The first row of boards is planed, and the boards are put upright. Foundations on the ground; the inside filled to the level of the sleepers with earth well pressed, on which is laid a half-inch of saw-dust and hemlock planks. To exclude the air I covered the top of the silo with boards kept in their place by a three inch plank, placed cross ways, so that the pressure may be evenly distributed. Above the planks I put a little hay, about one foot, fifteen inches of stone, and lastly straw well pressed.

3rd. The cost of my silo is fifty dollars.

4th. I pitted cut Indian corn.

5th. I filled my silo without interruption in three-quarters of a day, and I pressed it at the same time. The mowing machine cut it down in the field, and the cutter cut the Indian corn into pieces three-quarters of an inch long. I filled the silo with a shovel, the cutting machine was beside it.

6th. I only know that my silo heated very much. There was no interruption in the filling or settling.

8th. I cannot say exactly. I read that 40 lbs. were counted to the square foot. I think I can say that my silo contained 40 tons, for it was pressed as much as it could possibly be.

9th. I closed it on the 25th of September, and I opened it on the 15th of November.

10th. On opening it, the color was the same as the day it was put in; a little yellower, because it had frozen in the field. Otherwise I think it would have been very green. The smell was good, alcoholic. The loss was 3 or 4 inches on the top, nothing around nor below.

11th. About forty pounds.

12th. I give twelve pounds at each feeding, or thirty-six pounds a day. This ensilage is my allowance for my cattle. I add to the ration unchopped straw, and my cows keep in good condition, and milk longer and more abundantly.

13th. Eleven tons to the arpent.

14th. Two dollars and fifteen cents to the ton, estimating the land at ten dollars an arpent and the seed at one dollar and twenty-five cents a bushel.

15th. Horse-tooth.

16th. If we could do it at the commencement of September and open it in February, it would be better.

17th. So far as I can judge, I think that ensilage is destined to render great service for feeding cattle by increasing the secretion of the milk, and allowing milch cows to be kept in better condition.

My cows are much better, in every respect, than last year. They have only ensilage and straw. Formerly I gave them a feed of hay every day. They were leaner, gave less milk and ran dry earlier, in spite of all I could do.

Mr. A. O. Marion, St. Jacques de l'Achigan.

1st. I have tried ensilage for two years.

2nd. My silo is built of wood, with spruce planks one inch and a half thick and tongued and grooved. Its dimensions are twelve feet square. The foundation is of clay.

3rd. My silo costs fifteen dollars.

4th. I pitted Indian corn.

5th. I cut the Indian corn with a sickle. I put it in by armfuls and load it immediately in the vehicle to take it to the silo. I trample it as

much as possible and I leave it all open until the fermentation reaches 115 or 120 degrees. Then I put in three feet thick, following exactly the same rules as I have just laid down, and so on until the silo is perfectly full. This year I cut my Indian corn with a machine, and left it an inch long. The fermentation takes three days for the first layer, and two to two and a half days for the other layers, to reach 115 to 120 degrees.

7th. I covered my silo with a layer two planks of one inch thick, over the whole surface. The planks are arranged in such a way that the upper ones cover exactly the empty space left between those below. I should tell you, for further information, that my silo is made under my barn.

8th. The weight on my silo is about 35 lbs. to the square foot.

9th. I commenced filling it on the 23rd of September, and finished on the 4th of October. I should state that it was only half-filled. I opened it on the 8th of November.

10th. When I opened the silo, the Indian corn had a slightly browned color, and a smell of malt. The loss in it was four inches on the sides and seven inches on the surface.

11th. My ensilage weighs twenty pounds a cubic foot.

12th. I give two feeds of it a day, morning and evening, to each of my milch cows. I give twenty pounds at each feeding. I give it pure, without any mixture. At noon I give my cattle straw.

13th. An arpent of Indian corn gave me this year nearly nine tons of ensilage.

14th. Taking everything into account, I reckon that every ton of this ensilage costs me three dollars.

15th. Last year and this I cultivated Western Indian corn, vulgarly called horse-tooth Indian corn.

16th. To cultivate my Indian corn I make furrows three feet apart from each other. I put manure in the furrows and then sow abundantly; otherwise called full rows. I allow three bushels and a half to the arpent.

17th. I consider that ensilage is destined to render great service to the dairying industry. A milch cow, fed upon it, keeps as long as a cow fed on ground grain and mashes. A cow keeps in very good condition, and then the butter made from the milk of this cow has the same color and smell as butter made in Summer and in the Fall. In conclusion, I may say that for the milch cow it is the most economical and most productive food for the severe winter season.

MR. ALFRED ARCHAMBAULT, ST. GUILLAUME.

1st. In 1886.

2nd. Framework similar to Mr. J. M. Archambault's. Only two doubles of planks tongued and grooved. Dimensions eight feet and a half by eight and a half feet, by twelve in height. Built of earth; earth, saw-dust and floored with planks.

3rd. Twenty dollars.

4th. Western Indian corn.

5th. Filled in one day; cut in the field with a sickle. No cutting. Indian corn whole.

6th. No fermentation during the filling. The Indian corn passed a day under rain in the field; was taken in next day, and pitted on the following day. About the 20th of September it had, while growing in the field, felt the frost.

7th. Slight layer of straw, loose planks, stones.

8th. About sixty to seventy pounds.

9th. On the 20th of September; opened on the first days of November.

10th. Dry yellow; vinegar and beer. Loss 2 to 3 inches on the top and sides.

11th. About twenty-five to thirty pounds.

12th. Pure and just as taken from the silo, after being cut with the axe.

13th. Quantity per head about forty pounds a day, not heated. I fattened my cows (2) with it. I sold one of them to the butcher.

14th. One arpent and a quarter gave me about four tons. The crop had failed completely for want of knowledge of how to cultivate it. Sowed too early and too far ahead.

15th. Western.

16th.

17th. I am convinced, in spite of my failure in cultivation, that this food will be economical, in so far as it applies to milch cows, and for fattening.

MR. LAMBERT SARRAZIN, ST. HYACINTHE.

1st. This is the first year.

2nd. All of wood, hemlock; posts eight inches square; cross-beams six inches; clap-boarded with planks, two thicknesses, tongued and grooved and planed. No foundation on the ground. Bottom of the pit in pressed earth on which a row of planks is laid.

3rd. The cost of the pit, one hundred dollars.

4th. Maize, horse-tooth Indian corn.

5th. The quantity of corn pitted was about the third of its capacity. The cutting was done with a sickle, after being mowed with a mowing machine. Carted in carts to the barn, where it was cut and shoveled into the pit, by the door that was left free, because the quantity to be put into the pit was not enough to fill up very high. Cut to one-half inch.

6th. We waited until the fermentation reached 120. There was no interruption during the eight days we took to do the work. The trampling was done by some little boys who amused themselves about an hour trampling on it.

7th. The covering up was done by putting about one foot of buckwheat straw, on which was laid a row of planks, as we thought proper, and the whole was then covered with a couple of feet of stone over the entire surface.

8th.

9th. Pit filled on the 20th of October, opened 1st of December.

10th. The pitted corn was magnificent, color somewhat brown, probably owing to the fact that the corn was cut somewhat ripe. The smell was alcoholic. There were only three or four inches on the top which had a mildewy smell, but the cattle ate it all the same. The sides were as good as the top.

11th. Did not weigh the contents of a cubic foot.

12th. The pitted corn was fed to the cows along with an equal quantity of cut straw, mixed with four pounds of bran for each cow every day. This mixture was sprinkled with a little hot water, and put into a heap the day before it is given to the cows. The cattle are in very good condition, but no experiment has been made to see what difference might be between them and cattle fed otherwise. This mixture was given only twice a day to the cows, with a feed of dry hay in the evening.

13th. I did not remark the yield to the arpent.

14th. I cannot possibly answer this question. It must be held over for another year.

15th. Only Western Indian corn.

16th. The cultivation was very simple. The grain was sowed by hand. It got only one hoeing with the cultivator.

17th. My opinion is that ensilage is the best food and the most economical for cattle.

LAMBERT SARRAZIN,
For the St. Joseph Farm.

Mr. J. L. Lemire, Baie du Febvre.

1st. Since two years.

2nd. The first year my silo, built of wood, measured 14 x 14 feet and 12 feet in height, two linings of boards, one inside and the other outside the frame-work. The inside one alone was tongued and grooved. The empty space between them I filled with saw-dust. I had to build another, because the frame was not strong enough. Last year I made a stronger frame, and put only one row of one inch planks inside without any saw-dust. My new silo is in a barn ; it is eleven feet by thirteen, and twelve feet high. It is divided into two compartments by a strong partition. The double planking is the only thing to keep out the air; but it is better to put a boarding outside the frame-work and to put saw-dust between the two walls. This protects it from the frost.

3rd. About forty dollars.

4th. Indian corn.

5th. The Indian corn is cut in the field with a short scythe. Some young people put it on birch branches to tie it up into small bundles, to render its conveyance to the barn easier. Here it is chopped up by a straw cutter, driven by horse-power (one horse). A man undoes the bundles, another puts them in the machine, a third, by means of a large shovel, places the cut forage into the pit, where a young man spreads it out and tramples it carefully. When the silo is too high to shovel the corn into it, a basket with a pulley fixed to the top of the barn is used. The Indian corn is cut in lengths of half an inch.

6th. My silo is divided into two parts. I put the corn one day in one part, and the next day in the other, but contrary to my expectation and to the experience I had of it the first year, the Indian corn did not heat enough in one single day. I took four days to fill the silo.

7th. With doors two feet and a half square, covered with fifteen inches of stone.

8th. I did not weigh the stones.

9th. On the fourth of September, opened on the eighth of November.

10th. The forage was very green, but smelt somewhat of vinegar. The loss was about two inches and a half on the top ; the sides were all good.

11th. I weighed a cubic foot of ensilage in a portion of my pit which was only five feet and a half high. It weighed forty-eight pounds. The usual weight of a cubic foot is said to be sixty-five pounds. I think that mine did not heat enough to settle well, and if I had had twelve feet in

height instead of five and a half, the pressure would have been heavier, and also the weight per cubic foot.

12th. I give every morning about twenty pounds of ensilage, mixed with four pounds of chopped straw. The mixture is prepared in the evening, to allow it to heat a little during the night. During the rest of the day, I give two feeds of oat straw, and the cattle are in good condition, and they scarcely ever leave the stable.

13th. About thirty tons to the arpent.

14th. About a dollar a ton, counting the lease of the land at ten dollars an arpent, the interest of the cost of the price of the seed, the costs of sowing and reaping.

15th. Western Indian corn.

16th. See the 4th report of the Society at page 59.

17th. Ensilage, when successfully carried out, will be the wealth of those who devote themselves to dairying, as it will of farmers generally, because it lessens by one-half the cost of wintering cattle, and it cleans the earth and prepares it for the cultivation of cereals and hay.

DR. J. A. COUTURE, QUEBEC.

1st. I only did it in 1885.

2nd. I used three stone walls of a building, the fourth wall was made up with a wooden frame-work, and clapboarded with one inch planks on each side. The space between was filled with saw-dust. Dimensions, 20 feet in length, 18 in depth, 8 in height. The air could enter only by the planking which was not over good at one or two places along the wall.

3rd. Cost me only a few dollars, for I had in the building all that I required.

4th. American maize.

5th. Cut with a sickle. Conveyed in a hay cart. The cutting machine was in the silo, and the maize was cut as it was unloaded, one inch in length.

6th. Trampled by two men. The filling was done during one day, then there was an interval of three days. Then another day's filling, and an interval of two days, when the pit was closed.

7th. With two inch planks placed together, and another upon the spaces covered over with stones.

8th. About ten pounds to the square foot.

9th. The 4th of September, opened the 15th of October.

10th. A layer, varying from six to twelve inches all around, top and bottom, blackish and in a state of putrefaction. The rest was yellowish green; smell of vinegar.

11th. I do not know.

12th. I had not used it. It was not worth while buying cattle, as I had only 15 tons of ensilage. I sowed one arpent.

13th. I had only half a crop, and I got 15 tons.

14th. I cannot answer satisfactorily, as I paid exorbitant prices for all the work. I know what it cost me, but that would avail nothing, as nobody else was in the same position as I was.

15th. American. The land being a meadow, not having been tilled for forty years, was ploughed twice in June, then harrowed three or four times and covered with manure. The ground was already well manured. The ground was not well enough prepared, there being a great many lumps. The furrows were four feet apart. The Indian corn was sowed three or four grains to every eight or nine inches, and then covered over.

15th. My experiment was not a complete success. This was owing, firstly, to my ignorance of its cultivation; secondly, to the land not being well enough prepared; thirdly, to the fact of the silo not being well enough filled. I should and would have had at least twice the crop I got. But I am convinced that this is the future feed for milch cows.

J. A. COUTURE,
Manager of the Cattle Quarantine at Levis.

Quebec, 12th December, 1886.

MR. FRANCOIS DION, STE. THÉRÈSE.

1st. I commenced my silo on the 27th of September and closed it on the sixth of October following. There were two days of interruption before it was closed, but on the last two days I added a second layer.

2nd. My silo is in a square of my barn, divided into two parts. Its dimensions inside are ten feet by fourteen, and twelve by fourteen. At the bottom are seven pieces of wood in the ground, the uprights of which are caught in a tenon on each side so as to prevent the bottom from opening. The uprights which are in front and in rear are also mortised in the same pieces. The posts in each corner are hollowed out in such a way as to leave room to nail on a board at each side. The dimensions of the up-

rights are three inches by eight. Those of the corners are eight by eight, the separation eight by twelve; between the last, three to three by eight to receive the plank of this division. The bottom is of broken stone with a slight layer of clay on the top. The silo is made of boards tongued and grooved for the first row, the second has square joints, and all around at the bottom there is between the planks a height of eighteen inches of galvanized iron to keep out vermin.

3rd. The cost of my silo is ninety dollars.

4th. Indian corn which had frozen.

5th. I commenced by having the Indian corn cut a day in advance. Then we cut it up with a two horse machine from Mr. Evans, of Montreal. I must tell you at once that the wheel which is attached to these machines is too large. It is usually eighteen inches in diameter. The one I attached is only eleven, and I found it to work very well. We used large shovels to take up the Indian corn. One man kept the cutter going as long as the pit was not filled up too high. Arrived at a height of seven or eight feet we put a large barn door on a little scaffolding, so that a second man could stand on it; a third one pressed it down. My pit being in two parts, the second day I began a second, and so I filled them turn about. The cutting was done in the field with a sickle, and arranged in small armfuls to render its loading easier. The length of the pieces cut was one-half inch. This settles best.

6th. I followed the directions of the Journal of Agriculture. I allowed one day's fermentation between the fillings. The filling was done from time to time during the day. Six men went up, and we all pressed it together for some time. When we began a second layer, it was quite warm.

7th. I covered up my pit with a lining of planks cut in two, and I put the ends crosswise, so as to keep the planks even.

8th. According to the Journal, I put on a good load of stones for every square yard.

9th. I finished my pit on the 6th of October, because I could not do it sooner. I opened it on the 13th of November.

10th. The ensilage was, to my mind, of the most perfect. Its color was yellowish; the smell sour or acid. As to loss on the top I had scarcely any. There were only two or three inches a little blackened. I mixed it with others and the cows ate it well. I understood that if I had put a little straw on the top it would have been all the same color.

11th. The weight is forty pounds, but my ensilage is perhaps different from that which is green when ripened.

12th. I am in the habit of gathering chaff and I mix it with ensilage. To each of my cows I generally gave a half basketful of this mixture, morning and evening. A good basketful weighs 28, 30 and even as much as 35 pounds. This depends on the care given to the mixture. I am not in the habit of letting it heat. As to the result, I have had satisfactory proofs: firstly, when I opened my pit, I was in a great hurry. I made only a small opening, not having any place ready to put my stone. After my cows had been fed on the ensilage for some days they gave more milk. Not having returned soon enough to make a second opening, my man gave clover three times a day and their milk became less. When I got back, the Indian corn was again served out to them, and they again increased. The proof is therefore very evident.

13th. I made no experiment.

14th. The following is the cost price:

Tilling and manure	$ 85 00
Indian corn seed	14 00
Cost of sowing	46 00
Interest of the land	40 00
Total	$185 00

I calculate on having seventy tons of Indian corn. Cost price, $2.65.

15th. Western Indian corn.

16th. I manure my land in the Fall, and I plough it in well. In the Spring I grub it properly, and harrow it well. I run my furrows twenty inches apart. I sow with a small sower, and I turn it into the ground with a harrowing along the furrow. After the Indian corn is two or there inches high I pass the horse hoe over it. This is all the tilling I do.

17th. From the little experience I have had of it, I believe that is the most economical system we can adopt in connection with the dairying industry.

Mr. Fulgence Prefontaine, South Durham.

1st. I practice ensilage since 1885.

2nd. My silo is made of wood, in a part of my barn, adjoining my stable and cellar. Its dimensions are ten feet by seventeen, and twelve feet in height. Its foundation is of cedar, and the sides are of pieces of hemlock, three inches by four; length twelve feet, leaning on the frame work of my barn on two sides and on the frame work of my stable and cellar on the

other two sides. The whole is covered with two seasoned planks, with paper between them. But this is not enough to keep the air from it. For this reason I intend to have the silo lined again with a thickness of paper between, so as to keep out the air completely.

3rd. About eight dollars.

4th. The first year I pitted Western Indian corn uncut.

5th. We filled the pit in one day, with the help of ten men. Five men cut the corn in the field with a sickle, three conveyed it to the barn in a cart, and the two others put it into the pit, using all due care to stow away the greatest quantity possible.

This year we passed Indian corn through a cutter, in one inch lengths, before putting it into the pit, where one man threw it in with a large shovel, as the two others cut it.

6th. We did not wait for the fermentation before covering it up, for we filled it in one day, and we covered it on the next morning.

7th. We covered it up with about eight inches of bad hay, with planks two inches apart and covered over with stones.

8th. We put on a hundred weight of stones for each square foot.

9th. We closed it on the 15th of September and opened it on the 23rd of December.

10th. The pitted corn was good in the middle of the silo, of a natural color; the smell was acid; the loss was ten inches on the top and two feet on the sides of the pit,

11th. I never took time to weigh it.

12th. We mixed the corn with cut straw, we let it heat for twenty-four hours, and we gave a half bushel of this mixture to each cow morning and evening, and we gave them a feed of hay at noon. The result was excellent. The cows gained in flesh, upon this feed.

13th. About twenty tons to the arpent.

14th. About two dollars and fifty cents a ton.

15th. I sow Western Indian corn.

16th. I wait until the earth is perfectly warm to cultivate it, about the middle of May. I put in about twenty double loads of manure per arpent, which I afterwards cover up at once by a thorough plowing to about seven inches in depth. After allowing the ploughed ground to be dried by the sun, I sow my Indian corn broadcast. I generally put two bushels to the arpent; then I harrow the land as well as possible, drain it well and roll it with a heavy roller, and never touch it again until the time comes to give it to the cattle about the first of August.

In favorable weather I have never failed to get a return of twenty tons to the arpent. I may also mention that I have always succeeded better in having a good crop of Indian corn on dry ground which had been used for pasturage the year before than on land which had produced a crop of oats or peas, or even a crop of potatoes.

This satisfactory result I attribute to the fact that Indian corn is a plant which requires a great deal of heat, to grow well. The warmth produced by the fermentation of manure and of the turf of a former pasture appears to be required for its rapid growth.

17th. My experience has shewn me that ensilage is the most economical kind of food, and the most suitable than can be given to a herd of milch cows, and when practice has taught us how to cultivate and take proper care of it, instead of a yearly return of twenty to twenty-five dollars a Summer for each milch cow, we will obtain obtain a return of thirty to forty dollars for each good milch cow fed upon ensilage during ten months of the year.

Besides this increase in the revenue obtained from each cow, the cultivation of pitted corn will have the effect of allowing the owner of a farm of one hundred arpents who can now conveniently keep ten or twelve cows with the other cattle required for working the farm, to keep five or six cows more, and consequently to double his revenue in this way, and thereby increase the value of his land in the same proportion.

Mr. Milton Macdonald, Acton Vale.

1st. This is my first year of ensilage.

2nd. My silo is twelve by twenty feet, and eighteen in height, five feet in the ground, foundation five feet, bottom cemented, wooden frame with posts of seven inches by seven, four feet apart, two rows of planks, one of them being tongued and grooved.

3rd. My silo cost me one hundred dollars.

4th. My ensilage is made with Indian corn.

5th. The cutting of the Indian corn is done with the sickle, it is removed in double carts, loaded crossways, cut with a straw-cutter into lengths of one inch.

6th. Four days were spent in filling the silo, leaving an interval of two days between each layer; the pressing was done by a horse.

7th. The pit is covered with doors made of two inch planks, four feet by six, loaded with stones six feet in depth.

9th. The silo was closed on the 20th of September, and opened on the 20th of November.

10th. The contents were in perfect order; natural color of Indian corn; smell alcoholic ; loss three inches on the top, no loss on the sides.

11th. Sixty pounds per cubic foot.

12th. We give fifteen pounds three times a day to each cow, mixed with chopped straw, double the quantity in volume; one half gallon of mash in this mixture, every day, the whole prepared a day in advance so as to feed it warm. The results are astonishing, both as regards the good condition of the cattle and the supply of milk.

15th. Western Indian corn, called "horse tooth Indian corn."

16th. Method of cultivation, good layer of manure in the Autumn and a good ploughing ; second ploughing in the Spring ; straight and cross wise harrowing ; plough furrows two feet apart; hand-sowing one half bushel to the arpent ; covered in with the harrow; passed over with the horse hoe when the plant is one foot high ; cut in September.

17th. My opinion is that this new system of cultivation is destined to exercise a great influence upon dairying. It is a source of wealth to our Canadian farmers, if they wish to give themselves the trouble to adopt it, and follow the advice of those who speak from experience. I sowed four arpents in Indian corn, and from the way I feed my milch cows with the ensilage mixed with chopped straw three times a day, in as great quantities as they can consume, these four arpents are enough to winter my twenty-four cows from the 20th November to the 1st of May. They will be and are already fatter and give as much milk as when I fed them on hay and vegetables.

Mr. Eusebe Dufault, Ste. Hélène.

1st. This is the first year I have tried ensilage.

2nd. My silo is made of wood. Its dimensions are ten feet by fourteen, and thirteen feet high on the inside, for the ground on which I built it is low and sloping. I was obliged to raise it by placing my sleepers, which are ten inches square, upon a foundation of stone about twelve inches high. I filled it inside to four inches below my sleepers with stone and earth carefully pressed, so as to form a floor as compact as possible and quite level. Then I put about three inches of sawdust and a row of planks above. My frame is in pieces of four by six inches, two feet apart from one centre to the other. The posts on each side of the door, which is two

feet wide, are six by ten inches; the sills are six inches by ten. I lined it inside with two rows of planks planed and tongued and grooved, with the joints well cut; on the outside with a row of planks planed and tongued and grooved, and I filled up the space between the walls with sawdust well pressed.

3rd. The whole cost me about forty dollars.

4th. Indian corn.

5th. We cut it with a sickle so as to keep it the same way to cant it and put it into the cutting machine. We chopped it about three quarters of an inch long. One man with a large shovel put it into the silo, another stood inside to spread and trample it.

6th. It was about the 25th of September that we began. We filled it about four feet the first day, and left it to ferment during three days, until it seemed to us to be pretty well heated. On the fourth day we filled about four feet more. This time we had to wait four days for the fermentation to take place. On the fifth day, we put in the rest of what we had. The silo was about twelve feet in height.

7th. We covered it with about a foot of straw, and then with a row of planks well joined together.

8th. About ninety-five to one hundred pounds for every foot of surface.

9th. It was about the fourth of October that we closed it, and we opened it on the twenty-ninth of November.

10th. The straw was rotten. There were about two or three inches of Indian corn mildewed on the top. The remainder was well kept, and as good along the sides of the pit as in the centre. In the corners there was nearly an inch a little mildewed (very little.) The smell was like that of a distillery; color yellowish green.

11th. About fifty pounds.

12th. We gave about fifteen to twenty pounds a head, twice a day, morning and evening; and straw at noon. Since we began feeding our cows this way, the milking of five of them increased by a quart a day, and the cows have somewhat fattened, apart from this.

13th. I had no scales to weigh my loads, but I must have had about eighteen to twenty tons to the arpent.

14th. About one dollar and fifty cents a ton, including the rent of the land, cost of tilling, of ensilage, and the interest on the cost of the silo.

15th. Western Indian corn.

16th. We manured our land and ploughed it about the fifteenth of May. On the twenty-fifth and twenty-sixth, we passed the cultivator both ways

to break up the earth, and sowed it by handfuls, as oats are sowed; then covered it up by harrowing.

17th. My opinion is that the facilities for wintering our cattle in good condition, and at so little cost, compared with the other systems, should give a considerable surplus in the profits of the dairying, if this style of feeding were adopted by a greater number of our farmers.

MR. J. M. ARCHAMBAULT, ST. HYACINTHE.

1st. First year.

2nd. In wood, twenty feet by sixteen, and twelve feet in height ; at ten inches above the ground. Two linings of planks tongued and grooved, the joints cut. The frame, the sleepers and posts are eight by eight, the cross-beams six by seven. I consider that the frame is the most important point in erecting silos.

3rd. One hundred dollars for both.

4th. Indian corn.

5th. My silos were filled without interruption. I cut the corn with the sickle. Two double vehicles fed the corn chopper which cut it into lengths of half an inch. It was shovelled into the silo.

6th. The thermometer rose to ninety or a hundred from the first day and remained there. I took eight days to fill the two silos. The work was not interrupted.

7th. One man was enough for the silo. I covered it with planks, then laid over it a foot of straw and fifteen inches of stone.

8th.

9th. On the fifteenth of September, opened the fifteenth of October.

10th. It was very good, had a beautiful color ; smell of beer ; no loss at all.

11th.

12th. I mixed my Indian corn with chopped straw, equal in quantities. The mixture was made for five or six days, and reached a temperature of eighty or ninety degrees. Each cow received from forty-five to fifty pounds a day of this mixture. I still milk them twice a day, and they give me an an average of ten pounds. Last year I gave them as much as three gallons of ground grain and bran mixed, and my cows gave less milk than now.

13th. Fifteen to twenty tons an arpent.

14th. The price of the ton is one dollar. Cost of ensilage, five dollars. Cost of tilling, four dollars. Interest on the land, five dollars.

15th. Horse tooth.

16th. In rows, every twenty inches. Two bushels to the arpent; this is not enough. My seed was mixed with plaster.

17th. Last year, for the same number of cattle, I used eight hundred bushels of ground grain and twelve tons of bran. This year, on the first of January, I had used only twelve bushels of ground grain. I think that I will require two hundred bushels, which, added to my ensilage, will be enough to keep my cows in better condition than last year. The interest on the land, the cost of building the silos, and filling them, amount to two hundred and sixty dollars. For my last wintering I required eight hundred dollars worth of grain. I therefore gain this year one hundred and forty dollars, and I have my silos which may last me several years. I had no idea that ensilage was so beneficial.

Mr. E. A. Barnard, Three Rivers.

1st. This is the first year. I see nothing to alter, for the moment, in the process followed, unless it be that I would greatly lessen the load of earth put on the silo, and that I would have the vehicles come above the silo so as to fill it easily and rapidly.

2nd. In the building (or shed) adjoining and attached to the barn and stables.

(*a*) Posts of 9" x 3," (1) twenty-four inches apart from one centre to the other; old common planks, not tongued and grooved, nailed to each post, on both sides; the spaces between the planks filled with sand taken dry from the bottom of the silo. I believe that any earth without gravel or stone would do as well as sand. This, it is well understood, is in default of tan-bark or sawdust.

(*b*) 13' x 15' (2) inside and 16' in height, four feet of which are in the ground. One of my silos contains 100 loads of green forage, half of which is brick, wheat not chopped, and as taken from the field, or about 75 tons of ensilage.

(*c*) It rests on the sand. I put a flat stone under each post. The bottom was dug 18" in the centre more than on the sides, and covered over with a layer of clay stamped down after being partiially dred. The bottom should be completely water-proof.

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(1) The sign " indicates inches; the sign ' feet. Read then 9 inches by 3, spaced out twenty-four inchs apart, etc.

(2) Read 13 feet by 15, etc.

(*e*) The top is covered with two rows of planks placed as may be desired, but in such a way as to cut the joints. The whole is covered with about 30" of black earth, which was moist when we put it in. This earth as soon as dry will be thrown into the dung heap adjoining my two silos, as we uncover them.

3rd. All the frame work, walls and cover, formed part of an old shed which I bought in the neighborhood, and which cost me about twenty-five dollars delivered at my place. The building of my two silos (of equal dimensions) including the digging, took in all twenty days' man's work.

4th. About half buckwheat, half Indian corn.

5th. (*a*) The buckwheat and Indian corn were mowed with a two horse mowing machine. The buckwheat, the grain of which was all formed, was very strong and very heavy. In the case of Indian corn, the mower mowed two rows at once, twenty-six inches apart.

(*b*) In carts, and low vehicles drawn by two horses, or about 1500 and 3000 lbs respectively, for each load. I left all the forage in bundles at least twenty-four hours on an average, so as to allow a portion of the enormous quantity of water these plants hold when green, to evaporate. This quantity of water is at least from 80 to 86 0/0. I consider that in this way I lessened the carriage by ten to fifteen per cent., but only by weighing could I verify these approximative quantities—which are perhaps quite wrong—which I must give in all these answers.

(*c*) The buckwheat was pitted without being chopped up. The Indian corn was chopped with the straw-cutter, in lengths of about one inch. A good straw-cutter worked by two ordinary horses will cut nearly two tons an hour, provided the men can supply it. This will cost about forty-five dollars.

(*d*) My straw-cutter was placed on a level with the silos, about 8' above the threshing floor, where the vehicles are unloaded, to suit the straw-cutter. By bringing the vehicles to the level of the top of the silos, the men's work would be lessened by one third. I wish to add also to the straw-cutter an endless linen band, receive the chopped corn and convey it to the middle of the silo, saving in this way the labor of one man.

6th. We commenced with buckwheat which had been cut 48 hours before. It was left on the ground, and was still warm when we put it in the silo. The first layer, 36" in height, thrown with a pitchfork, as it came from the field, was pressed or trampled only around the silo to a width of about one foot, so as to fill up properly the empty spaces along the sides of the silo. After forty-eight hours the thermometer indicating 125

degrees of heat (Fahrenheit) at about one foot from the surface, we added a second layer of 36" put in the same way as the former one, and so on from layer to layer. These new layers became heated to 125° in 30 hours, on an average. Each new layer of 36" in height raised the contents of the silo by an average of only one foot. After eighteen to twenty days from the putting in the first layer of buckwheat we apparently filled the silo with a layer of 20" of chopped Indian corn, in length of one inch. This Indian corn had also lain on the field about forty-eight hours. On the second day after, we added a new layer. In this way we took from eight to ten layers of Indian corn to completely fill the silo, the settling down still continuing in a surprising way. For the Indian corn, as for the buckwheat, we always waited until the heat was from 125 to 140 degrees (Fahrenheit,) before adding another layer.

(*c*) The only artifical pressing was around the silos, so as to leave no vacant space.

7th. See answer 2 (*e*).

8th. 30" of damp earth.

9th. The silo was commenced about the 27th of August, and was finally filled only about the 2nd of October. The covering over with earth was only finished on the 4th or 5th of October. We opened the silo on the 11th of November.

10th. (*a*) The Indian corn was somewhat less green. The buckwheat was browner than when it was put in the silo.

(*b*) Agreeable ; vinous.

(*c*) Not appreciable.

11th. Remains to be established, at different depths.

12th. From thirty-five to forty pounds for each cow, mixed with unthreshed oats chopped in the straw-cutter, with dwarf beans not threshed but chopped. The oats and dwarf beans were paritally steamed, then mixed with the ensilage.

The results appear satisfactory, but it will require very careful comparative trials to establish its true value compared with vegetables for instance.

13th. I reckon that a good farm well manured can give from 12 to 15 tons of green buckwheat, and from 20 to 30 tons of Canadian corn. Unfavorable circumstances kept me from establishing the exact yield per arpent this year. I desire very much to do it next year.

Under favorable circumstances, and with suitable manure I think, that even on lands naturally poor, from eight to ten tons of unripe fall barley,

and from 20 to 25 tons of Canadian corn can be produced in the same year, upon one arpent of land.

14th. By means of the special implements I use, double plow, harrow, scarifier and sowing machine, sowing three rows at once, either in grains or pulverulent manures I think that the cultivation of one arpent of Indian corn costs me about six dollars. The manure is rich, but it costs me very dear. I spread fifteen tons of it per arpent with the manure distributor of Messrs. O & A. Desrosiers. I estimate the value of the manure at forty dollars.

To obtain heavy crops I also require, per arpent:

100 lbs. sulphate of ammonia at	$ 3.50	
200 lbs. superphosphate	2.50	
500 lbs. unslacked ashes	1.50	
200 lbs. plaster	0.75	$ 8.25
Harvesting and storing 30 tons of fodder, about		12.00
		$66.25
Less, value of the manure for subseqent crops estimated at...		20.00
(c) To this must be added rent of the land, interest etc., on silo		3.60
		$50.00

Or, for each ton of ensilage (30 tons) $1.66. It is considered that one ton of good Indian corn ensilage posseses one third of the nutritive matter contained in a ton of hay. At this rate the equivalent of a ton of hay would cost about five dollars. It must be well understood that the calculation I have just made is an *estimate* of what it appears to me to be possible to do, and not the result of our experiment this year.

15th. Canadian Indian corn. The sort we grew was from six to eight feet high, in spite of the exceptional poverty of the soil. Without manure this land would hardly have produced twelve bushels of oats to the arpent.

16th. I plowed about six inches deep, with a double plow, doing, with two horses, at least three arpents of plowing each day. After plowing in way, I made furrows about 26 inches apart. The manure was spread in these furrows, and covered up with the harrow. Then we sowed with the roller sowing powdered manure distributor, sowing and covering three rows at one operation. I sowed about a bushel of Indian corn per arpent. This is double the quantity required when the seed is excellent. In future I will spread out the manure at and before the first plowing, so as to receive the

manure at once. A second ploughing will serve to mix the whole with the earth.

I strongly recommend using pulverulent manure. It produces four effects: (1) secures a prompt and powerful growth; (2) drives away crows by its strong smell; (3) hastens the ripening; (4) enriches the soil a much as much as ordinary half manuring.

17th I have not enough experience to express a formal opinion. I trust however that ensilage well done will render great service to Agriculture, especially to the dairying industry in Winter.

CULTIVATION AND ENSILAGE OF INDIAN CORN.

BY THE ABBE CHARTIER.

The Abbé Chartier, after explaining under what circumstances the foregoing reports were made to him, and explaining their leading features, continues:

First of all, before building, the proportion between the extent of the silo, that of the land on which fodder is raised, and the use to be made of it, must be exactly determined. One cubic foot of ensilage, after pressing in the silo, weighs about 45 lbs. The sinking caused by the pressure may be estimated at 1/5 in a silo filled with intermissions. The amount consumed by a milch cow is about a cubic foot per day, with other food; the Indian corn not being a complete food in itself, ten per cent in weight of bran must be added to it, so as to furnish the nitrogen which is wanting in it. When clover hay with Indian corn is used, the addition of bran is not required. First quality clover hay has the same effect as bran, and twenty per cent of this hay may replace the ten per cent. of bran.

The feed should be well divided, so that its different parts may mix well together. All fodder, timothy, clover, straw, &c., should be cut and mixed with the ensilage, bran or ground grain. This, above all, is important when concentrated food is given, as mash, grain, bran, and principally linseed cake.

Let me now tell you how I would advise you to proceed.

CONSTRUCTION OF THE SILO.

If it is to contain more than fifty tons, the silo should be longer than it is wide. In selecting the spot for it, a bed of four or five inches of thickness of small stones as are picked from the fields must be laid down. The sleepers of eight inches square, of strong wood, red spruce for instance, will then be laid on these stones. Earth is added between the cross-beams and up to the very top so as to exclude the air completely. If the silo is more than twenty feet long, it is well to put a sleeper in the middle to keep it from opening out. Put four good posts at the four corners. The silo should not be less than twelve feet high and the uprights of the framework should be two feet apart. The fastenings of the posts and sleepers should be iron pins, instead of the ordinary wooden pegs. They should be six inches by eight.

PANELLING.

The silo must be planked inside and out. The space between the two plankings is filled with sawdust well pressed. If it cannot be procured, it may be replaced by two thicknesses of dry wood tongued and grooved and separated by paper. These double linings with paper should be put inside the framework.

The door of the silo should be about three feet wide, so as to allow easy entrance into it with a basket. As it is hard to shut this door well, it should be closed as the ensilage rises on the inside, and care must be taken to fill up all small empty spaces with Indian corn well pressed. There is also another system, and this is the one we will follow in future, which consists in shutting the door before commencing to fill, and filling the silo from the top by means of a large box which is raised by horse-power. This box is two feet two inches wide on the outside, three feet two inches in length, and two feet two inches in depth, so that it holds the chopped load of an ordinary farm dumping cart.

The cover of the silo should be made very economically, boards laid close together to exclude air will suffice.

The inside of the silo may be covered with a coat of paint to preserve it. The outside should be banked up with earth for Winter, and the earth removed in the Spring.

HARVEST AND CUTTING.

As shewn by the reports, the cutting is done in different ways. Everything considered, I think that the sickle is better than any other imple-

ment, for the Indian corn is very well disposed at once for being loaded lengthwise in the carts, or crosswise on wagons. Two men in the field can feed a corn cutter driven by two horses and cutting to ⅜ in length.

FILLING THE SILO.

This is done in two ways, according to the result desired:

1st. It is filled without interruption, and the ensilage is sour or acid. In this case a very heavy pressure is required by means of some load or weight, for the diminution of height of the layer stored in it, must be much more considerable, and this weight is for the purpose of keeping the mass always pressed down as it sinks. The edges and corners must be carefully pressed, the centre settles of itself.

2nd. The second plan is generally preferred. The corn is put in by layers of one to three feet, which are left to themselves, for a longer or shorter time, to allow a fermentation to set in until the temperature of the mass reaches 130 Fahrenheit.

The ensilage then settles better and keeps sweet. It takes from one to three days to attain the required temperature. I see no harm in allowing the ensilage to heat to 140 F., but it must reach at least 130 F. When the last layer is 130 F. a row of planks is laid on, then at least eight inches of earth or stone, to keep out the air.

I also recommend having several small silos in preference to one large one.

The multiplicity of silos allows of their being filled alternately while the crop can be taken in without interruption.

When the filling has been made in September the consumption may begin in November.

I will here claim your permission to make a short digression on the principles which should guide you in the choice between the two plans of filling the silos.

The cause of all fermentation is the air. Without air there can be no fermentation. The Indian corn which comes in from the field is, so to speak, thoroughly impregnated with air. Its leaves, which have undergone no pressure, are full of it; the spaces between all these thousand pieces of Indian corn cut and thrown into the silo are yet occupied by air. The sugar contained in the Indian corn in a considerable quantity is thus in

a favorable condition for fermenting, and first of all giving out alcohol and then souring in the air, and giving to the ensilage that vinegar smell which you all know it has. Now, to load the silo with heavy weights will certainly expel a portion of the air it contains, and prevent the fresh air from reaching the mass; but there is always enough left to cause a strong enough *vinegar* fermentation. Experience has shown that all silos filled rapidly, and even well loaded, always undergo a vinegar fermentation, or, to use the term applied by the English, gives "sour ensilage" as distinguished from "sweet ensilage"

Means have been found to exclude the air still more completely, either by using weights or dispensing with them. It consists, as I have already stated, in filling the silo by intermittent layers, or leaving between each filling a long enough interval to let the ensilage heat to 130 or even 140 degrees. Hot air dilates; it therefore takes up more space than cold air, consequently when the ensilage is heated, there is less air in a cubic foot than there would be in the same space if the air was cold. Heating therefore drives out a great portion of the air of the silo; as a result of this heating, the cut leaves and stalks become considerably softer and pack more closely than ensilage not heated, and the successive loads heaping up upon each other, exercise a considerable pressure on the lower strata, and pack them easily, and reduce to a minimum the quantity of air left in the silo or which may be introduced into it.

The consequence of this is that the ensilage has not sufficient of air to allow it to pass beyond the alcoholic fermentation which is the desirable condition, and this is the fermentation which gives sweet ensilage.

On principle, then, the air must be excluded. This is better done by fermentation than by any other means. It is better to let it ferment and not fill the silo, than to fill and not let it ferment. I have tried especially as an experiment, on the Seminary farm, exactly what I have just pointed out to you. I filled the silo we built this year, with intermissions, to let it ferment, and I put no other load on it than about two feet of straw. I lost a little on the top of the silo, but apart from this the ensilage was as well kept and as sweet as I can ever hope to have it.

Now comes the question whether a heavy pressure on the silo would not be advisable. This question amounts to asking whether it is better to lose a certain quantity of the ensilage which should serve as isolating matter, or whether it is better to put on the silo, earth, stones or wood, and to load it with these. Experience will enlighten us on this point. I now proceed.

USE OF ENSILAGE.

If Indian corn is to be mixed either with straw or with concentrated food, it is right to make the mixture twenty-four hours before feeding it to the cattle. The acid smell is partly removed, the heating takes place, and the ensilage is very much improved from an alimentary point of view.

RAISING INDIAN CORN.—VARIETIES.

Western Indian corn is recommended as very productive. I think it would be well to try Southern white, which is said to yield abundantly.

As for the land, the most suitable is that on which the cows of the farm pass the night. The animal manure can be spread over them in a regular way by using movable fences that can be displaced as this sort of manure becomes sufficient.

For extensive cultivation this enclosure is not sufficient, and the greatest possible quantity of manure must then be put on the field intended for the cultivation of Indian corn. Two ploughings must be made, one in the Fall and the other in the Spring. This last ploughing will cover up the manure laid on at the rate of at least 25 double cart loads to the arpent.

In light lands one ploughing in the Spring is sufficient. An old meadow should be broken up before the second ploughing.

In any case the land must be well drained and thoroughly harrowed.

The furrows are made with the plough at 3 or 4 inches in depth. I do not think it is better to sow more than a bushel to the arpent, unless it is to be used unripe during the Summer. In this latter case, by sowing more thickly, the stalks remain more slender, and consequently more tender. The furrows are from 18 to 25 inches apart.

The sowing is done at the end of May or the commencement of June, but never before the ground is thoroughly warm. The seed is covered with a harrow or a hand rake.

The hoeings are repeated frequently when the vegetation of the corn commences. One or two will be sufficient, if the weather is dry and warm.

As soon as the plant is 12 or 15 inches in height, it has nothing to fear from weeds, and doing the work over again is useless.

As a general rule, when the tilling is well done and the manure sufficient, a yield of 20, 25 and even 30 tons an arpent may be expected.

When the tufts appear, the right time for cutting it is at hand. It is always better to begin the ensilage early than late, so as to avoid the frosts which lessen its value.

RESULTS OBTAINED WITH ENSILAGE.

The experience I made of it this winter convinced me that corn ensilage is worth its weight of the large mangel wurzel beets.

We gave at first 45 lbs. of beets and 5 lbs. of bran to each cow every day. On the 8th of February our supply of root crops ran out, the silo was opened and the 45 lbs. of beets were replaced by an equal weight of ensilage. During the first days the supply of milk did not increase, but it afterwards increased somewhat after 3 or 4 days, and the effect was lasting.

After these results I give up the cultivation of beets which costs dearer and yields less than Indian corn. Thus :

Indian corn.		Beets.
Manure	is equal to	Manure.
Cutting and storing equal to digging out and cutting.		
Seed $1.10	and	$ 1.60
Cost of cultivation $3.00	and	$12.00

The comparison is therefore entirely in favor of the former crop.

The following is the estimate I make of the cost of a ton of ensilage, supposing the common average of 15 tons to the arpent :

Two ploughings	$ 2.00
Breaking up and harrowing	1.00
Sowing	1.00
Two hoeings	1.00
25 double loads of manure (½ of the cost)	12.50
Rent of the land	6.00
Cost of ensilage (15 tons)	7.50
Total	$31.00
Cost of a ton	$ 2.06⅔
Interest of the silo 10 0/0 $6.00, or per ton	0.40
Total cost of a ton of ensilage	$2.46⅔

Now, if we suppose a return of

20	tons	to the arpent,	the ton	would cost	$1.85
25	"	"	"	"	1.50
30	"	"	"	"	1.23

I think that with a proper organization, the cost of ensilage can be reduced as low down as to make the price of a ton of ensilage, counting in all the charges, about a dollar.

Examination and practice shew that three tons of Indian corn ensilage are equal to one ton of first quality hay. So that, by practising ensilage, it is feasible to feed cows quite economically and keep two or even three cows, and in good condition, where without ensilage only one could be kept.

Up to this the question has been only of Indian corn ensilage. Trial of other substances, and especially clover, has yet to be made.

An experimental station is required. It would serve as a sure guide for the others.

DISCUSSION ON ABBE CHARTIER'S LECTURE.

Mr. BARNARD :—Gentlemen, allow me, on my own behalf and in the name of the Association, to thank the Abbé Chartier for the lecture he has just given us. The Abbé, with a humility worthy of all praise, told us at the outset, that what he had to say to us was neither a speech, nor a lecture, that he was only going to have a conversation with us. Well, I, for my part, declare that his work has been admirably done.

It appears, because it has been said about us often enough, that we, French Canadians, are an inferior race, that we amount to nothing, that we are not up to the level of the other races. Now this ensilage question has been discussed often enough by our Upper Canadian neighbors, in their Dairy Associations, and these gentlemen, at least some of them, appear to me to have come to the conclusion that ensilage is utterly useless. Our Association has studied this question during only three or four years, each year brings us further information, and we have already astonishing improvements. The Abbé Chartier has summed up the science of ensilage. The Ontario people have told us that it was impossible to build silos otherwise

than of cemented stone. We have found out that they can be made of wood. The Abbé Chartier goes further. After the experiments he has made, he claims that the enormous quantity of stone which up to this has been used to exercise a pressure, can be dispensed with, provided the exclusion of the air be complete. I believe he is right. This discovery is an immense improvement in ensilage. You understand that it is no trifling matter to put on top of the silos from one to two hundred weight of stone for every square foot, and afterwards be compelled to take it down in the Spring, with the certainty of having to do the same thing over again next Fall. This was quite enough to keep people from making silos. To-day there are upwards of fifty silos in the Province. This result is due to the efforts of our association. Most of those who undertook to build silos have succeeded. Why? Because, before commencing a silo, they studied it over for some years. When they were satisfied that the system was good they followed out the plan which experience taught them.

If we could all unite together to do what the Abbé has proposed to us to convince our statesmen of the necessity of coming to our assistance, because we work for the encouragement of Agriculture and for the welfare of our country, this Association would continue to do its good work.

Abbé CHARTIER: Mr. Barnard's compliments have made me forget both what I know and what I do not know. I will be most willing to answer any question put to me, when I know what answer to give. But I cannot bind myself to give correct answers to all the questions submitted to me, because I am convinced that there are a great many things that I do not know about ensilage. As far as my knowledge goes, I will be happy to answer all who may question me.

Mr. BARNARD: Have you studied practically this question of dry straw for covering the ensilage?

Abbé CHARTIER: No.

Mr. BARNARD: It is a new question?

Abbé CHARTIER: It is a new question. I will tell you that as procurator of the St. Hyacinthe Seminary, I am allowed to make experiments. I will continue my experiments so as to be of some use, and perhaps later on I may be able to answer the question put to me.

Mr. BARNARD: I think that what you have said about lessening the pressure is very good. It is a question which is far from being decided.

Abbé CHARTIER: In spite of the serious doubts as to the possibility of carrying out the suggestion I have made, it is quite likely that next Fall I may put a layer of straw under the top of my silo, with planks over it, so as to ascertain, by an experiment made in our own country, whether it succeeds. But I will take care to put over the planks either saw-dust or earth so as to completely exclude the air.

Mr. BARNARD: Lecouteux, a farmer of Sologne, who has become one of the most distinguished agriculturists in France, says that he tried straw on his ensilage, and that the ensilage did not succeed. He explains this by the superabundant moisture absorbed by the straw, and which causes the ensilage in contact with this straw to become mouldy.

Lecouteux also made an experiment which I thought at the time very useful. He put a layer of earth, several inches thick, on his ensilage, and then covered this layer of earth with cut straw. He made a store of cut straw over his silo. From that time he has ceased to recommend this plan, so that I am inclined to think that the few inches of earth did not keep the moisture from reaching the straw and that he lost some fodder. He published a work on ensilage.

I think he made these experiments with the straw, before publishing his book, and his book is dated 1874.

Abbé CHARTIER: The studies which I made on ensilage are based on American experiments. I like the Americans for many things. They are enterprising men, ready to run any risk and willing to help each other. But there is one thing that struck me as quite extraordinary. I believe that we will show the Americans how to make ensilage cheap by using wooden silos. I read lately that an American was boasting of having made the cheapest silo. Yet his silo cost three times as much as ours. They ended by suspecting that silos could be built otherwise than of brick and stone.

Mr, BARNARD: Three years ago mention was made in the United States of a silo built of wood.

Mr. CASAVANT: Mr. President, I do not wish to say that I have studied the question of ensilage. I have only listened to the discussion. But something has occurred to me which I will now suggest. Would not the cover of a silo, if made of solid pannels well joined together serve as an isolater. There would only be the spaces between each pannel, and these would be closed with the utmost care. I saw four or five silos last year. One of them was built of stone, and the cover was made of pannels well tongued

and grooved and very solid, four or five feet wide. Two men can work them. It is because this plan would render the use of the silo easier that I suggest the idea.

Abbé CHARTIER: According to our principle, if you have a covering which shuts hermetically, which completely excludes the air, I have no doubt, for my part, that you will obtain the same result either in one way or another. But I doubt very much that by covering the silo with a surface that would scarcely move you can completely succeed in keeping the air out. In any case I think that it would cost you more than if you covered your silo with saw-dust or earth. As a question of economy I think you would gain nothing, not to mention the risk incurred.

Mr. CASAVANT: In any case the experiment was tried last year, but I have not seen the report of it.

Mr. BARNARD: Mr. Howard, of England, is a manufacturer of farm implements. He tried to take advantage of this principle of excluding the air. He arranged his silo in such a way as to cover it with some inches of water by means of special vessels completely covering the ensilage. Of course it was costly, but you see that his idea was to exclude the air.

In reply to Mr. Casavant, I will say that the question has been discussed at meetings in the United States and in Europe. They have finally arrived at the conclusion that covering by pannels is not practicable, because the pressure cannot be effected, and because little by little the pannels warp, and the air finds an entrance.

Mr. TACHE: What thickness of spoiled ensilage did you find at the surface, on opening your silo?

Abbé CHARTIER: Twelve inches. But, as I have remarked, the experiment I wished to make was different from all the others. I put no covering on my silo, and put on only a load of straw. The upper part was not pressed down, and a load of straw was thrown on it. I did not claim to act scientifically, I wished to make an experiment. I ascertained that from the moment there was a layer of decomposed ensilage thick enough to exclude the air, the fermentation was stopped, and the ensilage which was in contact with that decomposed layer is as good as that in the middle. That is to say that, as soon as the air ceased to penetrate the silo, decomposition ceased. This confirmed me in the idea I had, that from the moment the air can be excluded, the pressure can be dispensed with. There must always be weight enough to keep the planking in contact with the ensilage. In

putting in no planking I intended to put only the least possible pressure on the silo. This is why I contented myself with only throwing a load of straw on it.

Mr. CHAPAIS: Supposing that it would be a certain and settled fact that whenever no covering is put on the silo, a layer of twelve inches of ensilage would be spoiled, would it not be more economical to let this layer be lost rather than incur the cost of putting on a covering to keep this layer from being spoiled?

Abbé CHARTIER: That depends on the way the proprietor would undertake to cover his silo. For instance, at the Seminary of St. Hyacinthe, we are well prepared for this, and I consider that it is a work of very little importance. It requires only two good loads of earth to cover our silo. Under these circumstances I think that it is more economical to cover the silo, and not lose the twelve inches of ensilage?

Mr. TACHE: Do the twelve inches of burned or spoiled ensilage you have on the surface of your silo, represent nearly twelve inches of pressed ensilage?

Abbé CHARTIER: No. I consider that this loss does not represent more than 25 pounds to the cubic foot, because it is the last layer and it is not pressed.

Mr. TACHE: Do you estimate that a cubic foot of spoiled ensilage represents twenty-five pounds worth of Indian corn?

Abbé CHARTIER: Yes. I calculate that I lose 9,500 lbs. of ensilage by that layer of twelve inches of spoiled ensilage; nearly five tons. Rather than load the silo I would prefer losing two tons, because I consider the five tons I lose as worth nearly five dollars. This is what we value ensilage at now. But I think later on it will not cost that much. It may be worth more than five dollars to raise several tons of stone to that height and afterwards lower them down again, and then be encumbered with them for the whole remainder of the year. If it could be covered with six or seven inches of earth, I would prefer that to losing the ensilage, because that earth could be used by mixing it with manure. The whole matter is a question of economy. Every one can examine and ascertain his own resources, how much a covering would cost him, and how much a ton of ensilage costs him.

Mr. CASAVANT: A load of earth (muck, *terre noire*) used like that would be worth a load of manure, that is to say, fifty cents, so that it would more than pay the trouble.

Mr. MAURICE FREY: I saw silos in England made in the open air and without any loads of stone, and where the pressure was effected by iron wire binding the ensilage. If ensilage in the open air is possible, it is perhaps preferable to the other system from an economical point of view.

Mr. BARNARD: In point of fact, pressure on ensilage by mill stones has often been tried, but it has never succeeded so as to become popular. The isolating matters of a closed silo must be replaced by enormous pressure, which is only obtained by a heavy outlay.

Abbé CHARTIER: There is no doubt that ensilage can be well done in the open air. In this case everything depends on the pressure. We are of opinion that it is possible to exclude the air without pressure. But from the moment that you wish to keep anything in the open air, the air must be excluded and this must be by means of pressure.

Mr. GIROUARD: Mr. Lantier, in the upper part St. Jérôme, made a stack. I saw the report of his operations in the *Journal de la Campagne*. He made a stack in the open air. He made a horse press it down, then covered it with coarse sand taken from the shore, and he succeeded very well. He opened his stack in the month of December and it was perfectly preserved. I think also that the fermentation was sweet and alcoholic. It is worth notice.

Abbé CHARTIER: You will find a sweet fermentation in the silos which have been prepared according to the principle which I have laid down for obtaining sweet fermentation. If you wish to have sweet ensilage, fill slowly, in layers, and allow an interval between each layer. If you wish to have sour ensilage, fill rapidly.

Mr. GIROUARD: Are you of opinion that sweet ensilage is better than sour?

Abbé CHARTIER: I cannot rely upon science to answer your question; but my impression, based upon some experience, is, that if we feed our cattle for seven months of the year on sour ensilage, the practice may be injurious to them. If we feed them on sour ensilage for two or three months only in the year, it would, perhaps, do them no harm.

Mr. GIROUARD: We have chemists here. Could these gentlemen not find something that might be spread over each layer of ensilage, and which would counteract the injurious effect of the acid?

Mr. TACHE: The association ought to request the Abbé Chartier to avail himself of the scientific knowledge of the Abbé Choquet, professor of chemistry at the college of St. Hyacinthe, and who has gone to spend a year in Paris to make special studies there.

THE BENEFITS OF AGRICULTURE,

BY THE REVEREND FATHER HERBRETEAU.

EXTRACT FROM THE REPORT OF THE JOURNAL OF AGRICULTURE.

At seven o'clock, P.M., the first meeting of the convention opened, and was presided over by the Hon. Mr. Boucher de La Bruère. His Lordship the Bishop of Three Rivers, as also His Honor Mr. Justice Bourgeois, the Honorable Mr. Malhiot, Mayor of the city, Honorable Mr. Turcotte, M.P.P., occupied seats of honor, and a select audience composed of thirty priests, aldermen and prominent citizens, a considerable number of farmers and specialists, assembled from all parts of the country, filled the hall. The gallery was crowded with ladies, and the city band added to the éclat of the meeting. The spacious hall was well heated and brilliantly lighted, thanks to the generosity of the civic authorities. Everything contributed to predispose the audience to listen willingly, as it was becoming they should, to the eloquence of those who were to address them. His Honor the Mayor welcomed the members of the Convention, and expressed the pleasure the Trifluvians felt in receiving them in their city. The president replied in a few appropriate words, and delivered his opening address replete with interesting details upon the Association, and important statistics on dairy industry.

When his address was concluded, he introduced to the meeting the Reverend Father Herbreteau, of the Society of Jesus, who delivered an address upon the benefits of Agriculture.

" *Non oderis opera laboriosa, et rusticationem creatam ab Altissimo.*"

" Hate not laborious works, nor husbandry created by the most High."

(Eccles., VII, 16.)

MY LORD, LADIES AND GENTLEMEN,

It must appear rather strange, at first sight, to see a priest, a member of a religious order, a professor of dogmas and Metaphysics, appear before this Congress of Agricultural Clubs, to speak upon Agriculture. Have we not here specialists as well skilled in the art of oratory as they are competent to deal with agricultural questions? Do we not see here, in our midst, the Chrysostom of our Canadian bishops, presiding over this meeting, and speaking on every subject, with charming eloquence?

My excuse, gentlemen, is that I am here only to make you more anxious to hear the speakers who are to come after me, and to foster an interest that must go on increasing. Another excuse, if I must give a further one, is, that I have not chosen for myself the honor of addressing this meeting. Mr. Barnard's friendship imposed it upon me. May he have no reason to regret it.

Again, gentlemen, it seemed to me, on second thoughts, that a priest may have his say, as well as another, upon questions of Agriculture. Is it not the priest who blesses the seed and the first fruits of the harvest? Is it not he who consecrates the bread and wine, producing upon the altar the bread of the elect, the food of souls. As priests, we are clothed in linen, we burn the wax of bees upon the altar, we use the flowers of the field to adorn the tabernacle, we pour oil upon the sick, and we are called pastors. Willingly do we, in the supernatural order, exclaim with our Lord, in speaking of the harvest of souls : "*My father is the husbandman ; Pater meus agricola est.*" (John, 15-1.) Moreover, in the natural order, cannot many priests, remembering the days of their youth passed in the country, like those of Moses or David, guarding their flocks, say, with feelings of becoming pride : "*I am the son of a husbandman ; Pater meus agricola est.*" The agricultural class is the one which, by a dispensation of Providence, remarked even by the Council of Trent itself, furnishes the best recruits to the ranks of the clergy. So that the priest has a right to speak of Agriculture.

In the same way, gentlemen, I find myself, as a member of a religious order, quite at home when speaking in the midst of a gathering of agricultural classes. I never think without pride, (though an ill-inspired writer

reproaches us for saying it boastingly) that the Jesuits were in some way the first settlers of Canada. "Everywhere," says Mr. Lefebvre de Bellefeuille, "the priest has followed closely in the wake of the first settler, and some-"times he has gone ahead of him... .....The priest is ever present in "Canadian society throughout the history of Canada. His works are found "everywhere, and with him is seen the Catholic Church, which, after hav-"ing founded our people, still preserves and protects it in the struggles it "has to undergo."—*Revue Canadienne*, vol. VI, p. 717.

Beside the forts, which secured the safety of the earliest settlers and of their first harvests on Canadian soil, the missionaries endeavored to attach to the labors of the field both the wandering tribes of Indians and the few families of French settlers. Father Buteux, on his arrival at Three Rivers, towards the end of July, 1635, made it his first business, after founding the Church of the Conception beside his hut built of stakes and branches, to set his parishioners to work at tilling the soil. Shortly after his arrival he wrote as follows :—"If Capitanal were still alive (Capitanal "was an Indian chief friendly towards the French) he would certainly "favor what we are going to undertake this Spring to lead these savages "by degrees to live a settled life. As these poor Indians have been accus-"tomed to idleness for a long time, it is hard for them to bring themselves "to cultivate the soil, unless they are assisted. We intend, therefore, to "see if any families wish to give up their wandering life ; if so, we will "employ anew three men to plant Indian corn near the new settlement at "Three Rivers.....We will pay the wages and support of these workmen "in proportion to the time we may employ them in clearing and farming "with the Indians. If I could keep a dozen of them, it would be the surest "way to win over the Indians." (Relations de 1635, page 20.)

What the Jesuits did at Three Rivers, was done by them or by other equally deserving missionaries at Quebec, at Tadoussac, at Montreal, at Sault Ste. Marie, all along the St. Lawrence and along the Mississippi to New Orleans. There is still standing at Cap de la Magdeleine, quite near here, an old monument which has been renewed for the postal service; this old monument is still called by the people, the Fathers' Mill. The Jesuits were, I believe, the first millers at Three Rivers and the Cape.

But it is not in Canada only that priests and religious have been the pioneers of Agriculture. History tells us that the monks also brought the soil of Europe under cultivation. "The three-eighths of the cities and market towns of France," says Mr. de Montalembert, "owe their existence

to the monks." (*Monks of the West, Preface.*) It was the same in England, Ireland, Italy, Germany and Switzerland. The monks, always shunning the settled centres, ever recruiting countless adherents, went from forest to forest, from desert to desert, and everywhere made the solitudes bloom. From the fifth to the fifteenth century, such was the providential mission of the innumerable disciples of St. Benedict and St. Columbanus. When they had cleared and drained the land, people flocked around the neighborhood of the monasteries, and these became the sites of a great many cities, which are now illustrious. Some of them little think that they owe their origin to the monasteries.

St. Benedict laid the foundatious of the celebarted monastery of Monte Cassino, in the desert of Subiaco, in Italy in the fifth century. The Goths and Heruli, who had lived by pillage, were seized with remorse and sought to expiate their crimes in solitude. St. Benedict received them, gave each of them a frock, attached to his girdle a mattock which he was never to quit, day or night, gave him a spade or an axe, and sent him out to exercise his energy and strength in clearing off the brushwood or breaking up the soil. One day a Goth, unskillful at his work, let the axe fall out of his hand and it sank to the bottom of the lake formed by the Anio, at the foot of the mountain. Benedict was there. He performed a miracle, and the axe floated up from the bottom back to the workman. "Take your axe," said Benedict to the barbarian woodsman, "take it, work and console yourself."

"Symbolic words," says de Montalembert, "wherein one may see "summed up, as it were, an abridgement of the precepts and examples "lavished by the monastic order upon so many generations of people and "conquering races: *Ecce labora.*" Ibidem.

I have stated enough, have I not, gentlemen, to convince you that as a priest and member of a religious order, I have some right to speak of Agriculture? You, gentlemen, know this well, and hence you place your agricultural circles under the control and management of your parish priests. I am happy to congratulate you, gentlemen, upon the correct view you have of colonization. If your agricultural clubs selected a coat of arms, I would tell you to put in it a cross for a saltier, upon a plough, with this motto, taken from the monks: *Cruce et aratro. By the cross and plough.* In your agricultural gatherings, the priest represents the cross, and the farmer the plough. Each has his own place assigned him there.

If, then, I may speak of Agriculture, I hope you will allow me, gentlemen, to *philosophize* somewhat upon the subject, leaving the technical details

to others. Every one to his calling. Those acquainted with rural management will tell you their experience about drainage, meadows and pasturage, about successful ensilage, about the best way to feed and improve the breeds of cattle, about the produce of milk and making cheese, and about a great many other things. It may be scientifically shewn how much is lost by allowing the richest treasures of Agriculture to go to waste and infect the air, or, by emptying the refuse of our cities, to find its way to the river. It may be proved, by calculations which defy contradiction, how important it is to return to the soil, by organic manure, what the soil has given to the crops, and what the crops have given to man and to animals. The law which governs this wonderful rotation in which the elements of life are increasingly perpetuated and renewed without ever becoming exhausted, constitutes the very basis of farming operations, and would furnish a beautiful, scientific and practical subject to treat in presence of this important meeting. Others, more competent than myself will, I trust, take it up.

For my part, as a professor of Metaphysics, I will enlarge upon a wider theme, more philosophical, more suited to my profession, and I will say in praise of Agriculture that it is the most favorable medium for the development of man's faculties, and the necessary condition for a people's welfare.

This is what I call, under a general heading, *the benefits of Agriculture.*

I.

It must be remarked, at the outset, gentlemen, that Agriculture is the most favorable medium for the development of robust health. "First of all we must live," was a saying of ancient philosophy, *prius est vivere;* afterwards, if all goes well, we may philosophize, *deinde philosophari.* Now, it seems quite plain, gentlemen, that a child's growth, and the development of a young person's organs, cannot succeed anywhere as well as in a country life. This tender nature, which, like a flower, absorbs air and light, becomes impregnated with its surroundings, can nowhere be formed or made to harmonize as well as by a life passed in the open air of a country life, amongst the sweet odors of the hay and the fields, amongst the breezes which have caught their balm from the resinous branches of the stately pine or the sweetened bark of the maple tree.

Look where you will and you will find the robust temperaments, the types of lofty stature which show no signs of declining health, the rich blood the rosy cheeks, the ruddy hue, the bloom of health glowing under

a fine skin, the life sparkling in the eyes, the noble soul dwelling in the body which it animates. All these you will find, above all, in the country.

The decaying generations are in the towns. Were it not for the increasing supply of recruits they obtain from the country, the towns would soon become empty, for the towns destroy their population.

The anaemic temperaments are caused by and developed in the unwholesome dwellings of thickly peopled localities in the reeking atmosphere of manufactories and stores. Paleness dwells in elegant drawing-rooms; consumption is the scourge of aristocratic races; epidemics never find a footing outside of cities. In fine, to sum it up in one word, life is shorter in cities than in the country, as shewn by countless statistics. Health is the first blessing of Agriculture.

II

From our first conclusion this consequence follows: Multitudes are made up of units, and races are made up of individuals. If then, a rural life forms men of robust temperament, it produces strong races, able to think and act vigorously, to don the coat of mail, and bear aloft the national standard with honor. With good reason did the Latin poet of old congratulate Italy that by her farming, she produced, both rich harvests and those hardy races of Marsi, of Sabines, of those ancient Romans who conquered the world. " Hail," sung Virgil, " hail, land of Italy, fruitful mother of rich " crops and valiant heroes."

Salve, magna parens frugum, saturnia tellus,
Magna virium !

(Georg. Book II, 171).

Wisdom, speaking by the mouth of Fenelon, has left us in a charming story the secret of renewing a decayed race. Listen to this page of Telemaque: " Mentor went out from the city (the capital of the " island of Crete), with the King Idomeneus, and found a great tract of " fertile country left untilled, others were only half cultivated, owing to " the negligence and poverty of the husbandmen, who, being deprived of " farm hands and oxen, were also wanting in the strength and courage " necessary to cultivate to perfection. Mentor, seeing this waste country, " said to the King: The earth here is only waiting to enrich its inhabitants, " but the inhabitants are wanting to the land. Let us then take out all " these superfluous artisans whose callings can only corrupt their morals, " and let us make them cultivate these plains and hills; the country will " soon be peopled with vigorous families addicted to agriculture."

The teachings of antiquity agree with the experience of modern times, and shew that Agriculture is the natural nurse of strong races. In fact, it could not be otherwise, for, the farmer's calling is man's most natural condition. "If I open the ancient records of the human race," says Mgr. Dupanloup, "I find Agriculture on the very first page, before man fell, in "the early days of his primitive innocence. In the happy abode of Eden, "man, in his original innocence, had to work, to till the earth. *Posuit eum* "*in paradiso voluptatis, ut operaretur eum.* (Gen. 2). So that the work of "tillage, before it became a punishment, was imposed upon man as a law, "a condition of his happiness, his dignity, his existence, a noble and neces- "sary employment of his faculties and his strength." (Comices Agricoles, 1861.)

Have you remarked, gentlemen, or shall I follow up the theme, how man comes into the world with frail and weakly limbs which must be strengthened? If you bring up tenderly the frail being we call a child, you will make it effeminate. If, on the contrary, you apply its limbs to work, if you put upon its shoulders burdens proportioned to its strength, if you allow it to grow up in the open air, its limbs will become strong and supple. At eighteen years of age it will be hard to say which should be most admired, its strength or its elegance.

Unquestionably, in order to develop his faculties, man requires to till the earth, as the earth requires man's help for its own fertility. And to prevent him from withdrawing himself from this duty, God, or, to use the language of Pliny the elder, *Nature*, cast him naked upon the naked soil. "*Nudus in nuda humo.*" He must grow hemp and flax for his clothing, bread and wine for his food, and the earth will give him nothing except as the price of his toil. "*Quia dii laboribus omnia vendunt.*" (Seneca.)

It is vain to substitute other work for the labors of the field, it seems that they are less in the order of Providence, and experience shews that they are less beneficial to the perfect development of the human frame. We must then conclude, with the Scriptures, that man is made to work, as the bird is made to fly, and the ox to draw, but man's principal work, that which Nature and his own needs impose most upon him, that which most highly perfects his race, is that of Agriculture.

The second benefit of agriculture is that it forms strong generations which are the honor of their country and of humanity.

III

God forbid, however, that we should limit man's perfection to the development of his bodily faculties. Above the material order are the intellectual and moral orders, completing, and, in many ways, permeating each other.

Is the farmer's life, then, favorable for the development of his intellectual faculties? I venture to affirm it, if the term be properly understood, and if, moreover, a very special cultivation of the mind is not meant.

First of all, it is quite true that the life of a farmer leaves little leisure for learned speculations, and does not call for very deep or very subtile knowledge. But cannot the same thing be said of most part the labors of other branches of industry and trades? Deep science is a career apart. Whoever wishes to succeed in it, must give himself wholly to it, grow pale over his books in his early youth, and devote his best strength to study to the end of his life. This is the destiny of the few. Out of thirty-six millions, the population of France, there are thirty-four million workers. So in the most highly cultivated countries, nearly nineteen-twentieths are the men who work at manual labor, and whose intellectual faculties slumber in their wearied limbs. If, then, the farmer is not more learned than other toilers, if he has even less of the hackneyed loquacity which we meet with in the great centres, he seems to make up for it by retaining the privilege of clearness of intellect and sure judgment. The equilibrium of the faculties is more easily lost in the tumult of the cities, while evenness of temper and disposition is better preserved in the country. Lastly, if it be true, according to the ancient proverb, that the perfection of man is made up of a sound mind in a sound body, *mens sana in corpore sano*, it seems that nowhere else than in Agriculture can its elements and conditions be readily found.

It may even be said of the other trades that they require less science than Agriculture. The weaver always drives his shuttle the same way; the carpenter makes only a small number of models; the blacksmith, however long he may do so, always strikes his iron in the same manner. In the great modern manufactories, where the division of labor is carried out, man is reduced almost to the state of a mere machine. Each workman executes only one detail, he never learns to put together the complete production of his industry. On the contrary, Agriculture, when properly understood, is eminently a science of observation, of method, of scientific combinations. The secretary of the Agricultural Clubs told me the other day, with an

elevation of ideas which struck me with astonishment (he will pardon me for telling his secret) that *Agriculture has, for its object, the understanding and carrying out God's plan in Nature.*

In fact, and God so willed it, there is a time to plough, a time to harrow, a time more favorable for dropping the seed in the earth. The farmer must. in all this, interpret Nature's laws, and consult experience as well as reason, Not every land produces alike :

Hic segetes, illic venient felicius uvæ ;
(Georg. L. I. 53).

Virgil said it, "here wheat, and there grapes grow best." Heavy land must be plowed deeply ; on weak land only a slight furrow must be made so as not to dry up the soil ; cold lands must be cured with lime ; dry land requires clay ; moist land must be drained ; sandy land must be watered. There are stimulating manures, such as animal black, *guano*, which, if used alone, would exhaust the soil ; they are tempered by natural manures, such as dung and the remains of forage plants, and their fertility is doubled. The farmer should know how much salts each plant takes from the earth, and what quantity of it each kind of manure contains. He must know how to alternate cereals and root crops, how long each land requires to be tilled, and how long it should lie fallow. These laws are all difficult.

Then, to the knowledge required for the farm, is to be added that required for the stable. The choice of breeding animals, the crossing of breeds, the most economical and advantageous system of feeding, the proportion between the quantity of cattle and the land to be sowed ; all these are so many problems where routine and ignorance are ruinous, and where, on the contrary, Science works wonders and realizes fortunes. There is nothing, even to the proceedings of your dairy industries, whose distinguished representatives I see here, which does not require an incredible amount of knowledge. A French publicist, Mr. Louis Hervé, in a report on Agriculture in France, in 1859, said : "A proper system of stabling is indispensable for increasing "the production of meat and milk ; but the confinement of cattle in low, "narrow, badly aired stables, often results in ruining the farmer. In fact, "epizootic diseases, the ailments of every kind which decimate cattle upon a "great many farms, arise, in most cases, from the bad places which shelter "them. Some model farms offer us buildings constructed upon the principles "of hygiene and properly understood economy, spacious and lofty stables, "with a double current of air at the top, a paved and sloping flooring to carry "off the droppings ; piggeries made upon the same rules ; dairies built so

" as to admit fresh and pure air, a uniform temperature, sheltered from the " odors which infect milk, and from the jolting of vehicles which prevent " the rising of the cream."

Are not these endless details, gentlemen, and they only refer to tillage and cattle. Yet I have said nothing of the poultry yard, nor of the garden, nor of the most advantageous working of sugaries, nor of fruit trees, nor of the forest. In truth, we may say that the farmer, if he wishes to cultivate to perfection, should know nearly all the Sciences, Chemistry and Physics, Natural History and Botany, Mineralogy and Medicine. The life of each plant, as well as that of every animal, has its food, its treatment, its ailments. The farmer is its physician as well as its nurse. If he does not know his business, he will do like an awkward nurse who would put vinegar instead of milk into her child's cup, or a doctor who would treat his patients with arsenic. Quackery in farming is far more ruinous than in feeding men, for men can complain, while plants and animals sicken and die without telling the cause of their complaint. The skilled farmer is left to himself to discover and cure it. Agriculture, gentlemen, is a school of common sense and practical science. Such is its third benefit.

IV

However, gentlemen, an easier demonstration to make, is to prove that Agriculture is a medium specially favorable to the development of the moral and religious feelings of a people. " Everything in the country is full of God," said a pagan poet :

Jovis omnia plena ;

" and it is the action of the divinity that is felt and heard in the germina- " tion under our feet, in the fields, and over head in the buds.

Et nunc omnis ager, nunc omnis parturit labor.
(Virg. Eclog. 111.)

The farmer does his work in common with God. He sows and God waters the seed. He hoes and plows, but counts on God's sun to ripen his harvests. Unable by himself to make the seed grow, he awaits his fortune from the Divine protection, and places his trust in the " *Father who gives his daily bread.*" Well, may he, speaking of God, say, this divine word: " *Pater meus agricola est,*" for God is, in truth, a farmer.

The work of manufactories is not shared in this way with God, man's effort alone appears in it. It is not within the blackened walls of a manu-

factory, in the crowded streets of our towns, that we meet these vast horizons of which Dante said, that "light and love were their only bounds."

Che, solo amor'e luce ha per confine.

Is it any matter of astonishment, then, that the farmer is naturally more thoughtful and more pious than the city workman? Everything in the fields lifts up to God a soul naturally good, and there is scarcely anything to turn it from Him. In town, vice is everywhere, and the thought of God is as rare, as the steeples, the sight of which is shut out from us by the houses. So has it been always remarked that Virtue betakes herself to the country. "Life in the fields," says Columella, "is nearly related to Wisdom, if not her sister." *Vita rustica sine dubitatione proxima et quasi consanguinea sapientiæ est.* And Virgil, the poet of Mantua, said that "Holy Chastity, driven from every place else, took up her abode in the country,

Casta pudicitiam servat domus.
(Georg. Book II. 523.)

"that Justice, quitting the earth at the commencement of the iron age, left "the last trace of her footsteps at the farmer's door,

Extrema per illos justitia excedens terra vestigia fecit.
(Georg. Book II. 470.)

"that even the young people, everywhere so unruly, were in the country "assiduous in their work and sober in their way of living, devout to the "deity and respectful to their parents."

Hic patiens operum exiquoque assueta juventus
Sacra deûm, sanctique patres.
(Ibidem.)

While the wandering and unsettled life of the workman is a school of ungodliness, of disorganization of family ties, of disunion and forgetfulness among those who were made to love each other, the head of a family in the country really does the work of educating his children, watching over their youth and preparing their future. It is not he who will imprudently expose his sons and daughters to the corruption of the cities. He keeps them at home while they are young, and trains them up to a life of austerity, labor and obedience. Morning and night, he sees that they accomplish their duties towards God; on Sunday, he takes them to the village Mass. No baneful influence reaches the sanctuary of the farm; the pious farmer models his children to his own image. When they are grown up, their father will not be compelled, in order to find them employment, to take them away too early from under his care, to give them up to strange masters, to abandon

them in the midst of a disorderly and unwholesome atmosphere. No, he will bring them with him to his work in the fields, and laying their hands on the spade, plow or sickle, he will say to them : " Here is your livelihood, do " like me and you will be happy. When you have worked and become old " enough, I will take off some of my fields, and build you a fine house, and " this will be your share. You will increase it, and preserve in it, with honor, " my name and my calling. Go, I leave you what my father left me, the " free air of your country, work, simple tastes, the love of God and peace of " mind."

It must be owned, gentlemen, that Solomon, the wisest of men, was right when he uttered the words which I have put as a heading to this discourse : " Farmers, love your severe labor, and above all, agriculture, which " was created by the Most High. *Non oderis opera laboriosa, et rusticationem* " *creatam ab Altissimo.*"

Agriculture is, in truth, the guardian of faith and morals. This is the fourth of its benefits.

V

The history of industry has its well known dates. We know that mechanical weaving is of recent invention. Cottons, calicoes, merinos, fine linen, cloths, as well as the most celebrated carpets, have their origin and their phases of progress, which can easily be established. The same must be said of the great products of smelting furnaces, of forged iron, artistic bronzes, and steel of all kinds, from the hard English steel to the finest flexible blades of Norway or Damascus. We can even say when iron was first forged or navigation commenced. But Agriculture has no dates, it is coeval with creation. It has even been created by the Most High—*creatam ab Altissimo.*

Polished and mighty nations have been able to exist and flourish without our modern inventions ; no branch of industry has ever been necessary for the prosperity of a great nation. According to the properties of the soil and the advantages of the climate, silk and cotton, wool and furs, grapes and hops, minerals and precious woods have been turned to advantage. These industries may give rise to a certain comfort, by causing an abundant supply of gold to flow, as in California, but they do not give a national character of greatness or stability to a people. In order that a nation may be great and prosperous, that its people may be attached to their country with a

feeling of patriotic love, that a special seal and distinctive character may be impressed upon it, they must be attached to the soil, and be in a manner identified with it, bedewing it with their sweat, and living upon its produce, being born there and laying their ashes there beside those of their forefathers. In a word, they must live there by Agriculture. A great statesman, Sully, had traced out this programme for his country, to which he was tenderly attached, and which owed her greatness to him. Sully used to say: "Pasturage and tillage are the breasts of France."

Truly, Agriculture is a condition necessary for the prosperity of a nation. The love I bear your beloved Canada, gentlemen, and the firm faith I have in the destinies of this people, doubly dear to me because it is of French origin and Catholic, urges me to prove a thesis, upon which, I believe, the future of this noble country is based. So that, gentlemen, when we explain their patriotic purpose, we raise to their proper level these gatherings of agricultural clubs, whose title is too modest a one.

Have you ever remarked, gentlemen, that all the nations which have made their mark in history, were devoted to Agriculture. Egypt, which attained in the earliest ages the very summit of power and civilization, Egypt, which had at one time twenty-two thousand flourishing cities, if we can credit Herodotus, Egypt which built for her kings the gigantic pyramids, which placed at the doors of her temples monoliths which Rome, London and Paris are proud to possess to-day, Egypt not only trained her people in the ways of Agriculture, but even introduced it into her religion. The Nile, which every year overflows its banks to renew the fertility of its banks, was a sacred river. The lotus, which grows on moist ground, and seems to be a token of its fertility, is, in like manner, a sacred flower. They meant to do great honor to the god Osiris, by assigning to him a bull's head. Isis had a cow's head, and was crowned with lotus leaves. You know, gentlemen, what ridiculous worship was rendered to the ox Apis, for which a palace was built, and whose funeral was celebrated with as much solemnity as those of the kings. The ox Apis was the king, if not the god, of pasturage and Agriculture.

The Hebrews themselves, whom Jehovah had led into a land flowing with milk and honey to assure their perpetuity, the Hebrews, even in the promised land, sometimes remembered the worship of Egypt, and, forgetting Jehovah in the enjoyment of the fruits of the earth, they adored Agriculture under the image of a golden calf.

In the Indies, on the luxuriant banks of the Ganges, where from the days of Niniveh and Babylon dwelt powerful tribes, the bull *Nandi*, the symbol of the fertility of the soil, was honored as a god. Amongst the ruins of rich Niniveh, two gigantic bulls of granite were lately discovered, bearing on their heads a crown of stars, and which were, doubtless, the tutelary divinities of the flourishing banks of the Tigris and the Euphrates. Amongst the Persians, the worship of the ox *Aboudad* was prescribed by a law of Zoroaster, and this venerated animal was looked upon as the source of all vegetable and animal creation. It would be a waste of time to enter into all the ridiculous details of this cosmogony. They only prove one thing, that Agriculture amongst the Persians was a religion.

The worship of Agriculture varies in form, with times and manners, but it is found amongst all pagan nations which have distinguished themselves in history. The grave Varro relates, *that to kill the plowing ox at Athens, in the Peloponnesus, in Phrygia, and amongst the most ancient Romans, was a crime punished with death.* The Greeks, whose artistic genius civilized ancient traditions, assigned the bull a place among the heavenly constellations, but they found a more elegant way of leaving divinity in Agriculture. Ceres was the goddess, to whom the benefits of this art were assigned. Ceres had been the first to till the soil, and in the fields she had given birth to Plutus, or riches. The shepherds chose for their protector Apollo, who had been the first to keep flocks. Pallas and Neptune, said the people, having a dispute between them to know who would confer upon mankind the most useful present, Pallas struck the ground with her heel, and made the olive sprout. The olive is the wealth of Mediterranean countries. Neptune, in turn, struck the earth with his trident, and from the ground thus opened sprung forth the prancing steed.

Cui prima frementem
Fudit equum magno tellus percussa tridenti.
Virg. Georg. Lib. I.

Bacchus was the god of grapes, and it was agreed (and it is so yet) that his gifts were divine. The most renowned kings of this artistic people were little more, in time of peace, than great landed proprietors, devoting their best attention to their countless herds of cattle Homer's immortal poems are thoroughly impressed with agricultural tastes. Hesiod celebrated farming in his poem on "Works and Days." Plato's accomplished disciple, Xenophon, after he had been a general in the army, wrote his book of Economics, wherein he explains in detail the processes of pasturage and tillage. He affirms in it "that Agriculture is the first of arts," and he declares that "he

will not admit that a free man can find any occupation more worthy of him."

As to the Romans, the most astonishing people of all, you know, gentlemen, that their first generals, the Fabricii and the Cincinnati, left the plow for the sword, and when the victory was won, returned to their fields. Marius, whose obscure birth and earliest occupations made him a farmer, Marius, seven times consul, was noted for the skill and extent of his agricultural operations. Amongst other works, some vine trees which he had distributed over the hilly portions of his domains, were admired for the skilful use made of the ground. As Pliny says, "They showed the complete art of the profound tactician and great general."

As long as its agricultural genius inspired the Roman people, they furnished invincible recruits to the legions which carried the glory of its name to the boundaries of the world. When farming ceased to be held in respect, when the festivals of Rome had drawn off the moral population to the town, the Roman colossus began to totter. In vain were laws made to bring back the proprietors to their fields. In vain did the Emperor Augustus ask Virgil to write his *Georgics*, that sublime appeal on behalf of agricultural labors. The Roman families soon ceased to have any heirs, the legions soon had no more soldiers, and famished Italy soon had no more bread. The barbarians came and took the place of the people, which no longer recruited its ranks, and could no longer feed itself. The Greeks, Persians, Babylonians and Egyptians had disappeared in the same way.

Agriculture, gentlemen, formed the great nations of antiquity. Such is its fifth benefit, which I undertook to point out to you.

VI

It only remains for me to tell you, gentlemen, that Agriculture is likewise the mother of the great modern nations, and that the great modern nations will not last unless they maintain as the basis of the immense expansion of artificial life called Industry and Administration, a broad and flourishing cultivation of the soil. This will terminate my discourse already too prolonged. Everybody knows that modern nations derive their origin from the barbarous nations which invaded the Roman empire and divided it between them, in the fifth century of our era. When the sea, encroaching upon the land, succeeds at last in breaking down a dyke

which it has long lashed with its angry billows, its waves dash over the country, excavate deep beds, sweep away in their eddies, the crops and herds as well as the husbandman and his uprooted dwelling. So, for more than two centuries did the barbarian conquerors of the Romans ravage Europe. Huns, Vandals, Visigoths, Herulians, Franks, Saxons, Normans, Slavs, Arabians and Tartars, were so many human waves, which, dashing against each other like the waters of a sea that has burst through its barriers, ravaged everything before them, and disordered everything from end to end of the ancient continent. When calm was restored, these plunderers, who had nothing more to plunder, were obliged to look to the soil for the bread which they could no longer purchase with gold or conquer with their swords. I have already told you, and M. de Montalembert has related the story in five volumes of thrilling interest, that it was the monks who attached these wandering people to the soil.

Lingard, the great historian of England, speaks of what the monks did to promote Agriculture in England, and mentions how they reclaimed immense uncultivated and uninhabited regions covered with forests or surrounded by swamps: "Such was the real nature of the vast territories de-
" livered over to the monks and which had the double advantage of afford-
" ing the communities a retreat inaccessible for a longer time than elsewhere
" and of imposing lesser sacrifices upon the munificence of the donors.
" They overcame all the difficulties of opening up a new country to culti-
" vation; cleared the forests, drained the marshes, irrigated or drained the
" soil according to the requirements of each locality, made bridges, roads,
" dykes, ports and light-houses throughout their domains, all of which bore
" testimony to their indefatigable and vigilant efforts. At least one-half of
" Northumbria was covered with sterile heaths and moors; one-half of East
" Anglia and a considerable portion of Mercia were covered with almost in-
" accessible swamps. The monks converted all these deserts into pastures
" and fields covered with abundant crops." M. de Montalembert confirms this statement of Lingard, and adds: "These monks turned ploughmen
" and stock-raisers, were the real parents of English Agriculture, which has
" become and continues to be, thanks to their traditions and their example,
" the foremost Agriculture in the world." (Monks of the West, vol. V, 173.)

So much for England. If you wish to know, gentlemen, how France was brought under cultivation, listen to the following narrative, and judge of the whole from one detail.

It was in the sixth century. A Breton monk, named Tellio,

after clearing the thickets and brushwood around his monastery of Dol, near St. Malo, undertook, with the help of another monk, St. Samson, to plant an immense orchard at a place where nothing but barren trees could be seen before them. For three miles in length, over a tract of land thoroughly broken up, and well mellowed, the monk Tellio planted apple trees of the best kind; for three miles in length the apple trees cast out their vigorous branches. The house was deluged with apples. Notwithstanding their appetite, the monks were unable to consume so many apples. Then, to lose none of them, for they were good, they bethought themselves of drinking them, and invented cider. And to-day cider gladdens all the drunkards of Brittany and even of Normandy, a result far beyond what the good monk Tellio expected.

You know now, gentlemen, where cider, the national drink of Brittany and Normandy, comes from. In these two countries the grape does not ripen. Do you wish to know now, who cleared the favored regions where champagne ripens, champagne wine, so much coveted by the English, the indispensable crown of every great repast in both the old world and the new? Listen. The monk Theodulphus, born of illustrious parents in Aquitania, became a monk at St. Thierry. He wished to be employed as a farm hand at the monastery. Two ploughing oxen were entrusted to him, and for twenty-two years he followed them at the plow. With this team, he did as much work as two, three or even four of his brother monks. He was more untiring than his oxen, for, while they were resting, he replaced the plow by the mattock, harrow or spade. And, on his return to the monastery, after his well spent days, he was always the first at the offices and psalmody during the night. After twenty-two years of tillage, he was chosen abbot of the community. The inhabitants of the nearest village thereupon took his plow, and hung it up in their church as a relic.

"It was a relic, indeed," says M. de Montalembert, from whom I have partly taken this narrative, "a noble and holy relic of one of those lives of "unending labor and perpetual virtue, whose example has happily exercised "a more fruitful and more lasting empire than that of the proudest con- "querors. It seems to me that we would all look upon it with emotion, if "it existed yet, this monk's plow, doubly sacred, by religion and labor, by "history and virtue. For my part, I feel that I would kiss it with as much "veneration as I would the sword of Charlemagne or the pen of Bossuet." (Monks of the West, vol. II, p. 451.)

France, like England, cultivated by monks, grew and prospered beside

her rival, although endless wars have periodically decimated her people during twelve centuries. France and England will both be powerful, so long as Agriculture continues to flourish in them, for the law of history, I repeat, is that the prosperity and greatness of a people shall be in proportion to the number and prosperity of its farming population.

That this principle is true when applied to the recruiting of armies, everyone admits, for everybody knows that disciplined soldiers, bold in the presence of death, are the robust and pious sons of the farming classes. But it is equally true of commercial prosperity and of the glory of genius. In order that commerce and industry may continue to exist, the country must furnish an ample supply of the food and provisions which form two thirds of local traffic; the rural population, after selling the produce of their lands to the people of the towns, must, in turn, purchase with their profits the products of the industries carried on there. Suppress either one of the terms of this double exchange, and both trade and industry are ruined.

If you wish a people to be wholly manufacturers, and to exchange their manufactures with a foreign people in return for food, I tell you that, with rare exceptions, they will still be ruined, for, as a general rule, industry being given the price of the raw material and of the labor, does not realize more than one third of the revenue required to support a people. The common law is that the farmer should be the feeder of the State, and that trade be the complement of the prosperity which the revenues of the land procure for the nation.

The same thing must be said of the glory of letters and the fine arts. This double glory flourishes amongst a people where works of art find rich purchasers and keen appreciators, where the conditions of fortune allow artists and literary men leisure and means to follow up their callings. Now fortune is to be found in the nation whose lands are an inexhaustible mine of wealth; it departs from it with the ears of wheat and the stalks of the harvest.

This sound principle of natural economy was well understood by the great and good King Henri IV, who, wishing his kingdom to attain greatness, both in arms, in industry and genius, laid down, as the basis of the benefits of his government, that every farmer in France and Navarre, "should have a fowl to eat on Sunday." And his prime minister, his faithful Sully, delighted to repeat, as a proverb, the well known saying I have already mentioned: "Pasturage and tillage are the breasts of France."

The other modern nations, which, in both hemispheres, are to-day the most prosperous, are those addicted to agriculture. There is, perhaps, none more prosperous than Belgium. Belgium supports in wealth or comfort the thickest population of Europe. But Belgium is cultivated like a garden, from the Sambre to the Baltic, from the Scheldt to the chalky cliffs of Pas-de-Calais. Its Agriculture, still more than its inexhaustible coal mines, and its rich quarries of colored marble, constitute the wealth of Belgium. The miners are on strike, and threaten the public peace. The farmers, who form the majority, are the safety of the country and of religion.

Agriculture also constitutes the wealth of Germany and Russia, where the country people are so simple and robust, so firmly attached to the soil and so laborious.

The Arab, on the contrary, is unwilling to cultivate anything. He contents himself with the wild fruit of the desert and the milk of his goats. The ground he walks on seems accursed, and civilization deserts the countries brought under his yoke. The Arabs are a nation without cohesion and without a country, doomed to perish in shameful misery.

At the extremity of Asia there exists a nation, which, in the Eastern hemisphere, is the coming nation of the future. Listen to what Mr. Thiers attributes the prosperity of China. "The Mongols," says he, "after leading "a nomadic life for centuries in the vast desert of Cobi, hurled themselves "upon China, divided its soil into a thousand portions, which, being in turn "flooded or drained by artificial means, are covered with rice; they have "cultivated the mulberry tree, surpassed every other people in the art of "weaving silk, have discovered a clay which, instead of turning red when "heated like our clay, comes out white and transparent, and have made of "it porcelain which they have ornamented with a thousand fantastic "designs, carved wood with astonishing skill, learned the secret of covering "them with a lasting varnish, built palaces of lacker, erected towers of "porcelain, and are, even to-day, the most skilful workmen in the world, ". . . . . What is it that has caused so complete a change? One thing "alone, the settling and cultivation of the land."

(Thiers. Propriété, p. 126.)

The history of colonization in America furnishes in its turn a glowing eulogium of Agriculture. The English colony of New England, and the French colony of New France, founded almost about the same time, should, it seems, have developed in the same proportion. However, the English colony soon doubled, trebled and quadrupled in number the French colony.

Despite prodigies of valor, Canada was invaded and conquered by the English. I am well aware that this conquest must be partly attributed to the negligence of France, which no longer sent either settlers or soldiers. But, unless I am mistaken, it must also be attributed to the fact that the French colonists of Canada were unwilling to live otherwise than by hunting and trading, while the English colonists settled down to Agriculture at once.

Father Charlevoix makes the following comparison between these two nations: "We do not," says he, "see any rich people in Canada, and it is a "pity, for there they are fond of displaying their wealth, and scarcely anyone "amuses himself with amassing wealth. They live well, if it leaves "enough for dress. If not they retrench from the table, so as to provide the "means of dressing well. It must be admitted that dress suits our "settlers. The colonists are all of tall stature, and in both sexes may be "seen the best blood in the world; a sprightly temper, mild and agreeable "manners are common to all, and rudeness of speech or behaviour is not "even known in the most remote parts of the country."

"Such, it is said, is not the case with our English neighbors, and any-"one judging of the two colonies only by the settlers' way of living, acting "and speaking. would not hesitate to consider our colony as the most flour-"ishing. In New England and in the other provinces of the continent, "there is an opulence of which they do not seemingly know how to avail "themselves; in New France, there is a poverty hidden under an "appearance of comfort, which does not appear to be studied. Trade and "cultivation strengthen the former. The industry of its inhabitants "supports the latter, and the taste of the nation throws over it an infinite "charm. The English colonist amasses wealth and makes no superfluous "expenditure. The French colonist enjoys what he has, and often makes "parade of what he has not. The former works for his heirs, the latter "leaves his in want, as he is himself, to mend matters as best they may. "The Anglo-Americans do not wish for war, because they have much to "lose; they do not spare the savages, because they do not believe they need "them. The French youth, for opposite reasons, detest peace, and live on "good terms with the natives of the country, whose esteem they easily "attract during war and their friendship at all times."

(Diary of a voyage in North America, Letter III.)

Father Charlevoix wrote these words about thirty years before the conquest by the English and the capitulation of Quebec. Since that time

the situation has changed. The French settlers of Canada, compelled to live in peace with the conqueror, now become a benevolent protector, left the gun for the plough. The Americans and the English chose trade as their portion.

Now, mark what happened, and how it verifies the law of history. The English diminish in numbers on the Canadian continent. The Yankees have exhausted their race in their counting houses filled with gold. The French Canadian race, on the contrary, overflows the region to which it had been relegated, it already retakes the towns of the colony, and fills up the spare lands of the United States which the Yankees cannot repeople. Such is the law of history. People devoted to Agriculture have riches, numbers and duration.

Seeing, in this way, the favor and extension which Agriculture is daily gaining in Canada, I gladly predict for Canada a happy future. Despite the inclemency of its winters, the banks of the St. Lawrence are, year after year, covered with more plentiful crops. A single one of our rich counties now produces probably as much grain as the Indians formerly gathered throughout the whole of North America. The Algonquin and Iroquois dish of *sagamité*, a sort of thick and nauseous stew, has been replaced by the beautiful white bread produced from the same land :

" *Tellus Chaoniam pinqui glandem mutavit arista ;* and, as in the days of the golden age coming after the primitive period, one can mix the clear water of the stream, which the Indians drank from the hollow of their hands, with more generous liquid sparkling in chiseled goblets :

" *Poculaque inventis acheloia miscuit uvis.*"

(Virg. Georg. Book I, 8.)

The same soil, which bestows these treasures on us, refused them to the Indians, because they refused to till that soil :

" *Fundit humo facilem victum justissima tellus.*"

(Ibidem, Book II, 460.)

When the lands will be better tilled, the same space of ground will give three times the crop it yields to day. Then families being in better circumstances, will easily support a larger number of workers. Nothing will be allowed to go to loss, neither wood nor pasturage nor land that can be occupied. Lands hitherto left untilled will in their turn be occupied. From all parts the produce of the country will be brought to the cities

Flour, horses, cattle, and the numberless other productions of the country, will find their way abroad. The River St. Lawrence will be covered with vessels bringing in the gold and silver of other nations, and bearing away with them our superfluous products.

Then will be the time to create with Canadian capital, the benefit of which will be left in the country, great manufacturing and mining industries, great institutions for the fine arts and higher education, great railway and engineering projects, for all which we have so far been paying tribute to the stranger. Then, above this population of workers and artisans, ever increasing in numbers and in prosperity, will arise a splendid aristocracy, the aristocracy of fortune, aristocracy of illustrious names, aristocracy of intellectual culture.

Such will be the prosperity of a flourishing people, such the honor of a noble nation, commanding respect, and bearing upon its brow the double diadem of Virtue and Genius.

Pedigree Book of Canadian Cows.

Evening Sitting of the 19th January.

MR. LESAGE, DEPUTY MINISTER OF AGRICULTURE.

My Lord, Mr. President and Gentlemen :

After the splendid discourse we have just heard, it is somewhat discouraging for those unaccustomed to produce masterpieces of oratory, to undertake to speak.

I will not address you at any length, because I have no desire to make a speech. I wish simply to make a few remarks to you about an accomplished fact, to which I attach, and you yourselves doubtless do also, a great deal of importance. I wish to speak of the Pedigree book and the golden book for the breed of Canadian cows, which to-day really exists, and which I hold in my hand. It already contains twenty-six entries, six of which are actually made, and twenty others are in manuscript, which will be entered without delay.

In the accomplishment of this work, I see, gentlemen, an unanswerable reply to the objections, which were urged against the encouragement which a certain number of farmers desired to give to the cattle of this country. At the last Provincial Exhibition, held in Sherbrooke, His Excellency the Lieutenant-Governor had the kindness to offer medals of honor for Canadian cattle. The Honorable Commissioner of Agriculture also seconded His Excellency's views, by offering, on his part, prizes to a considerable amount. These gentlemen were very much disappointed, and so was I myself, for the interest I take in Canadian cattle dates far back. Since I have the honor of being connected with the Department of Agriculture I have labored unceasingly for this purpose, and, after the indifference I had met in so many cases, I finished by falling in with fellow-workers, who astonished me by the zeal and devotion they showed for the object I had undertaken.

At the last session of the Legislature, Parliament authorized the publication of a Pedigree Book, and you may have seen in the last issue of the Official Gazette that the rules for the carrying out of this new project have been sanctioned and approved by the highest authority. Finally, in the month of December last, the Honorable Commissioner of Agriculture gave

notice that this Pedigree Book was opened. We deemed this convention an excellent occasion, gentlemen, to commence the entries in this Pedigree Book, and we have begun to do so only this evening.

This event may appear trifling to some persons. Well, for my part, gentlemen, I attach considerable importance to it, because it is the way to render long delayed justice, to the indigenous animals of this country, and to revive the breed, for it is nearly as extinct as many fear it is. In the course of the many trips I have had occasion to make, in the different sections of the Province, I have always observed very carefully the cattle I met on my way, and I never passed through the country without meeting on my road several animals bearing very characteristic traits, and showing very distinct traces of their origin.

This partiality to Canadian cattle is not, gentlemen, a mere matter of fancy. We know from history that the cattle of this country were selected with very great care. The horses and cattle sent to Canada, at the commencement of the colony, that is from the year sixteen hundred and sixty-five to sixteen hundred and eighty or ninety, were very carefully selected. It was at the time when the great King Louis XIV ruled over France, with his immortal ministers. It was when he sent to Canada such men as the Vice-Roy de Tracy, Talon, Frontenac. When New France was treated so liberally in the selection of distinguished men, we may well believe that the best that could be had in the kingdom of France was sought out and sent to Canada. We find the proof of this in the resemblance which any one can notice between our Canadian cattle and the most celebrated cattle to be found in Europe, I mean the Jerseys and Guernseys. If you examine carefully the size and outline of these cattle, you will notice a striking family resemblance between them and the well preserved specimens of our Canadian cows. Moreover, in all cattle which have retained the principal traits of the Canadian breed, you will observe not only a family likeness with the Jerseys and Guernseys, but you will notice the distinctive, superior qualities of both these breeds, namely, the richness of the milk and the length of time the cows continue to give milk. Some cows give a great deal of milk when grass is plentiful. But all who have carefully remarked the habits of the Canadian cow, agree in saying,— and it is a remark I have heard since my childhood, but the truth of which I only admitted later on, when after repeated trials I was forced to do so,—that Canadian cows, so thoroughly despised at one time, keep on giving milk with remarkable uniformity, from one end of the year to the other. When the grass is plentiful and rich, cows larger than the Canadian, give great abundance of milk, in fact surprising

quantities. The Canadian cow does not in reality reach to these highest quantities. But if you take a good one, and observe her milking from one year's end to the other, you will find that she will give, as a general rule, more butter than the other breeds, in proportion to the amount of food she has consumed, because it stands to reason that a cow which takes more food should yield more. But, given equal quantities of food, I do not think it can be denied that the native cow is a better producer than her foreign rivals.

I have already stated that these cows were numerous, and that in the trips I had made throughout the province I remarked a great many of them in districts where people did not imagine there were so many. One thing is certain, that there are some in every district. Mr. Couture and Mr. Barnard were astonished, yesterday, during the visits they made to some stables, to find such perfect specimens in the very town of Three Rivers and the environs, and it is quite certain that anyone who will take the trouble to search, will discover more of them. I do not think I am going too far when I state that at least one-fifth of all the cows in the country are of are of Canadian breed. Now this proportion of all the cows in the country exceeds one hundred thousand. You can thus see that it is still time to pay pay attention to the preservation of this precious breed, and that there is still time to improve it wherever its primitive qualities have been lost.

At an exhibition held last summer in the county of Charlevoix, in the parish of Baie St. Paul, I had the pleasure of seeing a very fine collection of Canadian cattle. In that part of the country, which is altogether isolated, there is little crossing of breeds with foreign animals. However, a certain number of Durham and Ayrshire bulls have been brought into some of these parishes ; in others it was hard to discover a trace of foreign blood. Yet we saw at Baie St. Paul, and I say it without exaggeration, three of the most perfect specimens of the Canadian breed, and I can safely say, gentlemen, that these three specimens could be shewn at any of our Provincial exhibitions, and would attract the notice of cattle fanciers more than any other cows that I know of.

At the Sherbrooke exhibition, where such encouraging prizes for Canadian cattle were offered, we were grieved to see them represented by a herd that was painful to look at. If it was intended to choose the leanest and worst conditioned cows of the whole Province, it could scarcely have succeeded better. This result was all the more mortifying, because notice had been given, inducements had been held out, the newspapers had called attention to it

early enough, and owners of Canadian cattle had been encouraged to send some of them to the Sherbrooke exhibition. However, nobody came forward when a strange farmer, an American living near Sherbrooke, to make a good job of it, said: "I'll go into the French parishes and pick out a herd of "Canadian cows and exhibit them at Sherbrooke." In fact, he brought four cows and a bull. People wondered at the time whether it was a deliberately planned trick to discourage Canadian cattle fanciers from ever attempting to show them and restore the breed. However, I think this opinion was wrong, and that the man was in good faith, only that he was unfortunate in his choice of the herd he brought to the exhibition.

So far as the characteristic traits were concerned, they had them fully; not a trace of foreign blood could be found in them, but in choosing so uniform a herd, unfortunate selections had been made.

The advantageous offers made by the Lieutenant-Governor at the Sherbrooke Exhibition not having been accepted, will be renewed at the next Provincial Exhibition, and so on, until a herd will be found worthy to receive them. I have no doubt that the Department of Agriculture will also renew, and no effort of mine will be spared to have them renew, the prizes offered at the Sherbrooke Exhibition. A great many farmers from the county of Charlevoix have already made engagements with us to get genuine Canadian herds of cattle ready for the next Provincial Exhibition. When you have seen the perfection of the Canadian breed, when you have seen herds of cattle such as are still to be found in the county of Charlevoix, you will admire and feel disposed to favor Canadian cattle. Not that I mean to underrate other breeds of cattle which have been brought to this country and crossed with ours; far from it. Let those who have crossed with the Ayrshire and Durham breeds, continue these crossings until they reach the perfection of these two breeds.

The main benefit that should result from the encouragement we wish to give for raising Canadian cattle, is that a considerable number of cows of this breed belongs to farmers who, for the most part, have not the means to make the expensive cross-breedings that are done in some better favored districts of the province. It is desirable therefore that these people should continue as they have begun, whilst improving the breed, be it well understood. By careful selection, they will succeed in by raising herds of cattle which will excite envy, and command very remunerative prices.

What I have said of cows applies with equal force to horses. We found in the county of Charlevoix, a number of mares and stallions having all the distinctive characteristics of the Canadian breed. In that district it might be possible to find the original stock, which it would be well to spread through the entire province, so as to try to revive this excellent breed of horses, which is threatened with utter extinction.

The Legislature voted a sum of six thousand dollars for the establishment of a Canadian Stud farm. So far, no company has been organized offering the required guarantees to be entrusted with the carrying out of the project. The Commissioner of Agriculture has its welfare at heart, and I trust it will be realized.

I cannot, gentlemen, congratulate your society too warmly upon the success of this meeting. I cannot compliment it too highly upon the fact of its being encouraged by the presence of so many eminent men who have kindly lent their co-operation to secure its success, and I am especially happy to see that the inauguration of the Pedigree Book has been made under such auspicious circumstances. This leads me to augur well for the future, and I trust my hopes will not be disappointed.

Report of the Competition for Canadian Cattle.

DOCTOR COUTURE:—Three years ago, with the view of encouraging dairying and above all butter-making, the Dairy Association resolved to establish a competition for milch cows and to give handsome prizes to the owners of such cows as would give the largest quantity of butter during a period of seven days, provided the quantity was not less than ten pounds. Like every new idea, it took some time to work its way into public favor. This year seven cows were entered, and I was instructed by the Dairy Association to inspect these cows, and to ascertain whether they were of Canadian or of other breeds.

I will now read my report on such inspection.

SIR,

I have the honor to report that I examined the cows entered for the competition during the Summer of 1886.

These competitions, like everything new, are not yet encouraged as they should be, but I am in a position to state that next year there will be a good many competitors. Wherever I went, I found that the farmers were beginning to understand it properly, and several proposed to take part in it. Scarcity of grass kept several from competing this year.

The following are the names of those who took part in the competition together with the results :

Calixte Thérien, St. Lin	11 lbs.	6	ounces.
Ignace Plamondon, St. Raymond	11 "	15¾	"
Médéric Lebeau, Charlemagne	13 "	10	"
George Carrier, St. Vital de Lambton	9 "	16	"
Louis Boutin, St. Sébastien, Beauce	10 "	6	"
Damase Paradis, " "	10 "	½	"
Philias Jérôme, Ste. Thérèse	11 "	4½	"

COMPARATIVE RICHNESS OF THE MILK.

P. Jérôme's	cow	1 lb.	of butter	with	19	lbs.	milk.
D. Paradis'	"	1 "	"	"	22	"	"
Ignace Plamondon's	"	1 "	"	"	19	"	"
Louis Boutin's	"	1 "	"	"	22	"	"
Geo. Carrier's,	"	1 "	"	"	28	"	"
Médéric Lebeau's	"	1 "	"	"	21¾	"	"
Calixte Thérien's	"	1 "	"	"	28	"	"

BREED OF THE COMPETING COWS.

Amongst all these cows I found only three pure Canadians, namely: 1st. Mr. Jérôme's; 2nd. Mr. Paradis'; 3rd. Mr. Plamondon's.

Mr. Carrier's is an Ayrshire grade. Mr. Lebeau's is cross bred, but the crossing cannot be well defined. So also is Mr. Thérien's. Mr. Boutin's is an Ayrshire grade.

FEED.

It would be interesting to know what food was given these cows during the competition.

Mr. Thérien's had the most abundant feed, besides pasture, Indian corn and 15 lbs. of ground oats per day.

Mr. Plamondon's: an average of 5 lbs. of shorts.

Mr. Lebeau's: nearly 7 lbs. of bran and shorts mixed.

Mr. Carrier's: 10 lbs. of ground oats.

L. Boutin's: 2 mashes per day.

D. Paradis': 6 lbs of ground grain per day.

P. Jérôme's: grazing on the public highway, and nearly 2 buckets of mash, $\frac{2}{3}$ of bran and $\frac{1}{3}$ of ground grain. So that none of them, except Mr. Thérien's, received more than an average quantity of food. Some of them, like Mr. Plamondon's, received but little extra food, 5 lbs. of shorts.

It may not be out of place to state here briefly the best way to test a cow.

The most favorable time is within 3 months after calving; for, as a general rule, as soon as the cow has been covered, the quantity of milk lessens.

The test should be made before the Summer drought, for then pasture is not so good, the cattle suffer greatly from the heat, and the cows give less milk.

FEED.

In order to get them to yield as much milk as possible, they must be made to eat as much food as possible.

Care must be taken that their health does not suffer through too abundant or too dry food.

The cows entered for competition must therefore be prepared two or three weeks in advance, by giving them a little extra food. The quantity must be increased gradually until it reaches the maximum. It will then be time to commence the test, during which the cow should continue to receive this maximum of food.

If treated in this way, there will be no danger of indigestion during the test, and the secretion of milk will be increased as far as can be done by feeding.

QUALITY OF THE FOOD.

All kinds of foods are not equally favorable for producing milk. Just as a certain food, prepared in one way, will promote the growth of fat, while it will, if prepared in another way, promote the production of milk. Soft food, or such as contains much water, is the best for promoting the secretion of milk. Consequently good pasture is the best of all.

Should the pasture not be good enough, it should be replaced by chopped hay, boiled or steamed for some time.

In addition grain should also be given, but not whole or dry.

Cooking, macerating, cutting up this food, makes it more digestible by softening it, breaking the husk or covering, and bringing the matter to be assimilated in direct contact with the digestive dissolvents.

The food should also, under these circumstances, contain a good deal water, as I have said above.

Whatever grain may be given, must be ground, or at least crushed and softened by cooking or boiling and fed in mashes.

But we must bear in mind that in these tests what we want to obtain is not only milk, but above all, cream, that is, milk containing as much fat as possible.

Grain is to a certain extent favorable to the formation of fat, but there is a sort of food which develops, in a special manner, the fatty globules in the milk, and that is linseed, either whole or in the shape of linseed cake, (oil cake,) or ground.

I would therefore advise all who wish to enter their cows for this competition, to accustom them to this food, taking the precautions I have mentioned above.

Linseed flour or cake must be mixed with grain or with bran, and form part of the mash, which should never be given cold.

If these directions were followed by all who take part in this competition, they would find an enormous difference both in the quantity and quality of the milk and butter.

J. A. COUTURE,
V. S.

Before I resume my seat, I wish to impress upon you the necessity of continuing these competitions. You have no idea of the amount of good which they do wherever there are competitors. I am firmly convinced that for every one we have had this year we will have ten next year, in the parishes where I went and where cows were entered. By means of these competitions the Association compels farmers to find out the real value of their cattle. The Dairy Association, the agricultural journals and specialists have frequently endeavored to call the farmer's attention to the importance of ascertaining the value of his herd in an accurate and definite manner; and the agricultural societies and journals have frequently been compelled to observe with regret that our Canadian farmers have not acquired the habit of examining into such matters. By means of these competitions, I repeat, we will compel farmers to properly ascertain the value of their cows and also to practice selection. There is not the slightest doubt that when they have found out the value of each animal and what beneficial results are derived from giving good food to good milkers, they will keep these and sell the poor milkers to the butcher. By means of these competitions also, the Association will excite the emulation of farmers in connection with the production of milk very much better than it could do in any other way. Those who are the most advanced will give example to the others. The Association itself will, through its members, be directly benefited by the increased production of milk throughout the Province. The country will likewise benefit by what requires no other capital than sufficient intelligence to make a rational selection.

Looking at the question from that point of view, it would also be very important for the Association, with the assistance of the Government, to organize a competition for milch cows, not only for thoroughbred Canadians, but for cows of every breed.

Therefore, if I can find any one to second me, I will propose that on the next occasion, three or four prizes, varying from fifty to one hundred or one hundred and fifty dollars, be given for cows of any breed, producing the largest quantity of butter, over ten pounds, during seven consecutive days. We will thereby have a considerable number of competitors, and will certainly create throughout the country an emulation far beyond our expectations, while we will do an immense amount of good as regards the production of milk and butter.

RESULT OF THE COMPETITION OF CANADIAN MILCH COWS, 1886.

—	Mederic Lebeau, Charlemagne, L'Assomption.		Ign. Plamondon, St. Raymond, Portneuf.		Calixte Therien, Laurentides, L'Assomption.		Phileas Jerome, Ste. Therese de Blainville.		Louis Boutin. St. Sebastien, Aylmer, Beauce.		Damase Paradis, St. Sebastien, Aylmer, Beauce.		1st Trial. Geo. Carrier, St. Vital de Lambton, Beauce		2nd Trial. Do.	
DATE OF TRIAL COMMENCING ON	27th June.		1st July.		30th July.		5th July.		30th July.		30th July.		19th August.		12th Sept'ber.	
Weight of milk at each milking:	lbs.	lbs. oz.	lbs.	lbs. oz.	lbs.	lbs. o7o	lbs.	los. oz.	lbs.	lbs. oz.	lbs.	lbs. oz.	lbs.	lbs. oz.	lbs.	lbs. oz.
1st day, Morning	13.50		10.12		17.25		14.08		16.14		13.00		15.12		17.08	
Noon	14.50		10.02		15.00		.....		.....		9.13		.....		.....	
Evening	14.50		10.00		12.00		16.00		16.08		10.05		16.00		17.00	
		42.50		30.14		44.25		30 08		33.06		33.02		31.12		34.08
2nd day, Morning	17.00		14.02		18.12-5		14 14		16.08		12.01		16.00		17.08	
Noon	12.50		11.03		14.50		.....		.....		10.05		.....		.....	
Evening	13.50		11.13		14.75		16.01		17.15		10.02		16.00		17.00	
		43.00		37.02		47.37-5		30.15		32.07		32.03		32.00		34.08
3rd day, Morning	16.50		11.10		16.50		15.04		15.14		11.13		16.08		16.08	
Noon	13.00		11.01		16.00		.....		.....		9.13		.....		.....	
Evening	13.00		11.11		11.50		12.11		17.00		10.00		18.04		18.00	
		42.50		34.06		44 00		27.15		32.14		31.19		35.12		34.08
4th day, Morning	17.50		12.10		18.50		16.04		16.12		13.05		17.08		19.08.	
Noon	12.50		11.10		14.25		.....		.....		10.05		.....		.....	
Evening	11.00		10.04		14 75		15.10		15.12		9,13		17.04		17.12	
		41.00		34.08		47.50		31.14		32.08		33.07		34.12		37.0 4
5th day, Morning	17.00		12.04		19.50		14.06		16.10		12.05		16.08		19.08	
Noon	14.00		9.15		14.25		.....		.....		9.13		.....		.....	
Evening	12.50		9.04		14.50		16.05		15.13		8.13		16.00		17.00	
		43.50		31.07		48.25		30.11		32.07		30.15		32.08		36.08
6th day, Morning	17.00		13.10		16.50		13.15½		15.10		13.05		17.08		19.00	
Noon	12.00		11.02		15.50		.....		.....		9.05		.....		.....	
Evening	11.50		9.14		13.50		15.11		15.06		8.05		14.12		18.00	
		40.50		34.10		45.50		29.10½		31.40		30.15		32.04		37.00
7th day, Morning	15.50		12.15		16.00		14.08		15.00		11.13		18.00		19.08	
Noon	12.50		10.11		19.00		.....		.....		9 13		.....		.....	
Evening	11.50		9.01		5.00		14.01		16.00		11.13		17.00		16.08	
		39.50		32.11		40.00		28.09		31.00		33.07		35.00		36.00
Total of trial. Lbs...	.....	292.50	.....	235.10	.....	316-87-5	.....	210.02½	.....	227.10	.....	226.00	.....	234.00	.....	250.04

b. Quantity of lbs. of cream at each churning, shewing from how many milkings the cream of each churning comes.

Milkings.	Pounds of cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.

7th day, { Noon	12.00		10.11		19.00		.....		.....		9 13		.....		.....			
{ Evening	11.50	39.50	9.01	32.11	5.00	40.00	14.01	28.09	16.00	31.00	11.13	33.07	17.00	35.00	16.08	36.00		
Total of trial. Lbs...	.....	292.50	.....	235.10	.....	316-87-5	.....	210.02½	.....	227.10	.....	226.00	.....	234.00	.....	250.04		

b. Quantity of lbs. of cream at each churning, shewing from how many milkings the cream of each churning comes.	Milkings.	Pounds of cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.	Milkings.	Cream.
1st churning	11	17	5	6.00	10	16	7	8.12½	5	8.08	21	18	7	10.12	7	10.04
2nd do	10	17½	4	6.14	11	17	7	10.12	5	8.08	.....	.....	7	10.00	7	10.04
3rd do	.....	.....	6	7.11	.....	.....	.....	.....	4	6.07	.....	.....	.....	.....	.....	.....
4th do	.....	.....	6	9.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	21	34½	21	29.14	21	33	14	19.08½	14	23.07	21	18	14	20.12	14	20.08

c. Quantity of butter obtained at each churning, weighed when it is fully completed; the quantity of salt used not to exceed 1 oz. for each lb. of butter; and shewing the quantity of salt.	Salt. oz.	Butter. lbs.	Salt. oz.	Butter lbs.	Salt. oz.	Butter. lbs.	Salt. oz.	Butter. lbs.	Salt. oz.	Butter. lbs.	Salt. oz.	Butter. lbs.	Salt. oz.	Butter. lbs.	Salt. oz.	Butter. lbs.
1st churning	7.05	7.00½	2.05	2.10½	5.25	5.4	5.50	5.12½	3.5	3.13	9.5	10.00½	.....	5.07½	4.5	4.07½
2nd do	6.75	6.09½	2.75	2.13½	6.00⅛	6.2	6 weak	5.08½	3.5	3.11	.....	.....	.....	4.00	4.5	4.09
3rd do	.....	.....	2.05	3.02¾	.....	.....	.....	.....	2.5	2.14	.....	.....	.....	.....	.....	.....
4th do	.....	.....	.....	3.05	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals.....	.....	13.10	.....	11.15¾	.....	11.6	.....	11.04½	.....	10.06	.....	10.00½	.....	9.07½	.....	9.00½

RESULT OF THE COMPETITION OF CANADIAN MILCH COWS, 1886.—(*Continued.*)

—	Mederic Lebeau, Charlemagne, L'Assomption.	Ign. Plamondon, St. Raymond, Portneuf.	Calixte Therien, Laurentides, L'Assomption.	Phileas Jerome, Ste. Therese de Blainville.	Louis Boutin, St. Sebastien, Aylmer, Beauce.	Damase Paradis, St. Sebastien, Aylmer, Beauce.	1st Trial. Geo. Carrier, St. Vital de Lambton, Beauce	2nd Trial. Do.
DATE OF TRIAL COMMENCING ON THE	27th June.	1st July.	30th July.	5th July.	30th July.	30th July.	19th August.	12th Sept'ber.
d. Quality, kind, and quantity of food given to the animal, apart from pasturage.	A mixture of bran and about 7½ every day.	1st day, 5 lbs. 2nd " 5 " 3rd " 7 " 4th " 3½ " 5th " 7 " 6th " 7 " 7th " ..	Indian corn and 15 lbs. of oat-bran alone.	About two bucketsful of mash per day, ⅔ bran, ⅓ pasturage, along the road.	2 mashes per day, only one on the last day.	6 lbs. of masiln per day.	8 lbs. of oat-bran per day.	10 lbs. of oat-bran per day.
e. Description of the place where the milk was put to cream, and of the vessels used; the place to be under lock and key; if the milk is put into a well, the vessel holding it to be locked up, and in both cases the key to be given to witnesses.	Ordinary dairy. Delf bowls, put in cold water, in tin pans.	Delf bowl, in an ordinary dairy. Fifth day; one milking in a tin creamer, in cold water, in the same dairy.	Cellar. Milk put in 1-gallon vessels, placed in a pan containing water and ice.	Ordinary cellar. Tin pans in a cupboard key given to witnesses.	In the cellar, in delf bowls, under lock and key.	Ordinary dairy, delf bowls.	Ordinary cellar and utensils.	Ordinary cellar and utensils.
Name of the cow.....	"La Jaune"	"Canadienne"	"Rougette"	"La Barrée"	"Barrette"	"Rougette"	"Fuyarde"	do
Age.....	8 years	7 years	6 years	8 years	10 years	9 years	8 years	do
Color	Yellow	Black	Red	Brindled	Brindled	Light red	Red	do
Weight.....	725 lbs.	700 lbs.	715 lbs.	650 to 700 lbs.	700 lbs.	700 lbs.	700 lbs.	do
Date of last calving.....	5th April, 1886	13th Ap'l, 1886	30th May, 1886	15th Ap'l, 1886	.....	28th Ap'l, 1886	1st Trial	2nd Trial

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Color	Yellow	Black	Red	Brindled	Brindled	Brindled	Light red	Red	do
Weight	725 lbs.	700 lbs.	715 lbs.	650 to 700 lbs.	700 lbs.		700 lbs.	700 lbs.	do
Date of last calving	5th April, 1886	13th Ap'l, 1886	30th May, 1886	15th Ap'l, 1886			28th Ap'l, 1886	1st Trial	2nd Trial

NOTE.

As at these competitions the Association was compelled to refuse prizes to cows entered in good faith as being of Canadian breed, but which certainly were not so, we add here, for information, notes taken from Dr. Couture's letters. They will serve the purpose of guiding the public in determining the exact origin of cows supposed to be of pure Canadian breed. See also the articles and letters written on the same subject in the *Journal d'Agriculture* in 1885 and 1886.

These notes not only shew the *characteristics* of the breed, but also give the signs of good milch cows, and make the animal quite a subject of interest.

1st. Short HEAD, broad forehead, short horns turned inwards, or long and tapering, turned forwards and slightly to the rear. Muzzle surrounded by a greyish or yellowish ring. Ears neither too short, nor too long, yellow on the inside, with fine hairs and as few as possible of these.

2nd. NECK slender, but proportioned to the size of the head and chest, clean and free from adipose issue (layers of fat).

3rd. BACK as straight as possible from the withers to the stump of the tail.

4th. CHEST deep, sides well rounded off. Absence of any depression of the thorax behind the shoulders.

5th. BELLY not too bulky, and forming a continuous line with the haunches and ribs.

6th. The LOINS and croup as broad as possible. The dimensions of these parts are taken by drawing a line between the point of the haunch on one side to the point of the haunch on the other side, and another line from the middle of the croup to the root of the tail, and a third between the chines (points of the rump).

7th. TAIL fine and forming at its root an uninterrupted line with the hind quarters. It should descend as low as possible.

8th. LEGS short, slender and wiry.

9th. MILK VEINS and teats as well developed as possible.

10th. UDDER wide, very soft when empty, clean, covered with very fine skin and free from large hairs. It should extend as much as possible in rear, between the legs, and in front towards the abdomen.

11th. ESCUTCHEON of the first order, no matter what the class may be.

12th. Color of the hair—black, black and red, (brindled) yellow; other colors may be allowed, as grey, yellow and white, roan, provided the characteristics are perfectly distinct, clear and beyond question

13th. PHYSIOGNOMY. Cannot be described.

GENERAL DISTINCTIVE MARKS OF GOOD MILCH COWS OF ANY BREED.

1st. Delicate shape, limbs and tail.
2nd. Slender neck.
3rd. Ribs well rounded, and chest very deep.
4th. Loins wide, withers wide and thighs long.
5th. Udder bulky, teats rather large and diverging.
6th. Mammary veins as fully developed as possible.
7th. Udder clean and covered with very fine skin.
8th. Short legs and large body.

All fine cows and good milch cows, should have these exterior qualities. The following may be selected as types, those which

1st. Have the hind quarters largest and deepest; 2nd. Which have the most effeminate appearance; 3rd. Whose udders are the most bulky, without being fleshy.

INSPECTORS' REPORTS.

To the Honorable Commissioner of Agriculture and Public Works, Quebec.

SIR,—

I have the honor to submit a report of my inspections of cheese and butter factories for the season just ended.

I visited 61 factories between the 28th of May and the 8th of September: 33 cheese factories and 25 butter factories, and 3 butter and cheese factories combined. Several of these I visited twice.

I notice with pleasure a very marked improvement over last year in the greater part of these establishments. The fabrication is more carefully done, and the old systems are set aside to adopt later improvements and the best methods. However, in spite of the progress made, there still remains a great deal to be done, before the majority of our factories can rank as first class.

According to the notes I have taken, in each factory, of the quality of the produce, the fabrication, the building and installation, in fact, all that concerns the business, I am in a position to classify them according to their merit and give their number.

First of all, I take the cheese factories, commencing with the construction from a general point of view. Out of 36 factories, scarcely 7 are first class, 13 are second, and 15 third. The comparison is not very satisfactory, but we must allow time for things to be done. They are not all ready, nor have they the means to make the desired improvements at once. As soon as the encouragement of these factories is resumed generally, as there is now every reason to hope it will be, a marked change will certainly take place. People are now beginning to know and to understand that in building, as in everything else, all must be first class to ensure success.

The cheese room, although comprised in the building, still requires special consideration ; 8 are first class, 13 second and 15 third. There is much room for improvement here, but the first step in that direction has been made. People are now pretty generally aware of the bad effects caused to the cheese by an ill-suited room, that is by one which is not protected from changes of temperature, and, above all, from the intense summer heat.

The whey vats are far from being what they should be. Out of 36, I found only 3 first class ; the remainder were all third class. By first class I mean metal vats, tin or galvanized iron, which can be cleaned every day, and in which the whey keeps good. In wooden ones the whey is spoiled in a short time. These vats, coated inside with a heap of rottenness made up of grease and decomposed whey, make it lose much of its value in a short time, and sometimes it becomes even injurious to the cattle. Every one knows what happens with wooden buckets for milk, in spite of the utmost care about cleaning them. So that these wooden vats, as reservoirs for the whey, which are the terror of the whole neighborhood of the factory, on account of the bad odor they give out, are not what is required for keeping whey good.

INSTALLATION.

The steam boilers are generally good, but many of them are in bad order for want of repairs. The quality of a boiler is a matter of no great consequence as far as concerns the fabrication, properly so called, but it is so on the score of duration and security. A boiler kept in bad order, which is seldom or never cleaned, rapidly becomes injured and may cause serious accidents.

The great majority of the vats are good, and they are all suitable for making first class cheese. The arrangement of the pipes for distributing heat with a certain uniformity of manner, is not always good. The cooking of the curd in this case requires to be done with a great deal more care to be uniform throughout the whole mass and to prevent accidents, by burning some parts, which can easily be avoided by stirring the curd constantly with a rake, especially with McPherson's, which is far preferable to any other.

The presses are generally good; I found a few of them somewhat defective, but it was owing, in most cases, rather to want of care than to any defect in their construction. Half of the factories are now provided with small presses to utilize what remains of the curd, so that the larger cheeses may be always of uniform size, and not spoiled by these leavings. These small presses cost but a trifle, and are very valuable in a factory. The good habit of keeping the cheese two days under the press is becoming pretty general, and its good effects are also felt.

As to the moulds and their accessories, I find only four in which they are defective; they are either too old or made of metal which is not strong

enough. The best are made at Belleville, Ontario. Several parties in our Province have tried to make them, but I know of none who have succeeded, the sheet iron plate used is always too weak.

A great many of the sinks are defective, but the new system of fabrication, in which all the work is done in the vat, does away with them. So that, whether good or bad, they must gradually disappear as the curd mills are adopted. It is certain that not a single factory will be established in future, without adopting the new system.

Curd mills are being rapidly introduced in factories. This is very important, for they remedy all defects. The system of fabrication which it introduces, and the services it renders, gives the manufacturer complete control of the curd ; while, under the old system, the contrary was the case. It is true that it has been greatly improved by imitating the new one, but it will never be equal to it. McPherson's curd mill is the one that I can recommend in preference to any other. It is a little more costly than the others, but it comes cheaper in the end, owing to the perfection of its work, compared to that of the others which certainly cause loss in the yield.

With one exception, I found the scales good everywhere. But several of them, without being untrue, are in bad order forwant of care or cleanliness. The necessity of keeping scales in good order is easily understood. Scales in bad order become deranged, and the manufacturer is responsible for any mistakes resulting from it. Before commencing to weigh his milk, the dairyman should, every morning, satisfy himself that his scales are in proper order; this is the way to be right.

As to utensils, by which I mean all the secondary articles used in the operation, which I might call the cooking utensils, one half of the manufacturers have them is more or less bad order, and a great many of them have not what they require. Negligence on this score is bad economy. However, every one knows that it is only with good tools that good work is done. I have noticed a loss in the quality of the product, owing to the use of a syphon in bad order or bad curd knives. I found in 6 establishments knives utterly unfit for cutting curd ; some had the blades too far apart, and their edges, full of notches, rather tore the curd than cut it. I have also very often seen knives, the blades of which were loosened, and which had the defect of cutting the curd very unevenly. The cutting of the curd is most important, and to be well done, the knives must have their blades regular and sufficiently sharp.

On verifying the thermometers in every factory, I found six of them which should be put aside, and four which were not exact, but which might be used on allowing for the difference. It is useless to say that a thermometer which is not exact, varying several degrees too high or too low, may cause a serious alteration in the fabrication. If, for instance, when the curd is considered to be well enough cooked at a temperature of 98°, it is at 102° or 94°, the desired result will not be obtained, and the cheese will suffer from it. Upon purchasing a thermometer, it should always be verified by one known to be correct.

Lactometers and cremometers.—17 out of 36 establishments have not these instruments, which are used to test the milk so as to discover the frauds perpetrated by the patrons. Among those who have them, the greater part do not use them, or do not know how to do so. So that it is not surprising that out of 36 factorymen 24 know nothing at all about testing the milk, and of the others only two know it thoroughly. From this it can readily be understood that dishonest patrons have the game all to themselves, so that fraud is much more general than one would suppose.

Knowledge of the milk.—This is the most important point in the whole business, and yet I have ascertained that 14 dairymen know scarcely anything about it, 16 do not know enough of it, and only 6 are thoroughly acquainted with it. The first mistake is, that on receiving the milk, it is taken without any attention being paid to it. No account is taken of the quality of each, or, if some defect is observed, the patron is not made aware of it or the milk sent back, if necessary, through fear of giving offence. Then the milk is made into cheese upon the old plan, without knowing what the result will be. The utmost care should be taken on receiving the milk, to see that the patrons always clean their cans well, and keep their milk in good condition. Any milk likely to injure the quality of the cheese should be sent back invariably. It is a conscientious duty.

Coloring.—Out of 33 who use it, 27 had it of good quality, the others had it of inferior quality ; the latter had prepared it themselves. One should never make his own coloring. It cannot be made of as good quality as the extract which can be purchased and which does not cost much dearer and is vastly more valuable.

Good rennet is now to be found almost everywhere. I noticed only 7 establishments where it was of inferior quality, and, as in the case of the coloring, it was nearly all prepared by the makers themselves. For it, as for the coloring, only the extract should be used.

Cotton.—A great many people now employ seamless cotton as bandage cheese. It is the best and most convenient, requiring only to be cut on the length, before using, and it does not come dearer than the ordinary one.

Salt.—This I found good everywhere, except in the case of a few who use coarse kitchen salt. This is not suitable for cheese, it is too large to melt easily, and another drawback is that it is never very clean.

Fabrication.—By this I mean all the operations, commencing with the warming of the milk to put the rennet in it, until the curd is under the press. From my notes I find that 6 do this work badly, 17 do it indifferently, and 13 do it well. In most cases it is from want of knowledge, in the others, negligence. It is not enough to have good milk, good rennet etc., etc., to make good cheese, but each operation must be done in time and scientifically and intelligently, to obtain satisfactory results.

Cleanliness.—There is much to be desired on this score. Of thirty-six factories, only fifteen are kept cleanly, eleven somewhat passably, and the remaining ten very dirty. However, notwithstanding the present state of things, there is a marked improvement upon some years ago. People are now coming to discover that cleanliness is indispensible to success.

Quality of the Cheese.—I found first quality cheese in eight factories, second in twenty-one, and third in seven. I call first quality any cheese having a fine external appearance, firm, with a good aroma, a fine paste, good color and solid consistency. Second quality I call any cheese, which, while being saleable, has some defect, either of color, pressing, bad cooking, too soft, rather suited to the local market than for exportation, which tastes a little sour, or is not firm ; in a word any cheese which has somes light defect in its preparation. Third class cheese is that unsaleable cheese which, seen on the cheese tables, presents a disgusting appearance, It generally has several defects, but the principal ones are the use of bad milk and of spoiled rennet. Where the cheese is first class, it is generally made according to the new style. In many second class factories, nearly one-half of the cheese is of good quality, but in those of the third class none is good. I have frequently met dairymen who did not know the cheese they make. They are liable to be cheated in their sales, by certain buyers who take advantage of their ignorance. Those who have never had occasion to see good cheese, should visit a good factory in their own neighborhood, or where it can be seen. There are good cheese factories in nearly every county ; so that it is easy for a dairy man, who will take the trouble, to go there for information.

Several cheese factories have been replaced this year by butter factories, especially in the eastern part, below Quebec, and appearances shew that they will finish by making only butter there, for in almost every place where cheese is now made, they talk of making butter. They are probably right in this, for every thing is suited to this kind of manufacture : climate, locality and the richness of the milk. The milk down there is certainly from 6 to 8 per cent. richer than in the neighborhood of Montreal. The further down one goes the richer the milk is. Thus the milk of the county of Kamouraska is richer than that of the counties of Montmagny and Bellechasse, and that of Rimouski is richer than at Kamouraska. This is probably owing to the breed of cows being more Canadian there than elsewhere, and perhaps, also, it is due to the climate and the pasturage.

These people are right, I believe, in preferring making butter to making cheese. If they make the butter good they will probably derive more profit. But, for the other parts of the Province, especially the South, I think they would do wrong to give up cheese-making for butter. As a general rule, cheese ought to pay better than butter, if they make it well. One reason which has caused several cheese factories to be changed for butter factories is the question of whey. In the butter factories the whey is returned to the patrons sweet, as a general rule, while, in the butter factories, it is generally returned when it is spoiled and scarcely good for anything. If it was kept in metal vats, as it could and should be, the patrons would be satisfied.

BUTTER.

In point of construction and equipment, the butter factories are generallly better than the cheese factories. There are some model establishments. As to the building, two are model, ten first-class, ten second-class, and three are third class. The new ones are generally well built and well equipped, and the centrifugal separator is everywhere in use.

The butter rooms are not always as they should be. Where the building is good, this room is generally so ; and where it is defective, the same may generally be said of this room. However, even in badly built factories, as well as in the good, it should be easy to keep a corner in the factory, so arranged and built as to keep the butter in good condition. This apartment should be cool, and can be prepared without costing too much. The immediate neighborhood of an ice-house is well suited to a butter room.

The ice-houses are good enough, as a general rule, thirteen are first-class thirteen second-class, and one third-class. Several have the defect of being too small, in consequence of which they are deprived of ice during the summer, and the fabrication suffers sometimes severely in consequence. There is no question of economy about this. What is necessary must be provided amply, otherwise there is danger of loss in the quality of the butter.

The steam motors in use are nearly all good. I found only four of them which were somewhat defective. It need not be stated that the horse motors used in some old establishments are inferior to steam.

The cream vats are, in thirteen first-class, and twelve second-class. I call those first-class in which the whole of the cream is well mixed up together, and in which it can easily be cooled by ice or cold water. I call those second class which are filled with water, and in which the cream is put to cool in cans. These latter cost more than the other, consume more ice, give more work, and are liable to produce a cream of unequal quality. I have often noticed in this system of cans, that in some the milk was sweet, and in others sour. This is owing to the fact that the milk comes to the factory in different conditions. The best vat for cream is the one made on the Marquis system, where the cooling can be done by the sides, below, or even inside, and where cold water can be circulated and piled ice be put in the troughs. In these vats the cooling is very rapid.

The wooden whey vats are found only in old establishments. The new ones are all provided with metal ones, which are generally well enough kept.

As to utensils, I find only six establishments where they are somewhat defective.

I found good scales everywhere. Some have no small scales for weighing salt or other light articles; the large scales used for weighing the milk do not suit this purpose. Scales are needed which can weigh ounces.

For churns, I have three classes. In the first I put the square churns, which number nineteen, in the second the barrel, of which there are eight, and in the third one the Blanchard. The square churn is the best unquestionably. It is more easily kept in good order, more easily washed, makes the best butter and is one of the least costly. The barrel churn is an excellent churn and makes butter on the same principle as the square one. But it is not so easily cleaned, and is perhaps somewhat more costly.

I say nothing of the Blanchard; it is used in only one establishment, and is to be replaced by a square one. In my opinion this churn is very much inferior to the others.

The kinds of wood which are the most suitable for churns are, I believe, white pine and red oak, but pine is preferable, especially for a square churn. The oak does only for the barrel churn. I have often seen square churns made of maple, but this is the worst wood that can be used; it warps very much, and is hard to clean. Before using a churn when it is quite new, it should be scoured with strong boiling brine, in the same way as a butter tub. Then before putting the cream into it, it should be carefully rinsed out with cold or warm water, according to the season, for the double purpose of warming or cooling it, and filling up the pores of the wood, so that the cream may not penetrate them, which it is important to prevent.

As soon as the butter is taken from the churn, the latter must be cleaned with cold water to remove all the small particles of butter which sometimes remain in it, and then scoured with boiling water while turning the churn around a few times; then washed again with cold water. From time to time washing soda may be used, to dissolve any greasy matter that may remain in it. The outside should be cleaned as carefully as the inside. If attended to in this way, it will keep clean for a long time. I have seen some very filthy, and they could never be cleaned, as the pores of the wood were filled with caseine or butter. No washing can take these out. This was caused by putting the cream into the churn before rinsing it, and by washing it with boiling water after removing the butter, without previously washing it with cold water.

Seventeen of the establishments I visited are centrifugal creameries, four cream by means of the Danish machine, and the others by the Laval.

I found bad thermometers in four establishments. A good thermometer is of even more importance in a butter factory than in a cheese factory.

So far as knowledge of milk is concerned I found a greater proportion of butter makers than of cheese makers acquainted with it; eight knew it well enough, 6 very little, and the remainder not at all.

The same applies to the testing of the milk; nine know it, one knows it insufficiently, the others knew nothing about it.

The operation of skimming is generally well enough done in the centrifugal establishments, while the contrary is the case in the others. In these

old establishments the bad habit of letting the milk thicken before skimming it, exists almost everywhere. So long as the price of butter does not depend on its quality, this great defect will continue to exist.

The cream is not always treated properly from the time it is removed until it is churned, which is called the ripening of the cream. I found only one half of the establishments, where this operation was performed well enough. Yet it is one of the most important points in its preparation.

From the moment that the milk is creamed, the cream undergoes a constant change, and solid foreign substances, apart from the butter which it contains, decompose rapidly. The butter always contains a certain proportion of solids, other than the fatty matter, and the less the decomposition of this matter in the cream is advanced, the better will the butter keep. Once the butter is made, owing to the small quantity of this foreign substance it contains, and owing to its dryness and solidity, decomposition is comparatively slow. From this it may be inferred that the fresher the cream is, so much the longer will the butter be fit to keep a long time.

But, on the other hand, in the ripening of the cream, two points are to be obtained. First of all, it is well known that acidulated or ripened cream churns more quickly than sweet and fresh cream; and it also gives more butter. Fresh cream and sour cream therefore produce contrary effects, the first quality, and the second quantity. But it is well to observe, that the excess of butter obtained from sour cream is not due entirely to the fact of this cream churning more easily. But it is partly owing to the fact that a greater quantity of foreign substances enter into this butter. During the chemical change in the cream, there takes place at the same time a development of aroma in the fatty matter. This development, the authorities tell us, is due to a certain chemical change, such as the decomposition of the caseine, the formation of lactic acid, the oxidation of fatty matter.

However, there is a difference of opinion as to the keeping qualities of the butter made from sweet cream and of that made from sour cream. But it is beyond doubt that the keeping and other qualities are partly lost when the cream is too old.

The cream should ripen uniformly, and we should keep within limits, not go beyond the first degree of acidity, and the results will always be satisfactory.

Churning.—This is the most important operation of all, but it is not the best performed. I notice that only 10 dairymen do it well enough, 16

more or less badly, and two very badly. The first thing to attend to is the temperature of the cream. Cream is very often churned at a bad temperature, too high for the most part. The higher the temperature is the more quickly the churning is done, but what is gained in time is lost in the quality of the product. On the other hand, the lower the temperature while churning, the larger will the churning last but the better will be the quality of the product. As a rule, churning should be done at the lowest possible temperature, so long as the churning is done in a reasonable time. The lowest average temperature in Summer is from 55 to 58, and in the Fall from 58 to 60.

Filling the churns.—A churn filled about two fifths or one third is in the best condition for working well. At the very utmost it should not exceed the half. It is better to make two churnings with proper preparation than only one without.

Speed to be given to the churn.—To each kind of churn a certain speed is applicable. Each maker is the best judge as to what speed is best suited to the churn he uses. But as a general rule, for ordinary square churns, a speed of form forty to forty-five revolutions a minute is about right, and for the round churn about one third less in speed. The length of time required for churning depends on the age of the cream, its temperature, how the churn is filled, and the speed given to it.

The end of the churning is the most important time of the whole operation, because it is important to stop the churn in time so that the butter may be in the condition required for the grains.

At the commencement of the churning the liquid (cream) has a dull sound, and at the end, when the separation is made, the sound becomes clear like the splash of water. The change is quite marked, and in practice is easily detected. When the churn has a glass, it is a safe guide, for when the butter is made it becomes clear, and the grains of butter can be noticed increasing gradually. Another sign is to pour from the tap a little milk through a strainer. If the liquid is still thick and contains small grains of butter, the churning is not advanced far enough. But if, on the contrary, it is clear and watery, has no small grains of butter and runs easily, the churning must be stopped. It should then be of grains not larger, at the most, than a grain of wheat, which size should not be exceeded, because, the larger the grain the more milk the butter contains.

The speed of the churn should be considerably lessened from the moment the butter commences to form, so that the operation may finish slowly and be

under ready control. If, at this moment, the temperature of the cream were too high, which happens often enough, it would have to be lowered some degrees by means of ice water, otherwise it would not be easy to prevent the butter from gathering into a mass at once.

Washing the butter.—Scarcely one half of the factories do this operation well, and yet it is one of the most important. When the butter-milk has been taken away, care must be taken not to shake the churn, so as not to let the butter get into lumps, and the higher the temperature of the latter is, the more attention must be paid to it. The same precaution must be observed in pouring water into the churn. The first thing to do afterwards is to put in the churn a large quantity of pure cold water, and let it stand some minutes to allow the butter to cool down to the required degree. If the water is very cold, four to five minutes will suffice. It is important to prevent the butter from forming into a lump. To effect this, it must be cooled enough before churning the butter in the water. The more the temperature is lowered, the better it will be. From 55 to 58 is sufficient, but near 45 is still better. When the water is not very cold, it must be poured in abundance at each washing, for it is well to know that the tendency of the butter to get lumpy, depends as much upon the quantity of the liquid as upon the temperature. The washing is sufficient when the water comes out of the churn clear. The water used for washing must be carefully drained off ; the same for brine, when it is used. For the last washing strong pickle may be used, and the butter may be left to soak in it from ten to fifteen minutes, taking care to give an occasional turn to the churn. This washing is for the purpose of doing the salting as much as possible in a liquid form, which is a more uniform way of doing it than with dry salt, and the quantity of salt to be added to it afterwards need not be as great.

Salting.—By means of the mixer or press, the skilful dairyman can succeed in doing the operation of salting and pressing in such a way as to produce first quality butter. But there is another and much easier way which is far preferable to this. It is taken from a work by Mr. Lynch, which has just made its appearance. It is as follows :

After washing, as soon as the butter is drained, rub over the whole surface equally with about $\frac{1}{8}$ of the quantity of salt required to salt that churning well. When this is done, lean the churn gently towards you, taking care not to disturb the butter ; then give a sharp turn down so as to let the butter fall on the side of the churn. The surface which is salted is now downwards, and the butter presents a new surface. Salt this in

the same way as the other with the half you have of the salt left, and, by a similar movement to the first, let the butter fall on the other side of the churn. This will give you another surface which may receive the remainder of the salt you have. Then shake the churn gently one way and another so as to mix the salt well. The dairyman will watch the operation attentively and shake the churn so as to make the salting as thoroughly as possible. Do not be in a hurry. Take time to mix the salt well and let it dissolve. The colder the butter is, the better the whole operation will be done. If it is rather soft, with a tendency to gather in lumps, more time and more care must be given to it. Once the salt is well mixed, let it dissolve for nearly half an hour. After this, put the cover on the churn, and turn it slowly for a couple of minutes ; the butter will form into lumps and the excess of the brine will escape. Let the butter stand this way a while longer, from 40 minutes to an hour, and it will then be ready to put into the tub. If it has too much brine, it must be pressed a little. This system is easy and more simple than the old one. Nobody who is once accustomed to it will give it up for the old system, and its superiority over the other for preserving the grain of the butter is easily seen.

In the ordinary system quite a number of manufacturers do this work badly, the butter being worked uselessly or unequally. It is not good to dry the butter before mixing the salt with it, as several do. It is a useless and injurious work. It is better to do the working for the double purpose of mixing the salt with it, and excluding the water contained in the butter. More salt will be needed, to make up for what is lost and dissolved by the water. By drying the butter before salting it, the salt can only serve to break the grain of the butter. Always use the best salt, and crush the lumps in it before doing so, and always use a sprinkler to spread it over the butter. Put what salt is required so that the butter may retain about $\frac{3}{8}$ to $\frac{3}{4}$ of an ounce for each pound. Sometimes as much as 50 per cent. is lost during the salting. This depends on the quantity of water the butter holds. The manufacturer should always be able to judge by the moisture of the butter to be salted, how much salt it will require. In this, as elsewhere, experience is worth more than all the rules that can be laid down. Submit your butter to the most direct pressure, avoid all friction and all crushing or sliding pressure. Let each pressing of the lever or roller be done in such a way as to squeeze out the water, incorporate the salt and protect the grain of the butter as much as possible. When the water has been squeezed out, when the butter is firm, and the salt appears sufficiently mixed through it, the working should be stopped. Then put the butter in a cool place and

after three or four hours, work it again to exclude the excess of the brine it contains, after which it may be put into the tubs. Do not take out too much brine in the last working. The butter must not be too dry or too moist. Always keep a fair medium. Care must be taken to work the butter at a suitable temperature. If this is too high, the butter becomes soft and greasy, and if it is too low, the butter does not work well and the grain of the butter is injured.

Preparing the tubs and packing.—The tubs used in our establishments are generally good, with few exceptions. Only those which are well made, well turned inside, well staunched and pickled should be used.

The way to prepare a tub is as follows: Take a quantity of salt, enough to make a strong brine, put it into the tub, fill it with boiling water, and let it soak a couple of days. Before putting the butter in, rinse this tub in pure cold water, rub it over on the inside with salt, and it will be ready to receive the butter. Put the butter in by small quantities by means of a pestle, so as to leave no empty space. Do not strike on the butter with the pestle. Do not overfill the tub. Leave about half an inch space on the edge, in the middle as well as near the edge. I have very frequently seen tubs so full in the middle that the cover touched the butter continually. In this way, the butter has no protection, which it indispensably requires. Always put a white cloth over the butter, taking care to pass it through hot water, so as to take away the starch it contains, and afterwards to dip it into cold pickle. Cut it about half an inch larger than the tub, and cover the butter well with it. It is well to let a small end of this cloth hang out, so that it may rest on the edge of the tub, and if any one wishes to look at the butter the cover can be taken off easily. Then put over it a layer of wet salt, so as to fill up the tub to the top and cover it. After two or three days, open it and you will see that the salt in drying has left the sides. Press the salt around it again so as to fill up all the space around, and the butter will then be well protected. Be sure that the butter always has a good appearance on the outside from the cleanness of the tinnet. Appearances count for something in sales.

Salt.—The salt used in our butter factories is, I believe, of good quality. Higgin's Eureka salt is used everywhere; it is considered to be one of the best for butter. A simple way to test the purity of salt is to expose some of it in a damp atmosphere as, for instance, during the night. If the salt is impure, it will become moist. If it remains dry, it may be considered pure.

Water.—It is of the utmost importance that the water which comes in contact with the butter be pure. That which is used in our butter, spring water, water works water and river water, is looked upon as pure. There is also well water, but this is often the most liable to be impure, either by its nature or by the impurities of the neighborhood to which the well may serve as a drain. A well serves as a drain for the surface of the soil to a greater distance than would be believed. It is claimed that one foot in depth drains four feet of surface. With this in view, wells must be sunk far enough from whatever might affect the water, as closets, the refuse of the stables, as also those of the factory. When there is reason to fear that the water used contain some impurities, the most practical remedy to apply is to have it boiled before using it.

General cleanliness.—Eighteen factories are cleanly kept, seven are more or less dirty, and three are dirty. The vessels and utensils should be washed every day immediately after they are done with. For the first washing, do not use the water too hot, and be careful to remove all the greasy matter contained in the vessels. Then rinse with very hot water. When anything has soured in the vessels, more care should be taken to clean them. It is well, from time to time, to use soda in washing vessels. But when this is done, they must be washed more carefully. The washing of the floors must not be neglected, and should be done every day. In a word, the most scrupulous cleanliness must be generally observed.

Trade mark.—There are as yet very few establishments which have a trade mark for their produce. This, however, is more important than one would believe. We are all interested in making our butter and our cheese known abroad. If we wish to arrive at this result, we must have a trade mark to make our produce known as Lower Canadian, and not, as in the past, under strange and unfavorable names. And for cheese, if the mark is not sufficient in case of fraud, I do not see why it should not be stamped on the side of the cheese itself. This could be done, I believe, by means of some harmless paint, which could be diluted by water or other composition.

Allow me, in conclusion, to make one remark. We have at St. Hyacinthe a model factory where a great many dairymen go for practical instruction in making cheese. The good which this school does is immense and beyond question. I do not see why at this same school the manufacture of butter could not be taught. Butter makers as well as cheese makers would have the advantage of going there to receive their practical instruction. St. Hyacinthe would, I think, suit this purpose as well as any other locality.

The thing can be done on a very small scale ; a capital of $150.00 would be sufficient. For instance, one of those machines for creaming milk, and turned by hand, could be obtained, which will be on the market soon, and which can, it seems, cream 250 lbs. of milk in an hour. This would do for instruction every day. This machine, which would cost about $125.00, with $25.00 for the remainder of what would be required, would make $150.00 which would be quite sufficient. In this way the same assistance could be given to the manufacturing of butter as to the preparation of cheese.

The last season certainly gives us better promise for the future. Our cheese and our butter were sold easily and at high prices, especially cheese. What should be more encouraging still and make us prouder, is that our produce was exhibited at London. Our cheese at least was highly appreciated. Many of the English newspapers gave it great praise, and some of them even declared it superior to the English cheese. From this the future appears quite hopeful. But we have work to do, to continue making our products advantageously known and to secure markets for them. We must, as a matter of necessity, work more than ever, and with energy, to improve our fabrication everywhere. The immense progress made within the last three years is due solely to our Dairy Association. The proof of this is evident. But it is to be regretted that a great many dairymen cannot profit by the advantages it offers them by becoming members of it. Those who belong to it are almost the only ones who make any progress. The others, who are still numerous, remain behind and injure our market. If there were means to instruct them and shew them what our Dairy Association is, an immense amount of good would be done to our Dairy business, and especially to the farming class.

Respectfully submitted,

J. L. PAINCHAUD.

J. M. ARCHAMBAULT'S REPORT.

HONORABLE MR. DE LABRUERE, PRESIDENT, ST. HYACINTHE.

Sir,

I have the honor to inform you that as Inspector for this Association, I have visited 112 establishments during the season of 1886. This number represents 104 factories, and eight visits were repeated. It covers 96 cheese factories and 8 butter factories. I gave 17 days teaching as paid professor, in 3 cheese factories, where I passed two days in each, and in 11 others, where I spent one day each.

Referring to the classification made in my report last year, I class these factories as follows:

1st Class.....	65
2nd "	29
3rd "	10
	104

The butter factories I visited appeared to me to be very well kept. In the general business of buttermaking, there is certainly an improvement upon last year. This, to my mind, proves the good done by our association. But not to leave on your mind too favorable an impression, which this classification might produce, I will take the liberty of adding that even in the first class establishments all are not equally good. On making a selection of our best, I find only 14 free from reproach, as regards the buildings and plant, and the work done. Moreover this classification is made upon the state in which I found these establishments when I visited them. I am well aware that if I could know the work done by all these dairymen during the whole year, many of the 65 would have to be taken from the first class and put in the second. Again, all those I visited are represented in the Association, and the worst managed do not, in general, belong to it. It can readily be understood that those who hold aloof from an association started in the common interests, must and do naturally remain behind the progress made by our dairymen.

I profit by the remark I have made already, to draw the attention of factory men to the difficulties which are met during a year's work, which difficulties are well known to them, but from which several of them find no means of escaping.

As a general remedy for all these difficulties, I agree with our traders in recommending the adoption of the Cheddar or McPherson process, as I have often called it from the name of the person who brought it into general use in the eastern part of Ontario, and from whom we have learned it.

Its principal features are: 1st. The removal of the butter-milk before it has undergone any notable change of condition; 2nd. The settling of the curd so that it may form into a mass; 3rd. Cutting the curd in a mill. With these three operations, we avoid the danger attending too long a stay of the curd in the whey, which is particularly liable to be damaged during the summer heat, when the milk is always advanced. The operation of draining off the curd is also rendered easier. This draining is done with difficulty in the

old process where the curd is kept in little pieces, forming a sort of bark through which the butter-milk passes with difficulty. In the new one, the cutting in block with a knife and a mill forms a new and fresh wound, so to speak, from which the butter-milk issues without any obstacle. Too sudden coolings are also avoided, and the action of the air benefits the freshly cut curd. This process makes the cheese close and silky to the touch, keeping well, even a hundred per cent. better, than by the old process. The cheese is not made open or with eyes. And the quality of the Cheddar process has its good effect, especially in Spring and Summer.

In Autumn or cool weather, this process allows the curd to keep at a warm temperature, as it is not removed from the vat except to put it in the mill and the vat is kept covered during nearly the whole of the process.

I will be able to give orally at the Three Rivers convention any information that may be required of me about this process.

Concerning butter making in autumn, I will take the liberty of repeating here some remarks made lately by Mr Robert MacAdam, a celebrated dairyman of the State of New York. He says that the defects of fall cheese are due to the following causes : 1st. Too much water, or, if you prefer it, too much butter milk, by not cooking it sufficiently, or, in other words, by not keeping it long enough at the temperature required for cooking (98°), so as to allow a certain acidity to develop itself. This makes the curd retain too much water, and produces a cold or inert and gummy cheese. 2nd. After the cutting in the mill it is taken to the sink, according to the case, where the curd is allowed to cool too much. 3rd. The cheese is pressed in too cold rooms. 4th. The pressing is not done evenly and gradually, and not even enough to remove the excess of cold, salty and sour butter-milk which is found in cheese not sufficiently pressed. 5th, The cheese rooms are not kept warm enough especially during the night. 6th. Sour butter-milk is used to turn the milk." And Mr. MacAdam adds that fall cheese is generally kept for the spring market, but if it is made in the conditions just mentioned, it is absolutely ruinous to purchase it.

The first defects pointed out by Mr. MacAdam may be avoided with a little care and attention. For the last, replace the use of butter-milk by the following method : Heat the milk to 90°, and keep it at that temperature for an hour or two, according to its condition, taking care to stir it up every two or three minutes, to prevent the cream from rising. Then put the rennet up to 80 or 90 and proceed on the usual plan, taking care to remove the

butter-milk only when the curd gives threads of one eight of an inch. The other defects pointed out must also be avoided.

I conclude my remarks about inspecting, with the following suggestion: Up to this date objections have been made to giving diplomas, and the reason was a good one, so as not to involve the Association in any responsibility. This deficiency might perhaps be remedied by allowing the inspector to give the person visited the observations and result of his visit. This would state nothing but what the inspector had seen, and would not imply any other recommendation. The visitor's certificate would refer to the following points: 1st. The building; 2nd. Plant; 3rd. Cheese making. A general note should be given on all these points, supplemented by additional remarks, when needed. As to the cheese, it would be necessary only to make its classification: so many cheese of first quality, so many second, &c., &c.

The certificate would be left with the person visited, and the stump would remain in the Inspector's hands. The directors, or rather the President of the Association, could take communication of them and acquaint himself in this way with the state of the business, and this, short of a mistake on the part of the Inspector, in such a way as not to incur any responsibility for the association, as the certificate would have reference only to what the Inspector had seen at the time of his visit.

St. Hyacinthe School-factory.—To replace me during my visits, I had, upon the recommendation of the Executive Committee, engaged Mr. John A. McDonald, an excellent cheesemaker, who was formerly employed by Mr. McPherson.

Mr. McDonald fulfilled his duties to my entire satisfaction, and, I believe, to the satisfaction of those who had occasion to visit him and take lessons at the model factory of Notre-Dame de St. Hyacinthe.

The pupils numbered 32, who passed in all 83 days at the model factory. I should rather say 32 manufacturers than 32 pupils, because they were all manufacturers of one year's standing and upwards.

The model factory was also visited by six manufacturers, who passed through it more rapidly.

Besides these, I have had two young employees, one of whom, an apprentice of one year, Mr Chabotte, passed a portion of the season teaching pupils and conducting a factory outside.

The encouragement we receive from the traders leads us to hope that the results of the labors of the Association, which are noticeable even now, will increase considerably.

Respectfully submitted,

J. M. ARCHAMBAULT.

Mr. Barnard: I rise, Mr. President and gentlemen, for the purpose of calling your attention to the loss of money in all the parishes where our association is not represented.

For one dollar the patrons in parishes where there is a butter or cheese factory may share in all the researches made by the association from year to year. You have just heard the inspectors of these establishments state that the great majority of those which have made progress are connected with our association; while those that are badly fitted out and badly managed have stood aloof from it. Let the manufacturers who choose to do so remain in their ignorance. That is their own business. But I invite the attention of the patrons, who are here so numerously represented.

Do you know how much is lost where the cheese is of common quality? I mean for the patrons; the cheese manufacturers do not lose much, the loss falls principally on the patrons. Now, gentlemen, the inspectors will tell you that the difference between the sale of common cheese and first class cheese is not less than twenty per cent. Count how much is produced in a year by a factory. You will find that the sales never amount to less than $3,000.00, and they sometimes reach $10,000.00. Take 20 per cent off $3,000.00, and you have a loss of $600.00 upon the patrons. On $10,000.00 they lose $2,000.00. Now, for a dollar a year and a little study, reading over our reports, these losses would be prevented. You see, then, how important it is, that all the parishes in which there is a butter or cheese factory, should be represented in our association.

I do not wish to enter just now, gentlemen, upon the merits of the several questions that have been raised by the gentlemen who have addressed you this morning. They are numerous and highly important. But I desire to call your attention to a mistake made, I have no doubt involuntarily, by one of them. You need not be told that the man who works is entitled to the reward of his work, and the very least recompense he can claim is, that the credit of it should not be given to any one else. Mr. Mc-

Pherson has just been credited, although it was evidently done without intention, for a work which justly belongs to another. During several years an American farmer studied carefully the fermentation of milk. He was a learned man who had been deemed competent to give a course of lectures on cheese making and the sciences relating to it, in the greatest university of the United States ; I mean Professor Arnold. For several years the Government sent me to Ontario, to study thoroughly the difficulties of the fabrication. During four years I heard Mr. McPherson and Mr. Arnold discuss together the fermentation of cheese, and I must tell you that the merit of the process called *chedarring*, by which an uniform cheese can be made the whole year round, belongs to Mr. Arnold. Mr. McPherson differed completely from Mr. Arnold's opinion on this point. This remark I make merely to give credit where credit is due. However I desire to do justice to Mr. McPherson as well. He belongs to the Province of Ontario, but is at the same time a cheese maker in the Province of Quebec. He has displayed a great deal of energy in the improvement of cheese, and is therefore deserving of great credit, and I do not wish to utter one word to disparage it.

Mr. J. C. Chapais : Mr. President, I wish to ask an explanation from the executive committee. Mr. Archambault mentions in his report that the association cannot give diplomas for proficiency in dairy work, on account of the responsibility it would incur. At the convention held in the month of April of last year at Quebec, I thought it my duty, owing to the interest I take in dairy industry generally, to propose that this association should open an entry book for butter and cheese makers, and give diplomas to those among them who would shew the most skill. I would like to know whether the executive committee has taken the proposal into consideration, and whether it has adopted any means to carry out the object in view.

Mr. Taché : Since that date there has been no meeting of the committee, except one held during the year at Montreal. I confess, in all sincerity, that I had somewhat forgotten Mr. Chapais' proposal.

Mr. Chapais : In that case, I draw the attention of the committee to the importance of that question, and I insist that it be taken into consideration. I believe that if the proposition was agreed to, it would be a powerful means to stimulate the zeal of butter and cheese makers, and that the cheese and dairy industry generally would be very much improved by it.

Mr. Taché: Several directors were opposed to the granting of diplomas just now and until such time as we could obtain absolutely reliable information, and which would not lead us astray about the merit of the manufacturers. It will be very dangerous and highly imprudent to grant diplomas, until this condition can be complied with. It is easy to understand that upon a simple visit only, it is a difficult thing for the inspectors to declare that such a dairyman is a first-class man. For instance, it very often happens that an inspector finds an establishment in perfect order at one visit, and in a very different state when he has called again. So that a certificate or diploma given to a dairyman of this kind, based upon what was seen at a first visit, would be altogether unjust, and would mislead those who might engage the dairyman upon the strength of this certificate. For some time after receiving lessons from a professor, the factoryman may make an excellent cheese, because the instructions given him by this professor are yet fresh in his mind. These lessons he may afterwards forget and become a bad cheese maker. Hence nothing but the guarantee of long practice could authorize either our professors or the association to confer diplomas; and we have no means at our disposal to satisfy ourselves of the fitness of a manufacturer in this way. The principle is admitted, that if we had the means to justify our diplomas, it would be an excellent thing. But because we have not these means at our disposal, we are afraid to give them. We have never mentioned in any of our reports that one dairyman surpassed another, because we did not wish to wound their feelings. I myself gave Mr. Archambault and Mr. Painchaud very severe instructions never to say in their visits that such a manufacturer was superior to such another. You are aware that competition is very keen between neighbors, and every precaution should be taken not to jeopardize certain interests which are very considerable. A single false step on our part might be enough to compromise the future of a manufacturer and the welfare of our association.

These are the reasons which kept us from putting in practice the principle laid down by Mr. Chapais, while we perfectly admit its justice.

Mr. Barnard: I believe that we all agree with Mr. Taché as to the absolute necessity of acting with the utmost prudence in the choice of the men whom the association might recommend as being perfectly qualified to make cheese or butter. I think we have done well to remain where we are just now, as we have not found the means to be perfectly sure of doing justice. On the other hand, if the association is to continue to prosper, the first thing we can ask it to do is to give us a recommendation for manufac-

turers. You come here every year. Strangers come to our meetings, and they seem so well satisfied with what they see that the most of them apply to belong to our association. They say to us : " We want a manufacturer, recommend us one." Yet we are unable to do so.

I would therefore suggest that the board of directors study the question, but with the understanding that the thing is to be put in practice only when we will be in a position to give diplomas to a certain number of dairymen about whose fitness there can be no doubt. I believe, if we consulted both of our inspectors, Mr. Archambault and Mr. Painchaud, and that we ask them their conscientious opinion they would soon give us the names of a certain number, whose ability would be beyond question. This would be a beginning.

We have opened a Golden Book—for Canadian cows. It seems to me that a Golden Book containing the names of deserving manufacturers and of model establishments, would be of far more value. Let us take all due precautions, but let us do it.

Mr. Chapais : I quite agree with the reasons given by Mr. Taché, the more so because all I wanted was merely that my proposal should be taken into consideration, so as to decide whether it was possible.

This proposition was agreed to.

Butter Making with Centrifugal Separators.

Mr. President and Gentlemen :

If I have accepted the honor done me by inviting me to give you a conference upon the manufacture of butter by means of centrifugal separators, it is because I am impelled by a sentiment which should animate every man who has at heart the success and the development of our splendid dairy industry. Every man who loves his country, who loves Agriculture and the farming class, should have no hesitation about giving any assistance in his power.

If by giving you this lecture I am able to render myself in any wise useful, to make a grain of wheat grow where the ground had been untilled, I will consider myself fully repaid for my efforts.

I have no intention to point out to you the importance or the utility of butter factories in the Province of Quebec; besides, it is an admitted fact that butter making holds one of the first places amongst our farming industries, and we should do all in our power to encourage and ensure its success.

I shall, therefore, be as brief as possible, and proceed to my subject at once.

The work resolves itself into two parts: the fabrication of butter with centrifugal separators in their several operations, followed by some remarks upon economy in the construction of butter factories and upon butter making. Advantages of centrifugal creamers over the old system.

RECEIVING THE MILK.

In a butter factory where there is only one separator, it is preferable and more economical to weigh each furnisher's milk in his own cans. Where there are two or three separators it is better to have a vat for weighing it, to which a tap is attached to allow the milk to fall into a receptacle which conducts it into the strainer put over the vat, placed to receive and keep it until it is creamed.

The vat should contain at the utmost one thousand pounds of milk. One of greater capacity is useless, as we weigh the milk as occasion requires.

The strainer should be of linen or cotton, in preference to those of network sieves or perforated tin.

HEATING THE MILK.

The heater used for heating the milk is of great importance in creaming, as it allows of heating only a small quantity at a time, a most important thing, especially in hot weather. To this heater a regulator is fitted. This is indispensable to prevent accidents, either spilling the milk on not having enough to feed the centrifugal, which is certain to happen unless a person is kept expressly to superintend the stop-cock. This allows the milk to run evenly into the vat, keeps the milk always at the same level in the little tank below the vat, and from there, without any superintendence, furnishes an even supply to the separator, which is absolutely necessary to cream it well.

This apparatus, manufactured by Mr. J. Thibault, although requiring some improvement to be perfect in all respects, deserves to be known. Wherever it has been used it has given satisfaction.

It is better and far less costly than the double-sided vats, in which hundred of pounds of milk are heated to a temperature of 90°, which exposes it to sour during the great heats. If an accident should happen, and the machine should have to be stopped, which rarely occurs when everything is in order, the milk runs no risk.

CREAMING.

In this operation the milk is usually kept at a temperature of 90°. However, I prefer 80°, for the heating of the milk always produces a bad effect which it is difficult enough to remove, unless the milk be quickly cooled down to 45° for instance, and this occasions a great waste of ice. Bearing in mind that the milk is received at an average temperature of 70 to 80 degrees in the warm days of June, July and August, theheating of it is scarcely anything, and its bad effects are reduced almost to nothing. Cooling it to 55° would, evidently, be as good as to 45°, which would save both labor and ice.

On the other hand, the centrifugal separators cream as well and as quickly at 80° as at 90°. Care must be taken to keep up this temperature during the whole operation. It does no harm to raise or lower it two or three degrees, but beyond this, it may cause loss of time or of cream, according as it is higher or lower.

Moreover, with these heaters it is very easy to keep up a uniform temperature, for, once fixed at the degree required, it does not vary unless the steam in the boiler is not kept at the same pressure.

The Laval centrifugal creamer is regulated by means of a simple screw which intercepts more or less the escape of the skimmilk. This screw has no need to be touched once it has been regulated. All that is required is to turn the tap which feeds the separator to give the cream the consistency necessary for churning, namely, from 15 to 18 per cent must be taken.

The Danish centrifugal separator can be regulated while in operation, at will, and should be regulated every time it is used.

These are the two separators in use in the Province.

ACIDULATION OF THE CREAM.

In places where spring water can be had, with an aqueduct, a double-sided vat is the best and most economical refrigerator.

If very cold water cannot be had, ice should be used. Several refrigerators are used and give satisfaction.

It is by cooling the cream that the required degree of acidulation is regulated, which has the effect of giving the butter all the advantages required for quality and keeping.

The acidulation of the cream renders the churning easier, gives more butter and imparts to it the aroma and delicacy required for foreign markets. For instance, I churned cream two hours after its separation. This process took 28 lbs. of milk for 1 lb. of butter, while the acidulated cream took only 22½ lbs.

It need not be stated that to secure an uniform produce, throughout the whole season, it is important that the cream be always prepared for the churn in the same condition. During the season of intense heat the manufacturer should be doubly careful. The cooling of the cream being more difficult to obtain, it should also be more rapid, as the milk being in a more advanced state of fermentation, should be kept some degrees lower, so as to check the acidulation.

The cream to be churned must be all of the same condition. If, as it happens in some factories where only a small quantity of milk is received, the churning is done only every second day, it is absolutely necessary that the cream be mixed well and often, during two hours at the least. This

mixture should, however, be made in the vat or in the cans, and not in the churn, if you do not wish to have the cream have a taste of wood.

I have no objection to churning every second day, even during the most intense heat, provided the churn is not overfilled, and that the churning is done in the afternoon, that is, the cream of the day before and that of the morning.

If it is treated as described above, we will have a sweeter cream than that churned every day. It is like a jug of water in one of vinegar; its strength is lessened by half.

CHURNING

This operation, which is one of the most important in the whole business, must not be neglected. If it be defective on one or more points, the effects are injurious, and the result is failure in quantity, want of uniformity in salting, in color, in the complete extraction of the butter-milk. So that to obtain a first class article it is important that the churning should be well done.

The churns in general use are the square, the barrel and the Blanchard. I have used all three, and, for my part, I very much prefer the square, large size, 6 feet by 3, or in proportion to the extent of the locality.

It is a very common mistake to think that it is an advantage to have two small churns instead of one large one, for the simple reason that in the Fall, when cream is scarce, a small quantity would not churn, or would do so only with great difficulty. I have churned the cream of thirty pounds of butter in a square churn able to hold 300 lbs. The grain of the butter was beautiful, and the yield was not at all affected. On the other hand one has double the trouble and supervision by having two churns instead of one. Before putting the cream in it, the churn should always be rinsed with hot or cold water, according to the temperature, or as the cream may be too hot or too cold.

The cream should be at a temperature of 56 to 60 degrees, according as the weather is cold or hot.

In the Fall, the churning should be done from 2 to 4 degrees higher, for the temperature of the cream in the churn has a tendency to rise in warm weather and to lower in cool.

If when in the churn the cream has not the required temperature piled ice may be put into it. This should be done only in case it cannot be avoided.

Although ice is not to be recommended, I much prefer it to warm water if the cream is too cold. I have such a detestation of warm water in this case, that I always manage to do without it.

This is what should be done. When the cream is cold for churning, which happens only at the end of September and in October, at which time the milk is notably lessened, it is easy to churn two days' cream at the same time. The cream should come out of the separator at 80° or 90°; according as the vat requires more or less heating, the cream, mixed with that of the day before, will naturally raise the temperature higher than the degree required. Then watch the cooling carefully, so that nearly two hours may elapse before the thermometer marks 58° or 60°. Take care to mix the cream well as stated above.

By this system the use of hot water in the cream is dispensed with, as also the use of a costly vessel for heating it by steam, especially in factories where cans are used for refrigeration. It is also the way to obtain cream in good condition, while churning only every two days, at all times of the year, which is a great advantage for small factories, especially where horse power is used.

By this system, if there is no economy of fuel, the cost is certainly not higher.

If you intend to color the butter, care must be taken not to go beyond the natural color, for too deep a color would be injurious. It is by practice that the quantity required can be ascertained.

A graduated measure will be preferable to regulate the color according to the quantity of milk received. That prepared with oil should always be used; it is the best and true color for butter.

Care must be taken to stop the churn two or three times, on commencing to churn, so as to allow the gas generated by the churning of the cream to escape by the cock or stopper. The speed at which the churn should turn is a very important thing, for the time required for churning and the quality of the butter depends greatly upon it. As a general rule, the churning should be done within twenty minutes and half an hour, according to the quantity of the cream and its preparation. If it takes longer, it is because the cream was not in proper condition, or the churn is too full, or it turns too fast or too slow, or perhaps, for several of these causes. The speed should depend upon the sort of churn used.

The square churn requires a speed of from 40 to 45 revolutions a minute, according to its size. The large ones should turn more slowly than the small. Barrel churns require less speed. The Blanchard requires a speed of 60; however, the churning is slower, and it is harder to give the butter a fine grain.

Finally this must be left to the judgment of the person making the butter, and he must give it the speed that will allow him to do the churning most advantageously.

When the butter is in grains of about the size of a pin's head, the churn should be stopped and very cold water poured into it. This will have the effect of gathering the butter into grains of more even size and render the washing of it easier. Towards the end the speed of the churn must be slackened, which is easy enough, even during the creaming, by using a movable roller to tighten and loosen the strap when required.

When the small grains are as large as half a grain of wheat or rice, it must be stopped. If larger than that they would contain butter-milk, which the washing could not remove.

WASHING THE BUTTER.

When the churning is finished, the butter-milk should be drained off immediately by the tap; it should be strained through a metal sieve or strainer, so as to retain the butter which might escape with the butter-milk. For washing the butter pure cold water should be used, at a temperature of 50 to 56 degrees, and even at 60 in the Fall. At each washing the churn should be turned a few times. Two washings are generally enough if they are done well. For this, the washing should be done in plenty of water. The water must be poured into 7 or 8 inches higher than the cream was. In this way a finer grain will be preserved, and with less trouble.

SALTING THE BUTTER

It is well to let the butter drain some minutes before taking it out of the churn. It should be taken out by means of a wooden spoon or dipper, and placed in a large wooden dish, to convey it to the mixer.

Well-made butter will keep with very little salt, while that which is badly made will not keep even when it is well salted. Only fine and pure salt should be used. Higgin's and Eureka are the best for butter. One ounce of salt for every pound of butter in warm weather, and three-quarters of an ounce in the Fall, are the usual quantity. This suits our market.

I have tried different ways of salting, but in the long run, that which gave me the most satisfaction is to spread the butter on the mixer as thinly as possible, from an inch to an inch and a half in thickness, and distribute it evenly with a sieve or by hand. If the butter contains much water, it will run out of it under the pressure of the rollers, and if it contains only a small quantity, little will escape, so that it is always in the same condition for receiving the salt. In this way the salting is done evenly.

After the salt has been well mixed with the butter, it must be placed in the box fitted to receive it for the second operation, which should be done next day. For this purpose a white cloth is stretched over a grating raised from 5 to 6 inches from the bottom of this box, to keep the butter from whatever might soil it. Cover it well with this cloth, put rather more than less ice to keep it firm, according to the temperature, but never put it on the butter, for this ice on melting will wash it and leave white spots in it, which it will be hard to remove. Moreover the parts which are in contact with the ice are very hard, while the inside of the pieces is softer, which renders the work harder and longer.

MIXING.

The object of this is to extract the water and milk that may be contained in the butter, to give it a solid consistency and mix the salt well through it. The working of the butter is done by pressure under a roller. However, all friction should be carefully avoided, for the grain of the butter will be broken and rendered greasy. The butter should be worked and handled as little as possible. The force of pressure should be applied carefully, but not more than is required. When the butter has taken a firm and perfectly uniform consistency, it is time to put it in the tub.

The hands should never come in contact with the butter. The ladle should always be used for working it. The most suitable temperature for making butter is from 58 to 60 degrees; if it is too hard the grain will be broken; if too soft, the work will not be well done.

PACKING.

Butter should always be put in a new firkin ot tub clean and well pickled. The inside of it should be well washed before putting the butter in it, so as to keep it from sticking to the firkin. A wooden pestle is used to press it, care being taken not to strike it, as that would break the grain. In a firkin of 70 lbs., put at least 70½ lbs., for if the weight is short, the buyer will deduct a pound. It is better to give good weight. Leave the top

surface of the butter level, cover it with a fine white cloth, over which you spread a layer of cement made of moistened salt, to keep the butter from contact with the air.

Take these firkins to the butter-room until the sale. This room should be cool and dry. The temperature should not be more than 60 degrees The firkin should always be weighed before putting the butter in it, then weighed again to put in it the required quantity. Mark on it the total weight, deduct the weight of the firkin, and mark the net weight of the butter. This will give the buyer satisfaction.

PREPARING THE FIRKINS.

The firkins should be filled with strong and boiling brine, three or four days before being used. The brine takes away the taste of the wood, closes its pores and protects the butter from contact with the air. When you are ready to put the butter in it, rub it well with a brush inside and outside, in cold water, for hot water would destroy the effect of the brine.

WASHING.

Cleanliness is of the highest importance in making butter. The butter maker should neither be guilty of nor tolerate any negligence on this point. Whatever comes in contact with the butter, mixer, dipper, basin, linen, &c., should, before being used, be passed through boiling water, then rinsed in cold water.

These utensils should always be washed carefully, every time they are to be or have been used. Above all, wash the churn in cold water as soon as the last grain of butter is taken out, if you do not wish it to have a bad smell. Take away every grain of butter that may be left. Then pour into it two or three kettlefuls of boiling water, close it and turn it for 3 or 4 minutes.

Pour out this water immediately, do not, under pretence of economy, allow this water to remain in the churn for use. As it cools and as you remove some of it, the greasy particles gather into lumps, stick in the seams of the firkin, so that the washing is of no use and it soon gets a bad smell. A dirty firkin will certainly injure the quality of the butter. It is good to wash it from time to time with lye or boiling water.

Tin vessels should be washed in hot water, and then rinsed with boiling water. Once a week these utensils should be rubbed with coarse salt after the first washing, and rinse as usual.

After speaking to you about making butter, I have now to say a few words to you about

ADVANTAGES OF THE CENTRIFUGAL SEPARATORS OVER THE OLD SYSTEM.

In considering all the points which relate to the importance of centrifugal machines in butter-making, all the advantages and disadvantages of both systems must be carefully looked into. This will enable us to decide which system is the best for producing good cream and making first-class butter.

Since the introduction of centrifugal separators, a great revolution has taken place in dairying. In Germany, in Denmark and Sweden, much attention has been devoted to the economic working of these machines. All sorts of trials and experiments have been made, and the results have been most satisfactory. These machines now leave but little room for improvement.

In what respect is the centrifugal system superior to every other system of butter-making ?

It is superior, because the milk can be skimmed as soon as received, and consequently a sweet and perfectly uniform cream is obtained, to which the required degree of acidity for churning can be given.

It is superior because we obtain nearly from 12 to 15 per cent more butter than by any other system of skimming.

Its superiority is incontestable as regards economy of space. This is one of the most important points, and one which speaks most in favor of the centrifugal separators as regards simplicity of construction. It is a mistake to believe that centrifugal creameries are more costly than those on the pan system. Taking everything into account, I consider them less expensive.

The smaller the building, the less the space to be travelled over to go from one place to another. The work is done more quickly. This facilitates washing, as the floor is smaller and economizes labor, provided the material be placed within reach and it takes up the least space possible, while affording the most convenience.

In a building of 20 x 30 feet, we can easily work 7 to 8 thousand pounds of milk, or even more, while with the pans, it requires 30 x 60 to work the same quantity. Moreover, the building has to be better finished, built with

very thick walls, or with a double lining, to maintain a uniform temperature, to make the cream rise, while a single lining will be enough for the creamery where the centrifugal machine is used.

This assertion may appear astonishing, because it has always been claimed, and justly so, that for a first-class butter factory very thick walls are required to guard against atmospheric changes. But this difficulty is now overcome by heaters, and centrifugal separators, because the milk, being poured into the receiving pan in small quantities as it comes in, passes into the heater, and from the heater to the centrifugal separator, without intermission. By this plan the milk is not liable to get cold, even if the weather be very cold.

The butter-room should be comfortable, and in it are placed the cream vat, the churn and the butter-worker.

Many people who possess a certain capital, would build butter factories, if their cost could be lessened, or reduced to one-third, or even one-half, of what our best equipped first-class butter factories cost, and if they knew that they can be put up for a thousand or twelve hundred dollars, as well fitted up, capable of making the same quantity of milk and producing as good butter as those which cost $2,500 or $3,000, by economizing expenses in every respect, such as fuel, labor, ice, &c. I positively believe that it would be a great improvement in the way of the advancement and progress of dairying in more respects than one.

The factories would increase in numbers, we would see fewer of them opened and closed up after being two or three years in operation. Less capital being required, it would be easier for the proprietor to do with a smaller quantity of milk, for it is always hard to find a locality able to supply the milk necessary to keep up a costly establishment.

I am striving with all my strength to attain this end, to lessen as far as possible the cost of fabrication, to put aside any useless implement or utensil, or those which can easily be dispensed with, to try to do away with the use of ice in many cases, and to considerably diminish the expenses where it can be done. I lay particular stress upon economy in the erection of the buildings and fitting up of the plant, so as to reduce the cost and dispense with whatever is useless.

The centrifugal system also allows of transporting the milk but once every day to the factory, thereby affording great advantages to patrons, and lessening the cost of conveyance by one-half.

The skim milk is far preferable for feeding young cattle, to that of any other system of butter-making, as the milk is still sweet after the skimming.

In some centrifugal butter factories, the milk is returned only next day. I disapprove most strongly of this way of returning the skim milk to the patrons. Why not avail yourselves of the advantages the centrifugal separator gives you, viz.: that of returning the milk good, as it was brought to you, minus the cream? Why put this milk to ferment in a wooden vat, where there is still in the Fall a small portion of the milk put into it in the Spring, and which has certainly had plenty of time to spoil, for the reception of the milk is done at the same time as the creaming, and no single basin is ever emptied? Even with two large tin vats to facilitate cleaning, there are still many drawbacks. Amongst others is the almost utter impossibility of distributing the skim milk evenly, as it must always be curdled. The water being separated from the caseum, it is very difficult to mix properly so great a quantity of milk, so as not to give only water to one and curd to the other. It has also the inconvenience of giving work to three men during a couple of hours, whereas during the rest of the time scarcely two are employed. I have seen this system in operation, and have heard many complaints from the patrons. On the other hand it requires costly pans, of immense size, to contain 7 to 8 thousand pounds of milk, that is, all the milk which is received every day.

This way of returning the skim milk gives the patrons only the advantage of not being compelled to wait for their milk to be creamed in order to take it back, but they have the disadvantage of seeing their milk refused when it is somewhat stale, owing to the danger of mixing it with the other and leaving it several hours before the creaming is finished, whereas it could have been received as good milk, if we passed it immediately through a centrifugal machine.

Such are some of the observations I have to make about the difference between the two systems, and allow me to state in conclusion that with shallow pans good butter can be made, but with centrifugal machines better butter can be made.

Respectfully submitted,

AIME LORD,
Manufacturer of Butter and Cheese.

CARE OF MILCH COWS.

By Dr. J. C. Coulombe, M.P.

Mr. President and Gentlemen:

The future of our young country depends mainly on Agriculture. This is admitted by all. Our position as regards the metropolis, our vast lands compared with the parcelled-out farms of Europe, the compact population of whose large towns is obliged to be fed from abroad, all seem to offer us, for a long time to come, a ready outlet for the exportation of our agricultural produce. Let us then strive with all our might to improve our Agriculture. It is our national future. Let us second the efforts of our governments, which are carefully studying the best means of perfecting our agriculture and prove their anxiety for our agricultural improvement by grants to agricultural societies and schools, by model farms, lecturers, farming, &c. We have, moreover, the powerful assistance of our clergy, so closely allied to the farming population; agricultural societies, partly founded and supported by worthy priests; agricultural lectures given by them, as colonization has always priests at its head, priests who devote their efforts to its spread. All these are so many proofs of the zeal of our clergy for the agricultural classes, and the presence of a large number of venerable priests at this conference is the most convincing evidence of it.

A distinguished lecturer, who studies the best means to favor agricultural improvement, said, at a meeting held some time ago, that it is acknowledged and admitted, after long discussion and experience, that dairying is most powerful means we have for regenerating Agriculture. In the crisis through which we are now passing, I think that dairying will be the means of saving us, if we consider on the one hand the extremely low prices of grain and of meat, and on the other the highly remunerative price of milk, as we got an approximate price of 80 to 85 cents for a hundred pounds of milk in our dairy establishments last Summer. The fact that there is no accumulation on our market is considered a hopeful sign for next year. But if for some years we have trebled the revenues of our dairies, if we export yearly for some millions of dollars worth of butter and cheese, we have not yet attained perfection; we can produce much more and perhaps produce a better quality.

Although we no longer live in the days when neighbors had to help each other to lift up the cows in the morning, I do not think that we still treat them with the care they deserve. In the first place are our stables as comfortable as they should be? A stable should be built in accordance with certain hygienic conditions so that the cows are not crowded in it. It should also be warm. It is now admitted, and experience proves it, that in a cold stable the cow is compelled to protect herself against the cold, to convert into heat a portion of the food which should make milk or fat. It is very advantageous that a stable should be well lit by large windows, looking towards the rising and the setting sun. When light enters abundantly it purifies and clears up the air, renders it more wholesome, removes the dampness and takes away the rawness of the temperature, which is always injurious to the health of the cows. But the point on which I lay the greatest stress is the airing or ventilation of the stable. A simple wooden shaft of dimensions to suit the number of cattle, and passing through the roof of the stable, is a matter of trifling cost, and suits purposes of ventilation well enough. When the air is not renewed it is vitiated by the breathing of the animals, their perspiration, and the gases which emanate from the urine and decomposing manure, and when a cow has breathed this infected and impure air for some time, her blood becomes slowly but surely poisoned, her appetite leaves her; she gets thin, and sometimes even dies without the proprietor ever knowing the cause of the evil. I am happy to state that, in my parish and the adjoining ones, after agricultural conferences were held, all the farmers who built stables provided light and ventilation for them, and all were warm in their praise of it, and told me that their cows were wintered much more easily.

Cows should always have good, clear, pure and limpid water close at hand. However, some farmers remarked to me that when cows had water close at hand, they often drank to excess, so as to bring on diarrhœa, and that they were harder to keep. According to their opinion, it would be better to have them drink once every day about 25 pounds of water. I submit the question to your consideration. I saw some farmers whose wells were near the drain from the manure heaps, and the cows drank only diluted manure. A cow drinking this can give only bad milk. Moreover, water such as this is saturated with morbid principles, which, finding their way into the blood, will poison it. The result is leanness, diarrhœa, and sometimes loss of the cattle.

Cows should be put in the stable as soon as the first cold nights occur

in the Autumn, and also in rainy weather. They should also get some dry fodder, to prepare them gradually for the dry winter food.

I have observed that it is better not to put cattle outside in Winter. If they must be put outside, it should be done carefully, only for a short time and in very fine weather. Above all, care must be taken not to leave them out during the sunny days of April and May, for the heat of the sun being very intense at this time of the year, may, in some cases, give them sunstroke. The cow does not get tired in the stable, because when not eating she generally lies down; but, for this reason, she must be always kept very clean, and very dry, with abundant litter as far as the supply of straw will allow.

The cows should also be curried every day, as far as it can possibly be done. This currying removes the small particles of dead skin at the root of the hair, promotes perspiration and increases the circulation of the blood. In a word it is the cow's toilet, and this toilet is very beneficial to her. The farmers in my neighborhood who tried it, found it so good that our traders could not supply curry combs to all the persons wishing to buy them.

Food.—A farmer who wishes to make a profit out of his cows, must not fail, during the Summer, to give them rich pastures, which he will subdivide so as to have grass in abundance and of better quality. He must furnish them with shade to protect them from the excessive heat of the sun's rays, and give them a plentiful supply of pure water. But his foresight must not stop there. He must lay up a reserve of green fodder for the end of the Summer and the Fall, at which time the grass hardens and becomes scarce. Every day he must distribute it in profusion to his herd, and by this economical process he can keep his cows so that they will give milk until the commencement of Winter. But should his care for the cows, in view of their milking, end here? Should the farmer allow them to run dry, feed them only on straw of good or bad quality, during the Winter, only giving them mashes when they are going to calve, and let them become lean, so long as they can rise alone in the Spring and make their way to the pasture, expecting them to fatten again upon it? This method is assuredly very hurtful and ruinous, for, while your cow is recovering in the pasture what she lost in the stable, she gives but little milk, and that of inferior quality, whereas it should, on the contrary, be the best of the season. If it be true that it is very costly to feed a cow well, it is just as certain, that if badly fed, she will cost still more. A good milch cow well fed can always pay for the food she eats, even during the Winter, for I am of

opinion that cows should be milked ten months out of the twelve, and allowed to run dry only two months before calving. A farmer who takes care to have a good supply of root crops, beets, carrots, turnips, parsnips, to give his cow daily with her dry fodder and a little grain, will get from her enough milk to pay for her feed. Even if he has no root crops, I think it is better to keep cows in milking condition, even if he must give them grain instead of selling it. A farmer told me lately that with ten bushels of ground grain, peas and ground oats, he made 50 lbs. of butter, and this without injury to his cows, which lost none of their flesh. He found a better sale for his grain in this way than if he had sold it to the traders.

But any one who could feed his cows on chopped and wet fodder, would save on the feed, and the keeping of his cattle would be improved by it. Here is the result of an experiment of this kind, made under my eyes, last Winter. A young man who owned some cows, had no winter feed for them, and he owned only a small lot of land. Learning at an agricultural conference that pea-straw chopped and softened by moist heat, was more nourishing than other straw, he prepared in the Fall an abundant supply of good short pea-straw, which he chopped up. Every day he sprinkled with boiling water twenty-four hours in advance the quantity required for the day's use, but he told me that twelve hours in advance would be preferable. With twelve pounds of feed prepared this way, and four pounds of mash every day, he wintered a cow that gave him eight pounds of milk a day for nearly the whole Winter. With the same forage he wintered a draught horse which worked hard without receiving more grain than is usually given to horses fed on hay. If you can give chopped and moistened feed, you would do well to mix the different kinds, adding the hay intended for your cows; variety stimulates the appetite. It is like a *ragout* in which there are several kinds of meat

It is well to add a little salt to the cows' feed; it stimulates the appetite and digestion, and purifies the blood.

As the cow takes nearly twelve hours to digest a good copious meal, I think it is better to feed her only twice a day, but she must be allowed as much food as she can eat, so as not to impair her appetite, and to avoid indigestion and metcorism. She should also, as much as possible, be fed at regular hours, leaving the same time between each meal, and the same for milking her. If cows are to be kept in good milking condition, this must be done very regularly. It is also well to treat the cows with a great deal of kindness; this is the best way to make them give their milk at once.

When the time comes to let the cows run dry, their ration should be diminished, and care must be taken not to let the milk collect in the milk veins by the fever; this would bring about the obstruction of these vessels, and the loss of one or more teats which would give no more milk.

Several farmers told me that their cows gave salty milk from the commencement of the Winter. This happened to my own cow, but upon giving her rich and plentiful food, her milk, which was salty, became sweet again. It sometimes happens also that it is very difficult and even impossible to convert the cream into butter in Winter. The most frequent cause of this is that the cows are too poorly fed. Give your cows good mashes over and above their feed, and the butter will be easily made. The careful farmer should pay attention to the calving of his cows, so that no accident may happen to them. He should also be on his guard against inflammation of the udder, which is to be feared at this time with cows that are well wintered. If there are any symptoms of inflammation, the quantity of food must be lessened, and the udder be emptied frequently. It may be washed in cold water and softening poultices may then be applied as needed.

As a general rule, I think it is better not to let the calf suck. To do this it must be taken away from its mother as soon as it is calved, and without letting the mother see it. It should be wiped dry with straw, and after some time the mother's first milk is given to it, for this milk contains a substance which serves the purpose both of food and also of a purgative. For some days the calf should get the milk which comes from the udder, then it should be let cream a little without getting sour. After being creamed it must be heated to 98 degrees, or the temperature of warm milk, before giving it to the calf, which is by slow degrees accustomed to a change of food, gradually lessening the milk and adding to it pea soup or ground grain, or linseed cake. I found a little dry peas given daily to be beneficial, as the calf's stomach digests this grain until the age of about three months. It is also good to give the young calf, every day during the first month at least, an egg, broken in its mouth, so as to be swallowed by it. Care must be taken not to disorder the calf's stomach, either by too cold drinks or by too much food, or food too strong for its tender constitution, and to avoid diarrhœa, the sickness most to be dreaded for calves, and which is, unfortunately, the commonest. The best remedy for this ailment is to make the calf drink milk from the cow's udder.

In Summer, calves can be put in a small pasture, provided they be well sheltered from the sun and from rain. It is an admitted principle that the

younger an animal is, the more the food it consumes benefits it. It is therefore sound economy to develop the calf in its youth, because the older it is the dearer it will cost. This is the rule laid down by cattle raisers. If you wish to have fine cows, develop your heifers well when they are very young, continue this care until they are two years old, at which age they ought to calve, and you will be well paid for the care you will continue to give her when a milch cow. A very important consideration for a farmer who feeds his herd richly, is the attention to be given to his animal manure. This manure will be better if the food has been rich; this is well known. Now, if much money is spent on feeding the cattle well, and their manure is neglected, I think that we lose on the one hand what we gain on the other. The stable must be arranged in such a way as to collect all the solid and liquid manure, and it should be put where it will be sheltered from the sun and from the rain; take care that it does not heat. A pile of manure should never be allowed to *smoke*, because the gas which escapes from it is ammonia, the most important element for fertilizing the soil. It is well to put a little plaster between each layer of manure, for the plaster absorbs the ammoniacal gas. When manure is spread on the land, it should be ploughed in immediately after, so that all the fertilizing ingredients may enter into the soil, except when the manure is spread on the meadows, when it should be spread immediately after mowing and taking in the hay.

The nature of this conference inclines me naturally to speak to you of the choice of milch cows. From what breed such a good milch cow be chosen in preference? I think our Canadian cow is but little, if anything, inferior to other milkers. She is the best suited for the country, and, with judicious care, she can be made a superior milch cow. The experiments that have just been made have given ample proof of this. I am told that a Canadian cow from l'Assomption gave 14 lbs. of butter in 7 days trial; and did not the old cow *Major* give over 11 lbs. of butter in 7 days trial, notwithstanding her fourteen years. And had it not been for an accidental sickness that befell her during the trial, I believe she would have given as much as 15 lbs. at least. This cow, before becoming the property of the Reverend Mr. Gérin, had passed through four or five hands, and had always been sold at a low price, because nobody knew her superior milking qualities before she received the proper care for developing them. If a skilful farmer had known how to profit by this cow, by raising all her calves, after selecting a good sire, he would be to-day the owner of a herd of cattle worth a large sum of money. In proof of this I may tell you that the Rev. Mr. Gérin refused two hundred dollars for his cow last Summer. But

notwithstanding the fact that this is certainly a superior cow for her milking qualities and her beauty, we may be certain that there are still a great many others, which, from want of care, are unknown.

Let us then choose the best milch cows from our herds, and send the inferior ones to the butcher. Let us take good care of our cows so as to develop their milking qualities; let us feed our calves well so as to develop them properly, and before long we will have a superior class of cows.

I almost forgot to mention the most important condition, the choice of a sire. We must never cross our Canadian cow with bulls of foreign breed, and never be tempted by the size of the bull. Select a calf from one of your best milch cows, and you will be sure to succeed, if you feed your cattle on rich and abundant food, and do so with discretion.

Some years ago, a farmer from my parish lived very modestly. He owned a farm of considerable extent but of poor soil, and sowed much and reaped little. He kept many cows and made but little butter. Being the father of several children, he thought it his duty to let them go abroad to provide for their own future support.

As soon as the creameries were started he decided to bring his milk there. During the first year, zeal and ambition stimulated him, and every day he strove to do better. He took all possible means to feed his cows well, and in the second Summer he sowed a great deal of seed in his pastures and root crops for the Fall. The first Autumn he sent his bad milch cows to the butcher, and kept only the best. He improved more and more. Agricultural conferences were established and taught him what he did not know. This farmer has to-day the best herd of Canadian cattle in the parish, and he makes the most money out of his dairying. Winter and Summer he takes the utmost care of his cattle, has always on hand a plentiful supply of green fodder for times of scarcity; turns all his animal manure to account; his lands are improved, and, although he feeds much grain to his cows, his crops are so abundant that he is one of those who sell most to the traders.

This *habitant* often told me that his cows had saved him, and enabled him to buy good farms for his children, while providing ample comfort for his own old age.

Let us, then, imitate this farmer's example, and, like him, we may be able with our cows, to improve our farming, double our revenues without more labor, bring comfort to our firesides, and settle our children in our own midst. In this way we will do a patriotic work, while, at the same time, benefiting our families and ourselves.

Mr. BARNARD: Dr. Coulombe, who has spoken to us with so much practical science about agriculture, excused himself by saying that he was not a farmer. I know that he is, first of all, a doctor; I know that he attends his patients and cures them. However he has given you an example which I would wish to see followed everywhere. Dr. Coulombe has employed his leisure hours in acquiring knowledge, which is especially useful to him and to his fellow citizens. He is a true patriot and a friend of agriculture. He has spent not only his leisure hours, but a portion of his nights in studying the best way to feed and manage cows. He has rendered important services to his fellow parishioners, to society, and to the country at large by coming to give us the benefit of the profound studies he has made. In the name of the Association, I tender my most sincere thanks to the learned lecturer who has just spoken.

Just now I was asked to request Dr. Coulombe to explain a point in his interesting discourse. Dr. Coulombe recommended, in special cases, to feed cows only twice a day during the Winter. This is the question that was put to me by a delegate from one of the agricultural clubs: Does Dr. Coulombe recommend that cows be fed only twice a day, even for the production of milk?

Dr. COULOMBE: I said in a general way that cows should be fed only twice a day. But this supposes that they are well enough fed. I base my assertion on the fact that cows take twelve hours to digest an abundant meal. Naturally, if only a little straw is given to them at each meal, they must be fed more frequently. To make you understand my meaning I will make a comparison. An infant in the cradle has a very weak and very delicate stomach. It can take only a slight quantity of very digestible food at a time. This child can be fed ten or twelve times in the twenty-four hours, and without any injury to its health. Now take the case of a healthy man who does not take much exercise. If this man takes one hearty meal in the morning, he can go until evening without eating, and his stomach will be only the better for it. It is the same thing for cattle. If you give them food so well prepared for digestion that it passes at once into the intestines, I advise you, in that case, to give them several meals a day, especially if you feed the animal with a view of producing milk.

Mr. CHAPAIS: If you give it only two meals a day, would you give one of them at six o'clock in the morning and the other at six o'clock in the evening, that is, would you make any difference between the hours of the night and those of the day?

Dr. COULOMBE: If the cow is in the stable, I would give her the first meal at six o'clock in the morning, and the second at six o'clock in the evening. That is to say, I would not make any difference between the hours of the night and those of the day, because the cow is not more active during the day than during the night.

Mr. BARNARD: I concur entirely in Dr. Coulombe's opinion.

This reminds me of a story. I attended meetings in Upper Canada for two or three years in succession. Every year a very distinguished cattle raiser from the United States, who had a large herd of cattle, told the meeting that he gave his cows only two meals a day during the Winter, and that they were still very fat, and that his calves brought very high prices. One day he was asked how he fed his calves in the Spring and Summer, and he answered: "I feed them absolutely the same as in Winter, giving them the same food. I give them only two meals a day. The first is at six o'clock in the morning. Then they are turned into the field to amuse themselves until the evening meal. In the evening they are brought back to the stable for their supper, and care is taken to amuse them again after supper. They are left to amuse themselves with the grass."

Thus, the Honorable Harris Lewis, of the State of New York, was of opinion that two meals a day were enough for cows, provided they were allowed to amuse themselves with excellent food between these meals. However, when cows do not give milk, two good meals a day may be sufficient.

PERMANENT PASTURE.

By Mr. Arthur R. Jenner Fust, Editor of the "Journal of Agriculture."

The age of miracles is past. The soil may be compelled to produce everything that nature has constituted it capable of producing, but to attempt to establish permanent pasture on an inferior sandy soil is to aim at the impossible.

That permanent pasture may be properly laid down, two things are necessary: the soil must be supplied with plenty of food suitable to the plants it is intended to produce, and the cultivation of the two preceding years must have been such as to insure the perfect pulverization of the land in which the grass-seeds are to be sown. The rootlets of every variety of grass are excessively fine, and will not grow freely among clods.

But you must not imagine that the proper preparation of the soil and the careful selection of the seed are all you have to provide for. Not at all; neglect for a few years the care due to your pasture, and you will soon see the herbage return to its primitive state; the choice seedlings will disappear; weeds, the original proprietors of the land, will renew their claim of mastery, and all the trouble you have taken will prove to have been thrown away.

A newspaper, the "Orillia Packet," used to amuse itself some six or seven years ago by making fun of those who advised farmers to lay down permanent pastures to some extent, on every farm. But that cry is no longer heard, only a short time ago an article appeared in the above named paper, not only recommending warmly the establishment of these pastures, but ridiculing Mr. Allen, a well known American agriculturist, for saying that no one but an enthusiast would persist in believing in the value of permanent pasture in these latitudes.

All those who have visited the British Isles must have been struck by the beauty of the meadows and pastures of those countries. I have no doubt that, with proper care, both meadows and pastures of equal efficiency might be established here. Our summer is hotter and the season of growth is shorter than in North-Western Europe; but the dews and rains of our

climate are sufficient to supply the necessary moisture to our soil, especially if the land has been properly prepared for the crop.

Mind, I by no means intend to convey the impression that grass will prove durable on a poor, sandy, badly prepared soil. But, I do say that, if the subsoil be cool, and the preparation be well done, your cattle will find food in pastures thus treated for many years; the grass will sprout far earlier in Spring, and last far longer in Autumn than in those *pacages*, as they are called, which we generally find in this Province. But, in spite of everything, the native plants will, sooner or later, conquer the foreigners, and it will be your duty to postpone their victory to as distant an epoch as possible.

A lesson of great importance, as regards the permanent grasses, may be learned from the Rothamsted experiments: as long as, in a permanent pasture, the different species of grass are left to the guidance of Nature alone, they live on good terms with one another, and all goes well; grasses and clovers, crow-foots and daisies, if uninterfered with, never quarrel. The plants that appear this year are pretty much the same as those that appeared last year, with this difference: certain seasons encourage the growth of certain species more than others.

But, let the hand of man once intermeddle with the peaceful scene, and the whole is changed like the changes wrought by the magic wand of a Harlequin. Daily is renewed the contest between the grasses and the other plants that occupy the pasture; one handful of nitrogenous manure will depress the scale of victory in favour of the grasses, while a little lime will so nourish the clovers at the expense of the other plants, that the latter will be quickly driven from the field. In fact, the existence of the herbage under the rule of man is passed in a series of battles—grasses against clovers, and both against weeds—and it is your business, brother farmers, to guide these troubles to your own ultimate profit.

Here is something worth remembering: the success of your attempts to lay down land to grass depends rather on the subsequent management of the pasture than on the most judicious selection of the seed. The Downs and the Heaths of Europe, the roadsides of this country, both show the same thing. If the natural soil be rich, the herbage will include all the best species of grasses and clovers; if, on the other hand, the plant-food be poor and scanty, the weeds will take possession of the turf, in spite of all the efforts of the better plants to keep them in subjection.

And here we have a generalization of the greatest importance: Feed well your younglings, and you will soon find them fighting on your side against your enemies the weeds. We all know that, do you say? Possibly, but you do not, to judge from your practice, act in accordance with your knowledge. If you did, the pastures of the province would wear a very different face.

Much care is required in the preparation of the land for laying down to grass. The seed may be sown either with or without a grain-crop. I prefer the latter plan, and for this reason: each seedling will have the chance of profiting by every particle of suitable food it may find near it, without any risk of interference on the part of the grain-plants.

But here, some will say, it would be hazardous to sow down land for permanent grass without barley, oats, or wheat, lest, the grass failing, the whole profit of the year be lost. Only too true, but it is worth while trying it. One thing is certain: the turf will grow faster and become close and thick sooner if it is sown alone than if it is sown with a grain-crop.

At all events, the first thing to be done is to thoroughly clean the land; and, for this purpose, there is nothing better than a root-crop. On heavy land, such as we usually find in this province, we should proceed something in this fashion.

The land will, probably, have just borne a crop of some sort of grain, the last of the rotation, and if it is infested with couch or other root-weeds, they must be got rid of. In my part of England we set about it thus: As soon as the grain-crop is carried—sometimes as soon as the shocks are set up—the grubber is passed along and across the stetches (lands, ridges), the harrows and the roller pulverize the grubbed surface, and the horse-rake collects the weeds into rows. With our feeble sun, we are compelled to burn them, but here, where the sun is so powerful during August and September, two or three days of exposure to its rays will be sufficient to dry up the couch, and it will be useful hereafter as the base of the dung-heap for the future root-crop.

After having got rid of the weeds, the Autumn furrow may be given. As to the depth advisable for this, it depends upon the condition of the soil. If it has been well farmed, and is not an absolute stranger to the dung-cart, there will be no danger of ploughing it too deep. As a rule, I do not care to bring up more than a couple of inches of the raw subsoil. Still, we must not forget the immense power of our Canadian winters over a well

ploughed soil. The descent of some part of the former manurings into the subsoil will have mitigated its crudity and made it less hostile to the penetrative force of the filamentous roots of the future crop, especially if we consider the heavy dose of manure which will be necessary if we look for a remunerative crop of roots.

Another rule: Always give a deep furrow *in Autumn* to land intended for a manured root-crop. In *Spring-ploughing* for grain, six inches are deep enough.

When the snow has gone and the land is dry, it may be either cross-ploughed or grubbed. I prefer harrowing, along and across, then a cross-furrow, finishing with the grubber. The cross-ploughing should be as deep as the Autumn-furrow; it will bring up to the surface all the root-weeds left after the Fall-ploughing, which after a few days exposure to the sun may be led to the mixen, or burnt.

When the swedes and mangels are up, do not forget to keep both hand and horse-hoe going. The more frequently this is done, the more perfectly will the soil be prepared for the succeeding crops. The field cleared of roots, plough for the seed-furrow before Winter. When the Spring arrives, sow the barley—barley suits grass seeds better than wheat or oats—harrow, harrow, and harrow again, scatter the grass-seeds, cover with the chain-harrow, and finish with the roller.

Once more a rule:—Do not let any cattle or sheep feed on the young grass after harvest. Not only do they damage young seeds by nipping out the heart of the clover, but their feet on a frosty morning in early Autumn tread the very life out of the grass. A slight coat of manure, laid on when the ground is hard and spread at once, will be most useful. Ten bushels of ashes and two of plaster per acre will be beneficial. Still, farmyard dung, acting both as a *mulch* and a plant-food, is to be preferred. Artificial manures, at present, are too absurdly dear in this country for me to recommend their use on grass.

The following, and every succeeding Spring, pass the bush-harrow and the roller over the grass. The rolling should be done before the land becomes too dry.

And, now, we come to one of the most important points of all: How shall we make use of the pasture-grasses about which we have taken so much trouble? In my opinion, they should be fed off by young cattle, and for the first season neither horses nor sheep should be admitted to the fields.

Cows are too heavy; they would injure the turf by treading it in wet weather. Horses and sheep bite too low, they would nibble out the heart of the clovers. Begin feeding off the grass sufficiently early in the Spring, and send in enough beasts to eat the herbage off clear in ten or twelve days. The closer the grass is fed off, the more quickly and thicker will it come again. If, on the contrary, some of the stalks are allowed to run to seed, it is but too probable that the roots, whence they spring, will die. Spread the droppings of the cattle carefully at least once a month, and if in the Autumn there are in some spots tufts of grass which the beasts will not eat, mow them; there is nothing more injurious to pastures than unequal grazing.

At the expiration of the ten days, turn your cattle into another field. let the grass in the former piece grow again, and fifteen or twenty days afterwards you will see, if the season be propitious, a bulk of herbage in excess even of what there was before the first feeding off.

The next season the pasture may be mown, if you really want hay, but it would be better for the permanence of the grass to pasture it continually, Bush-harrow and roll every Spring, and give it a good dressing of well rotted manure, mixed with earth, ditch-clearings, &c., every third year. Ten bushels of lime mixed with ten loads of earth will help, if dung cannot be spared.

In the Eastern Townships, many pastures are to be found which are as Nature left them; they have never felt the plough. Thence come the best butter and the most savoury cheese that are made in the country. Unfortunately, their proprietors have terribly neglected these fine pastures. They have robbed them of all their wealth, and have repaid them no part of it; they are ignorant of the very existence of the dung-cart. If these farmers will listen to me, they will never break up these fields. They are full of every description of grasses and clovers native to the country, and only wait for food fitted to their wants to produce abundantly. Are they too moist? Drain them. Those who say that grass-lands do not benefit by drainage are mistaken. It is just the reverse: the best herbage will not grow in wet places. Every animal on the farm improves more rapidly on a dry soil; they find the grass more to their taste, and are generally more comfortable. In marshy soils, dung is almost wasted, it remains a *caput mortuum*, and, like a corpse in a wet cemetery, it takes some years to become decomposed.

But to return to the consumption of the now established pasture. As farmyard manure but too often runs short, give two or three pounds a day

of oil cake, pease-meal, or corn-meal, to each of the cattle on the pasture, and within a twelve-months of beginning this system of feeding, both cattle and land will show its efficacy. With us, in England, the better class of farmers always treat their second-rate pastures after this fashion, and thus make them almost equal in fattening power to land of the first quality. Do not omit spreading the droppings of the stock two or three times a month.

Rape and colza are, unfortunately, almost unknown crops in this province. Frequently, grass-seeds are sown, in England, with rape, and the double crop fed off by sheep or young cattle. This answers very well, as the beasts tramp down the roots of the young grass, and thereby fix them in the soil more firmly than can be done by rolling. As rape is sown broadcast, it requires no hoeing, and you may take my word for it, that the cultivation of this plant, with its subsequent consumption by sheep, each one eating in addition a pint of pease with a little clover-chaff *per diem*, would restore the sadly worn out lands of the country sooner than any means that can be devised.

And what grasses shall we grow on our pasture ?

The choice depends entirely upon the texture of the soil we have to deal with. Some grasses start into growth early in the Spring ; others are valuable from their persistence in the Autumn. Again, the grasses long for nitrogenous food, whereas the clovers seek for lime and phosphoric acid ; both grasses and clovers are fond of potash, and both, if these food-matters are freely presented to them, will be found in amicable occupation of a well managed pasture.

When the turf is thickly set, you will very probably find as many as thirty different species of graminaceous and leguminous plants in it, that is, provided that the soil be of good quality. And this variety of species is by no means unimportant, as all animals do better on mixed food than when confined to one sort of food. Butter and cheese too will be more highly flavoured when the pasturage is such as I have described. Timothy grass and weeds, which is about what our cows get in August and September, will never produce good cheese.

The greater the variety of grass-seeds sown, the greater the chance of some of them suiting the land. Soils have tastes as well as men, and are sufficiently skilled in selection to distinguish those species which are the most likely to survive when the terrible contest, which will inevitably take place between their true and their foster children, shall have terminated.

Grass-Seeds for an Acre—Professor Brown, of Guelph.

GRASSES.

Meadow fescue	6 lbs.
Meadow foxtail	3 "
Perennial ryegrass	2 "
Timothy	3 "
Orchard-grass	3 "
Canadian blue-grass	4 "
Red top	2 "
Yellow oat-grass	2 "
	25 lbs.

CLOVERS.

Lucerne	4 lbs.
White clover	2 "
Red clover	1 "
Yellow or hop-clover	1 "
	8 lbs.
Total grass and clover	33 lbs.

Grass-Seeds and the Soils for which they are suited.

Meadow foxtail	Rich loams.
Rep top	All soils.
Yellow oat-grass	Sands.
Crested dog's tail	All soils.
Rough fescue	All soils.
Meadow "	Rich loams.
Sheep's "	All soils.
Rye-grass	All soils.
Orchard grass	Rich heavy land.
Perennial Rye-grass	All soils.
Timothy	All soils.
Blue grass	All soils.
Poa, the common	Clays.
" wood	Shady spots.
" evergreen	All soils.

Mr. Brown's list is very good, but I should, in this province, omit the Lucerne, which does not seem to do well when mixed with other seeds, though it is invaluable as a forage plant. The orchard grass, on light inferior sands, may be replaced by 3 lbs. of crested dog's tail and 2 lbs. of yellow oats.

My own mixture for the average run of soils in Quebec, is as follows:

Pacey's perennial rye grass	8 lbs.		$ 80
Timothy	6 "		25
Orchard Grass	7 "		1 50
Meadow fescue	3 "		1 05
Perennial red clover	3 "		45
Alsike "	1½ "		45
White "	½ "		30
	30 lbs.		$4 80

The seeds in Prof. Brown's list would cost, in Montreal, about eight dollars.

As to the flavor of cheese depending on the pasturage, I append a letter I received some years ago from Mr. MacFarlane, a most successful dairyman in the Eastern Townships:—

"You are perfectly right in saying that the butter you tasted in Montreal, at the Exhibition of 1879, was the production of *old* pastures. As to the variety of grasses of which the West Brome *meadows* are composed—they consist of timothy and white clover principally, but the *pastures* are all permanent, hilly for the most part, with the exception of here and there a piece of natural grass containing the species native to low-lying lands. We rarely see pastures that have been ploughed: they are just as nature left them after being cleared."

West Brome, Dec. 2nd, 1879.

The cheese in question was so good, both in form as in taste, that I was sure no young grass could have produced it, and I was right. It is clear that, all other things being equal, a varied food, like that yielded by the Brome pastures, must give a more high-flavoured cheese than where one or two grasses compose the whole meal.

And there is nothing easier than the improvement of these hill pastures. Lime and phosphoric acid are their chief wants, for the potash has never been extracted by successive grain crops. One barrel of plaster a year, and 2 cwts. of "old char" from the sugar refineries will supply all the manure wanted to start with, and careful grazing with added food, will secure the continued success of these invaluable feeding-grounds. Oh, happy farmers of the Eastern Townships! If you only knew the value of these hilly pastures, down which flow hundreds of soft streams only waiting for the hand of man to lead them in graceful curves over the turfy slopes, and thereby convert them into the earliest and richest land of the whole country.

A. R. J. F.

Effects of Feeding upon the Improvement of Cattle.

Human industry has ever gone on improving, but its progress has never been as remarkable or as rapid as during the course of the present century. Agricultural industry has not escaped this upward tendency. The ever increasing needs of the masses have made improvement in the tilling of the soil, and in the care of domestic animals, the important adjuncts of any system of agriculture worthy of the name, and matters of the utmost necessity.

The farming community has necessarily felt the effect of the success obtained by the manufacturing and commercial classes. These successes have brought about an immense circulation of capital. Fabulous fortunes have, in some instances, been amassed, and, in many cases, the general comfort has been increased. All classes of society have desired to add to their comfort. The families attached to the cultivation of the soil, in spite of their simple lives, their frugality and proverbial economy, have followed this general current, without scarcely knowing it. They have become more extravagant in their dress, and, especially in the choice of their horses, harness and vehicles. They have at the same time become more eager for information.

It is far from our intention to blame the agricultural classes for this improvement in their style of living. We merely wish to establish the fact, that the farmers' needs have greatly increased.

To meet these wants, agricultural industry was compelled to produce more abundant and continuous supplies, to compel the earth to be more fertile, to raise more cattle and cattle of better quality, capable of giving better returns with the same amount of food. In a word, agricultural industry had to be improved in all its branches. Impelled by the necessities of the times, eminent agriculturists have multiplied their studies and observations, and have succeeded in organizing a body of agricultural teachers, well supported and qualified to serve as safe guides in the methods of tilling the earth, and of treating cattle and utilizing them more economically.

In this work of improvement there was but one aim in view, namely, to render human efforts more available, by relying on the union of natural forces, and we gladly acknowledge that the utilization of all these forces

has already, in our own country and elsewhere, produced remarkable results in all branches of practical agriculture. However, we are as yet only at the beginning. What will be the result in the future, if, as we hope, this movement does not weaken ?

In point of progress, the first step is the most difficult. The first voice raised, in the midst of a people, to encourage improvements, and point out the way to them, often preaches for a long time in the desert. This is what happens with our farming classes. But to-day the onward movement is fairly commenced, and the future appears full of hope. Thanks to the timely help of the public authorities, thanks to the energy and enterprise displayed by a number of eminent farmers, who have astonished our people by their success and the progress they have made in improved farming, thanks, finally, to the impetus given by the Dairy Association to the improvement of our cattle, we are well on the path of progress, and we see no obstacle in our way likely to stop our onward march.

Of all the branches of farming, that which is most worthy of the attention of men of progress is, without contradiction, the care of cattle. The importance of farm stock is admitted on all hands. The systems of farming which can succeed without a large herd of cattle are so few, and form such a feeble minority, that they are but exceptions and serve only to confirm the general rule.

In the present condition of farming, the basis of any rational system is cattle. This truth is so self-evident that nobody denies it, and it has become an axiom.

A herd of cattle, at the same time, produces labor, supplies for the market, and manure, and is also a consumer of fodder. It does not come within our present scope to treat of cattle as producers of labor. We propose to treat this important question only in so far as it concerns the products necessary for the consumption and support of cattle, by making use of the produce raised upon the farm.

The question of live stock, even within this narrow limit, is still of great importance, and calls for the attention of every farmer acquainted with the sound doctrines of real agricultural progress. The cattle raised and kept on farms are a source of direct revenue, because their produce forms the object of a traffic which is more or less profitable.

Farm cattle are of almost infinite variety, considered as to their size, color, production and other peculiarities no less important. Each zone of

the earth, each country, each agricultural region has its own animals, endowed with characteristics well defined, and which are reproduced in their entirety.

In the torrid and in the frozen zones, for instance, which are distinguished by their long, cold or dry seasons, during which the only food of the cattle consists of dry fodder, often insufficient in quantity, and by a short, wet or mild season, favoring the growth of aqueous plants of good quality, these animals have food exactly suited to their requirements for only a short time of the year. Their growth necessarily feels the influence of this state of things, their bodies remain small, slight, thin, their hind quarters are devoid of fulness, and their fore quarters are narrow.

On the contrary, within the temperate zones, favored by long, mild and moist summer seasons, during which the soil never becomes arid, the growth of sweet nutritious grasses of good quality is scarcely ever stopped, and furnishes the cattle with a constant supply of food suited to the condition of their digestive organs. Their bodily development is unceasingly increased to the highest degree. Here we have no occasional famines, no periods of fasting, but a continuous abundance of succulent and varied food is the lot of the privileged breed living within these latitudes. And consequently we have fulness of shape, heavy form and gait, and, at the same time, our animals are gentle and yield abundantly.

Mountainous countries and dry lands support only breeds of stunted growth, thin and slender, of lively gait, which are the only ones capable of utilizing the scanty grasses which cover their poor pastures, often difficult of access.

Level countries furnish a more abundant vegetation and richer food, and the size of the animals and their production attain a remarkable development.

Finally, low, moist lands are clothed with the most abundant vegetation; cattle find within easy reach, without the least exertion, or the slightest fatigue, a most abundant food, which they digest while quietly dozing. Under these circumstances the characteristics of the breeds change still more completely. The animal is only a heavy, lofty and solid mass, beautiful of its kind, moving indolently, but gentle, docile, and producing abundantly the substances which constitute its distinctive traits.

The diversity of the breeds of animals is therefore a settled fact, and it is not necessary that a person should have any particular skill to notice it. In

point of fact, nobody has any difficulty in remarking the striking differences between the Durham and the Galloway, the Hereford and the Down, the Ayrshire and the Jersey, among cows; between the Leicester and the Southdown, the Cotswold and the Shropshire, among sheep; between the Berkshire and the Suffolk, the Essex and the Yorkshire, among pigs.

A man unacquainted with farming, may, of course, be ignorant of the names of these different breeds of cattle, but, at first sight, he will at once distinguish the general differences between them.

But this difference between the breeds is not confined to outward appearances only; in fact this is a secondary matter in the farmer's opinion. What he is above all interested in studying is the special production.

The practical farmer trained by careful theoretical studies, will readily recognize in the Durham a great disposition to fatten, the production of an enormous amount of fat under the skin, a boney framework of exceeding fineness compared with the whole mass of the body, but, at the same time, a great craving for abundant, rich and varied food. He will observe, in the Hereford, a boney framework stronger than in the former, covered with flesh often slighter, but with the lean and fat better distributed, more tender and juicy, and therefore more prized by meat fanciers. He will notice that its development is less precocious, that it fattens more slowly, but that it is less exacting in the choice of its food, because the animal easily fattens on ordinary food, which valuable quality causes it to be much sought after by men who make the fattening of cattle a special business.

The Galloways are a strong and very docile breed. They are quick and good eaters, middling milkers, and yet give a milk very rich in cream; reaching their full size while quite young, fattening easily on moist pastures. They sometimes weigh over 800 lbs. when only four years old.

The Ayrshires are a hardy breed, easily satisfied with their food, able to adapt themselves to the most varied treatment, excellent milkers, but more remarkable for the abundance of their milk than for its richness. And yet their yield is closely connected with the food which they are given, being abundant when the food is rich, and poor when they are underfed.

The farmer will observe at once that the Jerseys are of small stature, owing to the influence of the pastures of their own country, on which they can live the whole year round. They excel as producers of milk, or rather of cream, for their high reputation is based, less on the abundance of their milk than on its excessive richness. If the reports of some experiments can

be relied on, the yield of butter from some Jersey cows is something prodigious. Amongst others, mention is made of one which is said to have given, during the two years after her calving, 358 pounds of butter a year. From sixteen to seventeen pounds of butter a week are admitted to be quite a frequent occurrence, but these are extraordinary cases. Besides, they are ill-shaped, as are most of the breeds of cattle raised for the special production of milk.

Our practical farmer will also notice in our Canadian cow some very precious qualities ; a moderate appetite which enables it to thrive in the midst of the greatest scarcity, a hardiness which the severest rigors of our climate cannot overcome, and great milking qualities in spite of the neglect with which it is treated. Considering the manner in which this breed is treated almost everywhere, he will certainly wonder that this precious quality has been kept so long. It is a matter of public notoriety that the Canadian cow, in the most backward parts of the province, from an agricultural point of view, is still the one which thrives best on the scanty food given to milch cows. On the other hand, these excellent qualities are outbalanced by numerous and serious defects, among which its bad shape is not one of the least.

He may make similar observations on other kinds of animals. He may recognize in the Leicester an extraordinary precocity, a tendency to fatten carried to the highest perfection, the faculty of producing a fine and soft but not abundant wool. Yet it is, at the same time, too delicate and too exacting in the choice of its food. The Cotswold is less precocious, fattens more slowly, is not so perfectly shaped, but it is very hardy, produces abundance of finer wool and of better quality. The ewes breed longer, are larger and less difficult in the choice of their food. The Cotsdown are the most perfect English breed for their shape, the fineness of their wool, their precocity, as well as for their disposition to fatten, and their hardiness and moderate appetite. And so on for the other animals kept on farms, whatever may be their kind.

Cattle therefore present remarkable differences in their characteristics, their shape and reproductiveness. Yet, it is universally admitted that all animals of the same species have come from the same source, issued from the same male and female, and afterwards spread over the whole earth, under the guidance of their Creator's providential hand.

Whence, then, do these differences arise ? By what means have these animals, issued from the same stock, become diversified to an almost infinite degree ?

Numerous causes have contributed to bring about this result, the climate of the different regions of the globe, the distribution of rain and heat over its surface, the special direction given by man to animal reproduction, certain local circumstances scarcely appreciable at first sight, but which, acting unceasingly although slightly, during a long course of ages, have brought about transformations in the primitive breeds. To these must also be added the direct action of the males, which has not only permanently produced certain characteristics, but has also developed others from their latent germs.

But the food given to animals is, unquestionably, the most remarkable among these creative influences, and it is safe to say that it goes far beyond all others, and entirely absorbs them.

In fact, what is the result of the climate, of the distribution of rain and heat on the surface of the globe, but the production of certain fodder plants, and consequently of the food which they will afford for the cattle? Cattle live in the midst of the greatest plenty, attain their utmost growth in the shortest time, and all their productive faculties are developed in the highest degree, in countries where rain, heat, climate in a word, favor the constant production of succulent, rich and varied food. In a few years all the animal kinds attain a remarkable degree of perfection without any intervention on man's part.

Where, on the contrary, these influences are unfavorable to the production of their food, cattle are fed irregularly, sometimes miserably. Short periods of abundance succeed long months of fasting. Their early growth is frequently stopped, their development is slow, and the time thus lost is never regained. They are doomed to be of small stature, their shape is faulty. They are merely flat, long animals, as narrow in front as in rear. Their issue undergo the same deterioration, and are inferior as producers of milk, as well as for the cattle market or as wool producers. Neither does the particular direction given by man, nor the local circumstances, the nature of the soil, its state of moisture or drought, act in any other way. The whole matter resolves itself into this one question, namely, the production of rich, abundant, succulent and varied food, suited to the animal's needs, and to its digestive organs.

We may, therefore, repeat again what we stated in our conference last winter, at a meeting of the Dairy Association, namely—*That cattle are what their food has made them.* This is only a repetition of the more forcible saying, which has now become a proverb in the countries most advanced in

agricultural progress—*Such as the fodder is, so are the cattle.* This is affirmed without any hesitation, and expresses, with as much energy as truthfulness, the close connection between the improvement of the soil and that of the cattle.

According to this principle, the size and productive qualities of cattle are necessarily subordinate to the food supply of the countries where they live. Any attempt at improving cattle without improving their food is a contradiction, and can only lead to the most injurious consequences.

Every intelligent farmer is well aware of the superior qualities of the Durham, the Hereford, the Leicester, the Hampshire, the Suffolk and Yorkshire, and we know that they have all attained a perfection not surpassed by any other breeds in the whole world. And yet, if we take them to countries where the production of fodder is insufficient, and deprive them of the rich food which has contributed to their perfection in the country from which they originally came, we will see these splendid animals degenerate rapidly and descend even below the ordinary level of the breeds peculiar to this backward country.

On the contrary, any kind of cattle, even the most defective, can be improved. Their miserable condition is only the necessary result of the ill-treatment which they have received during several generations. Let us change this treatment, and replace their perpetual misery by continual abundance, and we will be astonished at the rapidity with which the most neglected cattle become transformed, embellished and perfected in every respect, without any assistance from the cattle raiser, and solely from the fact of their food having become richer, more abundant and varied.

The improved breeds are not kept up otherwise than by means of substantial diet, affected as little as possible by changes of temperature. A condition of success is, therefore, that system of farming which provides their winter food by means of a full supply of roots, dry and ensilated fodder, and their summer food by rich and well kept pastures, or better still, by green fodder cut expressly for the purpose of feeding the cattle daily, in sufficient and regular quantities.

On the other hand the unimproved natural breeds are satisfied with the food and defective treatment to be found in the backward systems of farming, of which they are the result. In times of plenty they reach their highest degree of improvement, and when food becomes scarce, they are still in a condition to support its drawbacks without any great falling off.

It may be laid down as a general rule, therefore, that, before entering upon any rational plan of improving cattle, the system of tilling must first be carried to perfection, especially in view of the production of food.

The English farmers, our masters in this branch of industry, have not acted otherwise. If it were not for the great progress made by them in their style of farming, what would have become of these now celebrated breeds of cattle? They would now be what they were at the commencement of this century; large sized cattle, but badly shaped, slow of development, great eaters, but feeble producers. Their practical good sense shewed them that in agricultural improvement lay the source of great wealth. They set to work at once, but commenced in the right way. From the very outset they brought their agricultural progress to perfection, by their constant efforts to produce more abundant and varied supply of food.

The introduction of the turnip, or, at least, its cultivation on a large scale, dates from this period.

We have only to follow their example and rely on the same principles, to attain the same results. Our indigenous races, like the English breeds, are susceptible of great improvement wherever farming is carried to perfection.

This work of improvement began in some places about thirty years ago, and already a marked change can be observed in the breeds of horses, cows, sheep and pigs.

But this improvement in farming must be gradual and carried on by successive stages. The first step in this direction is the introduction of artificial meadows, and the formation of more abundant pastures. This enables the farmer to commence immediately by giving more abundant and regular food to his cattle, so as to support more of them on the same extent of land. It also renders their supply of food more independent of changes of seasons.

However, this is only a commencement. We must not stop when we are only fairly under way. We must advance by degrees in the path of progress. The next step will be to increase the extent of ground allotted to artificial meadows and green fodder. After this will come the cultivation of root crops and even the use of silos for keeping green fodder. If means can be found to ensure its success.

The cattle can then receive abundant, richer and more varied food in Winter, while during the Summer they are kept on pastures of better quality.

When this phase of progress in farming has been reached, we will see a renewal of the wonderful results which have rendered the countries most advanced in agriculture famous, that is, to say, a general improvement of the breeds of cattle.

And yet people fear to adopt this plan of improvement, although it is so simple and is really the most efficacious, and this fear is not owing to any doubt of its practicability but only because it is considered as too slow. This is a great mistake, the very opposite of the truth. Improvement in food is the safest and quickest way to improve the breeds of cattle. The experience of the eminent agriculturists who have already preceded us will convince us of this.

Let us select some locality where the proper principles of farming have not as yet penetrated, and where only poor and unproductive cattle are to be found; let us choose the first cow that comes to hand, couple her with a bull of the same breed, so that we may be certain that the influence of an improving type will not contribute in any way to the improvement sought under these disadvantageous conditions.

During the whole period of gestation, until she calves, the cow should be fed abundantly but not to excess. The calf obtained from her this way will be better in appearance than the generality of those of its kind. Let the same choice and abundant food, suited to its age, namely, good milk and of sufficient quality, be given to it while it is suckling, and, after it is weaned, good grass be given to it during Summer, and good fodder and root-crops in Winter.

By following this diet, the animal will be better shaped, and when it is only one year old it will be nearly as well developed as the average ones of its kind, which have been brought up in the usual careless way, are at three years.

Let us produce in this way three or four calves, male and female, following the same improved plan. Let us couple them together, and treat their offspring in the same way. On reaching the second generation we will be astonished at the results, and at the third, the progeny of the new family will be so different from the primitive type that it will be very difficult to believe that they belong to the original breed.

All the characteristics, all the qualities of the breed can be perfected in this way by proper feeding. The size and shape are, indeed, the first to feel its good effects; but milking, precociousness, tendency to fatten, im-

provement of the fleece will follow close on them, and loudly proclaim the beneficial results of food upon the improvement of the cattle.

We do not pretend that the wonderful improvements obtained in our time amongst the different kinds of cattle, are due only to their food. Far from it, we readily admit as regards all the improved breeds, that a great deal is due the influence of a careful selection of males, whether the founders of these breeds have brought about this improvement by selection, or by half-breeding or cross-breeding. All that we wish to show is that the best way to improve cattle, is to improve farming in view of the production of fodder, and in this we think we have succeeded.

J. B. D. SCHMOUTH,
Professor at the St. Ann's Agricultural College.

FEEDING OF MILCH COWS.

Mr. President, Gentlemen,

When I accepted the invitation of your secretary to address this meeting for a few moments, I had no intention whatever to convey any information to those who are assembled here and who form so distinguished a representation of the *elite* of Canadian agriculturists. My aim is a more modest one. If I can only succeed in awakening your interest by conveying to you the result of what few observations about dairying I have been able to make, whether in the course of my studies or of my travels, both in France and elsewhere, I will be fully satisfied.

This branch of industry has a very wide range, and you are all well aware, gentlemen, that its importance is daily increasing in Canada. This is also the case in Europe, and particularly in France and in England. In the older countries at least, this is owing to the very great improvements made during the last few years in the immense territory of the United States. The use of the most improved implements enables the farmers of that country to raise wheat at such low prices that the French farmers, even those who farm the best lands, cannot withstand their competition and are forced to look elsewhere for profit. Notwithstanding the protective duties imposed by the Parliament in 1885, the situation does not appear to-

day to be in any way improved. Not only does American wheat arrive at Atlantic ports in enormous quantities, but, moreover, in consequence of the facilities of communication by Suez, the wheat from India floods Marseilles, our chief market on the Mediterranean coast.

On the other hand, the consumption of meat, milk, butter and cheese, has been steadily growing with the increased comforts of living in cities. This then is the real outlet. And so well is this understood by the farmers, that all who can do so, raise cattle either for producing milk, or for producing meat, their chief speculation. To such a length are matters pushed by some of them, that there are farms on which no wheat is raised at all, but only fodder and grain to feed the cattle.

Dairying has, therefore, attained considerable development everywhere. Societies such as we have here in this Province have been formed for the purpose of instructing, enlightening and guiding the masses, and especially of spreading improvements as far as possible. Herd-books have been compiled for our principal breeds of milch cows. Norman cattle, as well as those of Brittany and Flanders, are now registered as carefully as the Durhams, Ayrshires and Jerseys. Special competitions or fairs for milch cows have been got up, to show the merits of certain breeds, or of particular individuals. Finally, the proper feeding of the cattle, which had scarcely been studied up to this date, has been developed and demonstrated during these latter years, by the French and German physiologists. The results of their studies, when they are brought within the farmer's reach, cannot fail to do him unquestionable service.

Yet this great problem of feeding is still attended with obscurity. Much still remains to be done, and one may almost affirm that this science will remain in its infancy so long as physiology, namely, the complete study of the animal functions, shall not have finally determined the methods to be followed in feeding.

The question which now occupies your attention, gentlemen, comprises so many subjects, and they are all of such importance, that I have thought it right to select one of them, and try to treat it in detail as far as possible. Acting upon the suggestion of your honorary director, Mr. Casavant, and of your secretary, I have taken up the feeding of milch cows. I will endeavor to tell you whatever is of most value in what I have seen in my own country, to give you examples of the rations looked upon as typical in the best dairies, and to compare what is done in France with what is done in Canada. To this attempt I will devote my best efforts, and

I think I am not asking too much to claim all your indulgence in return for it.

Milking qualities have to be considered in individuals. We must know where the product comes from and how it is formed, in order to understand all the importance of food in the production of milk. Milk is prepared in the mammary glands, and it is a result of the dissolution of the secreting organ. It is not merely a liquid eliminated from the blood, as it was for a long time believed to be. The composition of the ashes of milk fully confirms this opinion. In fact it contains a great deal of potash and of phosphate of lime, whereas all the fluids which separate directly from the blood are especially rich in chloride of sodium. The ashes of milk contain three and even as much as five times more of potash than of soda, whereas blood ashes contain five times more of soda than of potash. All this may go to show that the mammary vessels have not all the importance attributed to them when comparing the milking qualities of different cows. The function of these veins, like all the others in the system, is to bring the blood back to the heart after it has passed through any organ and after depositing in it the elements it contained. This shows that the development of the veins will indicate not only the quantity of blood which is withdrawn from the udder, but also, as a consequence, it shows what blood has been deposited there and has contributed its elements to the formation of the new glandular cells. It is perfectly logical, therefore, to take the milk vein into account. However, it may be remarked that it is necessary to consider the age of the animals, as animals have this vein less developed, while they are still growing, than cows which are full grown.

The quantity and quality of the milk are therefore determined in the first place by the general development of the lacteal gland. The question of feeding occupies only a secondary place, but its importance is none the less, especially in regard to the quantity of milk produced. Even when fed upon the same diet, one cow will give but a small quantity of milk, while another will give a great deal. It is a well known fact that the milk of cows kept on mountains is generally poorer in butter than the milk of cows living on low lands or near the sea. This is because, in the former case, the cows breathe a more bracing and colder air than the others, and they are obliged to consume more fat, to maintain the temperature of their bodies. All the large breeds of milch cows, and especially those noted for their butter, dwell near the sea shore. All the Jersey, Cotentines and Brittany cattle show this. On the other hand, if we wish to obtain a milk rich in caseine for making cheese, it is furnished in abundance by the breeds

living on the higher grounds. In France the cows of Salers, living on the mountains of Auvergne, in Switzerland those of Fribourg and Schwitz give a milk poorer in butter, but which makes excellent cheese.

In France milch cows were subjected to two very different systems of diet during the course of the year; the Summer diet, during which they were pastured or fed on green food in the stables, and the Winter diet, when they were almost wholly confined to the stable, and which was made up of hay, straw and farinaceous food. From what I have been able to learn since I came to Canada, things are not done exactly the same way here. The cattle are, indeed, pastured in Summer, but in Winter they receive much straw, only a little hay, and no grain at all.

Let us now see why in France our cows are not treated in the same way. This is owing, I believe, to two causes. The first of these is the cultivation of beet-root sugar. During the continental blockade the chemists all sought for the means of extracting sugar from a number of plants. The first beet-root sugar factory was started in 1812. This industry, which is now carried on upon an extensive area (150,000 hectares, or about 450,000 arpents,) had an enormous influence, not only on the fertility of the soil, but also on the improvement of the cattle. The residue left after making the sugar, and which is known as pulp, is, in fact, an excellent food for milch cows, oxen, and even for fattening cattle. All the nitrogenous elements of the beet-root remain in the pulp, while the sugar, which is only a ternary compound, takes off the carbon, oxygen and hydrogen, which substances the farmer has not to restore, as the plants can always find them in sufficient quantities, either in the soil or in the atmosphere. The improvement of our most beautiful breeds of cattle dates from the cultivation of the beet-root. Thanks to it, consumers in the neighborhood of the large cities can now count on a constant supply of milk during the whole year.

When I consider the amount of good this industry has done in France, I cannot help wishing success to the enterprising men who are endeavoring to introduce into Canada an industry which will certainly exercise the most beneficial influence upon the soil as well as upon the cattle.

The second cause is the discovery of ensilage. This proceeding has been in use for a long time on a small scale, to preserve vine leaves for feeding the goats of Mont d'Or. It was not generally followed in France until after 1872, when the first maize silos were made. It spread rapidly after this date, and gave general satisfaction to those who tried it. The construction of silos was perfected, until a farmer in the south of France undertook to lessen the

cost of construction and made a stack of lucerne grass in the open air, and loaded it down with stones. His example was followed by others, and the new process became so general and gave such satisfaction that during last year the Royal Agricultural Society of England held a competition for the best silo, and for the best silage-stock. The judges made a long examination of the best of each kind and concluded by giving the silage-stock the preference over the silo.

Cows can now be fed upon one diet only by means of ensilage and root crops, namely green food. It does not require a long time to show all the advantages of such feeding. Everybody knows that green feed allows of the production of the greatest quantity of milk. We have now to examine in what way this food is consumed, and what process must be followed to obtain the maximum yield with the least quantity of food.

On many farms the animals are still allowed to roam about the pastures. But since exhaustive tillage, such as that of corn, or beet-roots, for instance, is adopted on a large scale, this practice has considerably fallen off. Farmers prefer paying something to distribute the food and keep their cattle in stables during the whole year so as to procure the greatest possible quantity of manure. In places in France where what are called artificial meadows are made, of clover, lucerne-grass and sainfoin, this pasturage does not suit well in consequence of the waste caused by the heavy cattle walking in the midst of such abundant harvests. It is then replaced by picket pasturage. The rope is about twelve feet long, and the stake a foot and a half. The cows are put in a line, at a distance of about twice the length of the rope from each other. Then from time to time, as required, the stakes are pushed forward at equal distances and the cattle are watered from a large barrel on wheels. In this way the waste is greatly lessened, and on the same space of land one-third more animals can be fed. This style of pasturage is not used for cows only, it is applied to horses. The Anglo-Normans are tied this way during summer in the department of Calvados.

In any case and in whatever way it is used, the fodder obtained from artificial meadows is of the utmost importance in feeding cows.

I will here make a digression, and remark, by way of parenthesis, that I have been very much surprised to observe that clover and lucerne are so little cultivated in Canada. I can even say that the lucerne is not cultivated at all. I have seen it on only one farm, at Mr. Casavant's. He brought the first seed from France, and bought the rest at Montreal. This distinguished farmer cannot give sufficient praise to this leguminous plant. He grows it

not only by itself, but also mixed with timothy, and thereby utilizes not only the upper but also the lower portion of the soil as well.

The yield this year was equal to that of the best years in France. Then towards the end of August a second cut produced nearly a ton. This makes a total of three and a half tons to the arpent of hay superior in quality to timothy and equally prized by all the cattle on the farm. The hay-making is done very easily. The lucerne is gathered into small heaps and turned over once, taking the precaution to retain as much leaves as possible.

It need not be stated that the lucerne is an excellent plant for ensilage. All kinds of soil, provided they be good and deep, are suited to it. The soil on which Mr. Casavant grows his lucerne is calcareous, but I have seen this plant growing all over, even on the shore of the sea in deep sand.

The sain-foin belongs to the same family as the lucerne-grass. It is extensively raised in the south of France. It prefers dry calcareous soil, and does not stand the frost as well as clover does.

Other kinds of hay are also raised for summer feeding. Vetches are sowed in Spring or Autumn and form a very rich food. The rapid growth of buckwheat often enables the farmer to avoid a scarcity of fodder or to replace a harvest which has failed. It is fit for use forty days after it is sowed, but it is a poor food and the cattle do not care for it.

The best time to cut it is a little before it blooms. After this the cellulose of the plant assumes more consistency and is not so easy to digest. Green food is given unstintedly, for its composition changes so much, according to its nature and the time of its consumption, that the appetite of the cattle is the only guide to go by. If the grass is very young, it is better mixed with a little straw than alone.

When cows are kept in the stable, certain precautions must be taken to prevent meteorism. Milch cows eat gluttonously because they produce a great deal.

The hay should be cut in the early morning. This will save putting it in large heaps or gathering it in the hotter part of the day, which would make it heat much more easily. Care must also be taken not to let the cattle drink immediately after eating, as this would bring on meteorism.

Corn often forms an item in the summer food. It is a good article of food, but it is incomplete. Cattle eat it eagerly, because it contains sugar in large quantities, but it is very poor in nitrogenous matter. Whenever attempts have been made to feed milch cows with corn only, it has

been noticed that the supply of milk lessens. This food cannot be given alone. In France it is customary to add to it a little oil-cake which contains a great deal of nitrogen within a very small compass. By ensilage the proportion between the nitrogenous and non-nitrogenous elements of the corn is somewhat improved, because a certain quantity of sugar is changed into alcohol. Wheat chaff is also thrown sometimes into the silo, to obtain this proportion to a certain extent. The whole is also preserved by taking care not to put in too much straw. One-fifth in volume, or one-tenth in weight is the limit which it is best not to exceed.

The winter feed requires more skill and care on the part of the farmer. In fact it should be arranged in a such way that the cattle are never limited to dry food only, or the milk will only be produced in small quantities. During this season milch-cows are generally kept altogether in the stable, the temperature of which is constantly about 60 degrees Fahrenheit. Beyond this temperature the cattle may perspire, below it they are obliged to brace themselves against the cold, and in doing so they consume a portion of the food they eat. They are not taken out even to drink. Good milch cows drink copiously, and it is very important not to give them the water at the outside temperature. It should be warmed to at least 60 degrees. Liquid taken cold must, when inside the body, heat itself at the expense of the food which might be employed to form milk. The result would inevitably be a diminution in the supply of milk given by the cows. On the other hand care must also be taken to avoid falling into the other extreme or giving them warm drink, as it would have the effect of weakening their digestive organs.

As to the food, it is composed, first of all, of hay. The best cattle raisers reckon that it takes at least one pound of hay for every hundred pounds of live weight. Either meadow hay, or clover or lucerne hay is used for this, as these cost less because horses eat but little of them in Winter. Beets with ensilage form the watery basis of the ration. Pulp and malt are excellent. Potatoes are given cooked or raw. Oil-cakes given in small quantity form the concentrated part, the rich portion of the ration. Rape seed, linseed, cotton seed are the most used. The quantity must not exceed three pounds a day for each head of cattle. A larger quantity, especially with the first, would give the milk a bad taste.

The following are some specimens of mixed rations:

Holland cows weighing 1250 to 1300 pounds received from the cattle feeders in the environs of Paris:

10½ lbs. of lucerne hay.
21 " " oat-straw.
10 " " shorts.
2 " " very fine bran.
21 " " malt.
1 quart of rape seed cake.

These cows were kept fifteen months, and were in good condition for the market.

At the Alfort Veterinary School, milch cows weighing 1050 pounds received daily:

10½ lbs. of lucerne, second cutting.
21 " " oat-straw.
9 " " shorts.
33 " " beets.
2 " " rape seed cake.
1½ gallon malt.
1 quart very fine bran.

At the Grand Jouan Agricultural School, the Parthenaise cows, weighing 1050 pounds received:

10½ lbs. meadow hay.
10¼ " clover hay.
28 " beets.
2 " rape seed cake.
2 " bran.

This last ration had been calculated by the students of the school, on the data furnished by Wolf, a German author.

The above examples represent what is judged the best to be done in the most prosperous establishments. There are several farms on which cows are not fed in this way, although the cows are milked all through the Winter. However, even there the food is good and the rations vary to an infinite degree. With hay of average quality, beets, straw and a little bran, I have seen milch cows kept in perfect condition. On another farm the winter food was hay, ensilated corn, straw and ground grain. This food, which is about of average quality, would do for the Canadian farmers who still persist in straw diet. The aim in view would be attained, and I think that those who would try the operation would find it profitable. In the present state of things, it is evident that a farmer of this province cannot adopt either of the

rations mentioned above. And even if he could, supposing that he had all the articles required for it, the operation would not be an economical one for him. But there is an immense difference between what is done in the environs of Paris and what is generally done here, and it would be good and profitable to lessen this difference. This would require our farmers to see perfectly and understand all the importance of root crops and hay, not only for the purpose of feeding cattle but also for improving the soil. The cultivation of the beet-root has increased the yield of wheat in France, and has enabled the farmers to clean the land, to feed their cattle better, and afford employment to thousands of hands. The lucerne and corn which are not plants ulilized by industry, play a subordinate part perhaps, but they are certainly none the less beneficial.

It only remains, then, to make known and bring within reach of the public whatever can be done usefully and with economy. Such is the self-imposed task of this association, and the devotedness of those who first conceived this great design is beyond all admiration. May the future realize their hopes! Such is my earnest wish for them and for all farmers who have the welfare of Canada's agriculture at heart.

I now bring my remarks to a close, gentlemen, as I am unwilling to trespass longer upon your patience, and I thank you for the kind attention you have paid me.

M. FREY,

Graduate of the Grand Jouan Agricultural School.

SKIM-MILK CHEESE.

Afternoon sitting of the 20th January, 1887.

Mr. BARNARD raised the question of the richness of cheese.

Two or three of the speakers at the conference to-day alluded to the difference to be found between pastures in connection with the richness of the milk, saying that certain lands are better suited to producing butter, because they are richer, whereas others are better for cheese, because they are richer in the substances which compose cheese.

I would be very glad if the Chairman (the Abbé Gerin) would have the goodness to communicate to us the information he has obtained on the question.

Abbé GÉRIN: I have not made any special study of the matter, but one of my parishioners who is now here, keeps a butter and cheese factory, for many years past. He has studied this question for a long time, and if he wishes to do so, he can give us a great deal of useful information upon it.

There are two establishments in my parish, one kept by Mr. Clement, who makes butter and cheese, the other by Mr. Baril, who makes only cheese. I cannot say how much Mr. Clement pays his patrons for every hundred pounds of milk, Mr. Baril gives 85½ cts. I think that for the whole year this is an excellent result. Notwithstanding this, Mr. Clement obtained a great deal more by selling to the same purchasers, at least generally. The result was to Mr. Clement's benefit.

Mr. CLEMENT: By the sale of my cheese, I paid my patrons on an average 92½ cts. If I had thought it would be of use I would have prepared an exact statement in detail, but any how the result obtained for the patrons was 92½ cents for every hundred pounds of milk.

Mr. BARNARD: Do you buy the milk?

Mr. CLEMENT: No. This year we worked on a percentage, 15 0/0 for cheese and 20 0/0 for butter. I sold all my butter and cheese at my own place.

Mr. J. C. CHAPAIS: It is the old question of the combined system, which is started again; the question which is debated at every convention. I would have been very much surprised if this one had passed off without its coming up for discussion.

We have adopted the combined system for about six years, and I have watched its working with close attention. I have already had occasion several times to speak of it at our meetings, and I have done so, not as a bitter partisan, but as a man wishing to satisfy himself. In an adjoining parish, on land in all respects identical with ours, with cattle of the same breed, there are some establishments which do not follow the combined system, and I have made a comparison between them and ours. After six years working, some of which have been very disadvantageous, I find to-day an average of 85⅛ for every 100 pounds of milk, which our combined system has paid its patrons. We have reached as high as 99 5/11 and 97½. This year it is 91 9/10. Last year it was only 54⅓. You see my average is taken under very unfavorable circumstances. Yet I arrive at a strictly exact average of 85⅛.

This year, when the question of sending cheese to the Colonial Exhibition came up, as I had trouble to obtain permission to send partially skim cheese, I succeeded in having some sent. We forwarded four cheeses to the Ayer firm at Montreal. They were taken from a lot that had been sold at 8 cts. For fifteen days we got no news of them. We got nine from Mr. Ayer, and his agent came to St. Denis to buy our cheese. Our cheese was sold at the same price as full-cream cheese to a man who knew that it was partially skim. We sold the butter from twenty-four to twenty-five cents.

I am in favor of the combined system because it succeeds better. I have noticed that the purchasers who were at first prejudiced against partly skim cheese, and who vowed that they would never buy ours, were doing their best this year to get it.

Mr. BARNARD: Does the average of eighty-five cents per 100 pounds include the conveyance of the milk.

Mr. CHAPAIS: Yes, the establishment has always conveyed the milk free of cost.

Abbé CHARTIER: I now begin to understand the question somewhat. There is no doubt that the manufacture of butter and cheese at the same time succeeds better. This I believe is beyond doubt. But the question is not of the actual sale only, the public welfare for the future must also be taken into account. On dairying rest our brightest hopes for the future. If its prosperity is to be assured, we must put good cheese on the market.

Mr. BARNARD: Here is a fact, Mr. Chairman, proving that skim cheese is good: The very traders who told me themselves that this cheese was no good, who almost swore at St. Hyacinthe that they had been cheated, that

the cheese was decayed, these very parties, whose names are known to us, write, telegraph, come all the way from Montreal to thirty leagues below Quebec, to get this cheese when cheese can be had anywhere. It is not likely that experienced traders would go so far in search of bad cheese for the purpose of making money. This proves that the cheese is good.

If I have stood up to discuss this question to-day, it is to ask the association to study it, so as to settle it once for all. I desire that the too lively discussions we have had these last years about this question should not be renewed. Mr. Chapais has a skim cheese factory, and he might send us a few cheeses. We would keep them so as to ascertain what they are worth ten or twelve months after being made. I am interested in having the truth made known, because I wish to know whether I am right or wrong. At a very important meeting some time ago, where some hundreds of distinguished visitors were assembled from all parts of the country, skim cheese was served out. Among those present were several English judges of cheese and some of them exclaimed: How is it! this is skim cheese. Why, it is as good as full cream."

You have been told several times to-day that some kinds of milk are richer than others. Every body knows this to be the case. Now, while in Upper Canada, where first quality cheese is made, there are Durham cows and other similar breeds which give only three pounds and a quarter of butter for every hundred pounds on an average, I get as much as six pounds and a half of butter for every hundred pounds of milk from my own cows, which are half Jerseys, and this I get, not at one trial or at a fair, but in the every day course of events. We put three or four hundred pounds of milk into the centrifugal. The butter was made at onee, well drained of its milk, put up in quarter pound prints and sold on the market. In this way we ascertained that we made 6½ pounds of butter for every hundred pounds of milk, in the month of August last. So that I had double the richness of the milk in Ontario which makes the best cheese. I have no hesitation in stating that the Ontario factorymen receive at their establishments a portion of their milk more or less skimmed. They have then skim-milk.

In the Province of Quebec, with Canadian cows, and rich pastures, as was explained to you to-day, we have milk worth 40 to 50 0/0 more than that of Ontario. This is precisely the situation. Yet the Ontario people will sell their cheese for 13 cents, while we get 12 cents. They will sell their cheese for 10 cents, while we get 8 cents for ours. With our milk which is richer than theirs we make less money than Ontario. To me

personally this is a matter of no concern whatever. It is true that I have a small factory, but it was not for purposes of speculation that I started it, but rather with a view to studying and solving similar questions if possible.

I ask the association to take means this year, to procure, in the months of June, July, August, September, October and up to the month of November, some samples of skim cheese to be had from Mr. Clement or other manufacturers. We could do the same thing for full cream cheeses, and keep them, by using proper precautions, as long as they will keep. We might then taste them at the conventions, and decide upon their value.

ABBÉ GERIN: Let Mr. Barnard make no mistake as to the intention of those who take the liberty of differing from his opinion. We know his zeal, and we are aware that he studies this question from the stand-point of general interests. We must not take into consideratiou this or that establishment below Quebec or near Montreal. We must consider all these establishments as forming a great mercantile establishment and private interest must give way to the general welfare. To my mind the question is to know whether traders in general pay for skim cheese a price nearly equal to what they give for full cream cheese.

MR. BARNARD: When you sell an article of produce that can be tasted, you do not sell on the strength of its outward appearance or on account of the stamp on the box. You sell it because the purchaser tastes it and finds it good. This is how the buyer purchases by wholesale and retail. He takes a sample of cheese, tastes it and asks the price. Of one thing you can be sure, Mr. Chairman, that in England where our market is, the dairy associations are controlled by the leading and the richest men in the country. These associations make from 25 to 30 different kinds of cheese. They make cheese more or less rich and others more or less skimmed. They exhibit at every fair. As high prices are offered there for cheese partly skimmed as for full cream cheese. It is a question of economy. A man may have the means to pay 18 cents for a pound of cheese, another with less means would prefer eating a proper cheese and paying less for it. If you make butter and cheese from your milk, you will sell this cheese to those who cannot buy the richest. This is the whole commercial question. Wherever cows are to be found, in any part of the world, cheese is made more or less rich. A large quantity of less rich cheese is made, sold and eaten because it is good.

It is quite possible to make skim cheese which may not be good cheese by the time it reaches England. This will happen to rich cheese as well as

to cheese which is more or less so. But if it is not good, it will not sell, for cheese is bought after being tasted.

Mr. TACHÉ: One thing is certain, that for us the whole matter resolves itself into a commercial question. But the only way we have to learn the tastes of our consumers is by the demands they make upon us for cheese. If the English consumer applies on the whole to us for a poorer cheese than the one we sell him, how can it be that our cheese exporters have a repugnance to handling such poor cheese?

Mr. BARNARD: If the purchasers were humbugs?

Mr. TACHÉ: I would like to know exactly where the truth lies.

Mr. BARNARD: The purchasers who declared that they would never buy cheese made on the combined system, afterwards strove to get it. They made this declaration in presence of the President, if I understood rightly.

Abbé GÉRIN: I have always been under the impression that the buyers who purchase cheese made on the combined system send it away with the rich cheese as soon as they judge it good.

I do not discuss the value or quality of that cheese. There may be a difference. It may be good without being equal to the other.

I asked the purchasers how it was that they purchase skim cheese at a price nearly equal to the other, when butter has been made out of the same milk. Their answer was that they buy it because it is good. I told one of these exporters: "But you mix cream cheese with full cream cheese. On arriving in England it may depreciate the other." He answered that they distinguish it when sending it to England. This I was at a loss to understand, because I never saw a distinctive mark anywhere for the two kinds of cheese.

Mr. BARNARD:—Your objection is well put. You ask whether there is not a sort of dishonesty in mixing all these kinds of cheese together, and whether the result may not be to depreciate Canadian cheese in England. This is the whole question.

Now all the reports of the cheese-makers and inspectors of cheese factories show that we have from 10 to 20 per cent of our cheese factories making first class cheese; we have 25 per cent of inferior cheese, and 38 per cent of quite inferior cheese. All this cheese is put on the market as full cream cheese. I will ask the chairman how it is that this cheese, which is

supposed to be all rich cheese, is sold at five or six different prices. How is it that good cheese has its value and bad cheese has its own too. The commercial explanation is very simple. You send the cheese on the market, each box is opened. The buyer tastes them and they are sold according to the taste. You can now understand that even if I would mix thirty cases of good cheese with thirty bad, it would make no difference as to the value of each box.

It would be different if the sales were made according to the mark of the cheese or its reputation. In that case what would be the consequence if I said to a retail purchaser : " these thirty boxes are good," when they were bad. This purchaser would send me back my cheese and deal with me no more. But as he tastes before purchasing, he cannot be deceived as to the quality.

It seems to me that my explanation is satisfactory.

In any case what I tell you is the commercial process for selling cheese in England.

Mr. TACHÉ : If purchasers could make as much profit by selling skim cheese, and at the same time allow the Province to make more profit out of the business, why should they oppose the making of skim cheese?

Mr. BARNARD : Skim cheese is sold because it is good. Now to make it good, one must know how to do so. Skim cheese is harder to make than full cream cheese. Unfortunately, it is shewn by the Inspectors' reports, admitted by Mr. Taché himself, that among the cheese manufacturers of the Province 10 0/0 may make good cheese, and 65 0/0 make it bad. If you tell these bad makers of rich cheese to skim the milk, it would be the same as if you told them to put manure in their cheese. Skim cheese is harder to make than full cream cheese. Those who cannot make good cheese must not be asked to make skim cheese.

The traders are not all honest. They often come to us to deceive us. They make an agreement among themselves, saying. " Let me go to such or such a place, and I will let you go to such or such another place. Let us not run in opposition to each other."

Mr. TACHÉ : That is not the case amongst us, in St. Hyacinthe.

Mr. CASAVANT : I did not expect this discussion would come up to-day, but as I have been one of the partizans of full cream cheese, I cannot allow the occasion to pass without repeating what I have already said. I will explain my meaning briefly.

Mr. Barnard has just said, I take his last words: "The traders are men who cheat us, who speculate on us."

Mr. BARNARD: Some, not all.

Mr. CASAVANT: This is all very well. If these are the only traders to export our cheese to England, I think the best thing to secure the success of the dairy industry of our province would be to pay the necessary expenses to ascertain whether the cheese made in our ordinary cheese factories and partially skim cheese can be sold at the same time and with as much success and whether we can be guaranteed a sure market in England.

I agree with those who wish to derive all the profit they can from the dairy industry, but so long as I have no other guarantees than the explanations I have heard so far, I cannot be in favor of partially skim cheese. The first reason for it is that there are half of our makers who cannot make it according to Mr. Barnard.

Mr. BARNARD: Three quarters; ninety per cent.

Mr. CASAVANT: If we have some factorymen who can make skim cheese, we have a great many who are incapable of doing so, who have no other ambition than to make a few dollars from day to day, and who seeing some factorymen making more money out of skim cheese, would strive to imitate them, and ruin our market.

To my mind, the first thing to be done would be to go to England, and know our market. So long as we can only debate among ourselves, we will arrive at nothing.

The next thing to do is to find professors who would teach our people how to make good cheese.

I have in my possession letters from exporters who told me: "I have strictly forbidden my purchasers to go into such or such a cheese factory, in such a county, the county of Chambly for instance, or to buy cheese there. The cheese makers make skim cheese, they are not even able to make good full cream cheese. How do you expect them to make skim cheese?"

If our cheese dealers are not men conscientious enough to do us justice, let us take the trouble to send the cheese direct to those who sell it in England. Let a report be had upon our cheese. In this way we can have reliable data, and be sure that they will be followed. This should be done by the Board of Directors. A sure market could be found for our cheese,

and we might know what kinds of cheese were most likely to find a steady market.

The exports from the American markets have lessened considerably within the last five or six years. This is owing to the fact that the Americans have exported adulterated cheese. Our exportations have increased because we have always tried to make good cheese.

I am in favor of progress, but not progress for to-day only, because we must live to-morrow, and the dairy industry is perhaps the only actually paying one. What can we make besides butter and cheese? Can we export cattle, when we have to compete with the immense prairies of the West, where pasture costs nothing? Can we stand competition in wheat? It is simply impossible. We have, then, only one industry to develop, namely, the dairy industry. I see no other.

It is, therefore, a matter of the utmost importance, in my opinion, that the Board of Directors should make any sacrifice that is necessary to do whatever had best be done. This is my view of it.

I trust that these remarks will be taken in good part. I submit to the board, and am of opinion that they are the most interested in enlightening us on this question.

Mr. BARNARD: I propose, Mr. Chairman, seconded by Dr. Coulombe, that the Board be authorized and empowered by the Association to procure as many different samples as possible of the best rich cheese and of the best skim cheese for the next meeting.

And now, Mr. Chairman, in reply to Mr. Casavant, who wishes to have professors for cheese making, I will state that I had studied this question before the Association was in existence. By dint of labor and perseverance, I succeeded in having a school opened for training persons to make all kinds of cheese. Unfortunately the Government was influenced by certain parties to such an extent that the school I had taken such pains to have opened was closed. Now, if we regret to-day to find that there is not a larger number of factorymen, it is not my fault, but the fault of those who had the school shut, after all the trouble I had to start it. This school had already produced wonderful results, notwithstanding the short time it was in operation. We have the proof of it to-day. Two of our young friends gave us conferences, which show that they thoroughly understand the business of cheese making. Those young people were at our school some time, and it is there principally that they acquired the knowledge

they have. Take, for instance, Mr. Painchaud, our inspector of butter and cheese factories. You have seen to-day that he has made an excellent report. He passed three months in the school that I had founded. This was all the training he had, although he has learned a great deal since. It is true that he has studied since then, but, after all, the basis of his education is what he learned at that school. Was I not right, then, gentlemen, when I tried, for the last five or six years, to draw your attention to the formation of excellent cheese factories by means of good training schools.

Now, gentlemen, to settle the question, I propose that this Association make every effort to prevail on the Government to open new schools to teach cheese making.

I hope you will admit that it is not out of prejudice that I make this proposition, but that I do so only in the public interest.

To the Patrons of the Butter and Cheese Factories of the Province.

CARE OF THE MILK.

Our association has deemed it proper in your interest to have instructions drawn up by its inspectors, Messrs. J. M. Archambault and Joseph L. Painchaud, upon the way in which milk should be prepared for the factory.

Please read the circular carefully, and you will find it to your benefit to follow it. With good milk, the factoryman will give you produce of better quality, you will obtain larger returns, and, consequently, more money for the milk furnished.

We advise the directors to have these instructions put in the factory regulations, and to declare them binding on all patrons.

THE DIRECTORS OF THE DAIRY ASSOCIATION
OF THE PROVINCE OF QUEBEC.

CARE OF THE VESSELS.—All the vessels and utensils used to receive milk, or used for milking, (cans, strainers, dippers, &c.) should be washed every day with boiling water, rinsed in cold water, and well dried with clean cloths, or put to drain in the open air, free from dust or bad odors. They should also be scoured at least two or three times a week, with a light brine or lye, or better still with a weak solution of washing soda (bicarbonate of soda.) The lye and soda have the property of dissolving all fatty matters which adhere to the vessels or to the cloths. They also prevent the fermentation of substances which may escape the notice of the housewife. Salt has the same properties, but in a lesser degree.

The joints and seams of the vessels should be cleaned with particular attention: it is in them that foreign substances lodge and have time to ferment.

The can in which the whey is brought back to the house also requires special care, which will be mentioned in detail hereafter.

Use only tin vessels for milk, tin being the only metal which does not present any inconveniences. Of course, it is well understood that delf vessels are not excluded.

CARE OF THE MILK.—1. The cows must be milked with the greatest cleanliness. The hands should be always clean, and the cow's udder should be washed before milking her. All the vessels should be washed as stated above, for each milking. Never use wooden buckets.

2. During the milking, as soon as a pail is filled, the milk should be strained at once, either into another pail or into cans or vessels, where the milk can be aired and cooled.

You may use ordinary strainers, well washed. But as it is customary to empty the milk into the can, we advise you to make a special strainer of good unbleached cheese cotton, put in two or three folds on a hoop a little larger than the diameter of the can, and to dip it often in lye or brine. This strainer does its work well and rapidly, and costs only a few cents. We may add, and our experience bears us out in saying so, that it is a prejudice and a mistake that does harm, to believe that the milk does not require straining.

3. As soon as the milking is over, and the straining carefully done, the milk must be aired, so as to let it take the air some minutes before cooling. If you cool the milk before airing it, it will keep the animal odor or the smell of the cow for a longer or shorter time. A long handled dipper is used for airing and stirring the milk.

4. Next comes the cooling of the milk. The usual way is to put the can into a tub of cold water, with or without ice. The milk is stirred continually with a dipper, and the water is changed until the milk becomes as cold as water just drawn from the well, that is, at a temperature varying between 50 and 60 degrees. The cooling is better the sooner it is made after the milking. It is indispensable for the evening's milking, especially during the dead summer's heat.

5. The milk having been first aired, and then cooled, you must put it away for the night in a place sheltered from the dust, mosquitoes, bad odors and moisture. Do not cover the can with its own lid, but with a clear and very clean muslin. The lid should not be put in its place until the milk is on its way to the factory.

6. Treat the morning's milk the same as the evening's. On no account pour the evening's milk upon the morning's, before the latter is perfectly cold. It is better, far better, to have two cans or more to convey the two milkings separately.

7. The patrons should be at the factory, especially in summer, for seven o'clock; never later than eight.

8. It is a dangerous habit to take back the whey in the can used for the milk. But as it is difficult to do otherwise, the following rules should be followed to prevent the milk from being damaged. As soon as the can returns to the house, empty it at once, and wash it as mentioned above. Scald in boiling water and rinse with cold water, then put it on its side so that it may be well aired. Scour it every day, or at least every two days. If you find these precautions useless, just swallow only two mouthfuls of whey and you will change your opinion. This applies especially to places where the whey is kept at the factory in wooden pails.

SPECIAL REMARKS.—1. You must never send to the factory the milk of sick or feverish cows. You must never send the milk of newly calved cows unless it boils without turning.

2. The milk of cows in season should be milked, strained, aired and cooled apart. It must be aired and stirred longer, and cooled more thoroughly. Unless treated the way we mention, this milk will be detrimental to the factory.

If you require milk for the house, choose a cow for this purpose, and put her milk apart. This is to remove any pretext for taking milk from the can. The milk intended for the factory does not belong to you from the time it is aired and cooled.

These dishonest and disgraceful practices, such as keeping the strippings, creaming the milk, watering it, are not general, but they are frequent enough to deserve mention. They amount to a real robbery, and a very bad one at that. Whoever is guilty of it robs his friends, his neighbors and sometimes the whole parish.

When your factoryman points out any thing wrong or refuses to accept your milk, do not take it in bad part. Rather ask his advice, and do not try to excuse yourself but endeavor to do better in future. When you are blamed this way read this circular over again attentively, and you will discover that you have neglected some of its directions. Observe what is said there, and all will be well. This we can assure you. If these counsels are followed, an improvement will be noticed in well conducted factories.

It must not be forgotten that to make money at the factory, you must take milk there, you must Winter your cows and feed them abundantly in

the Summer. Money cannot be made with a cow that takes half of the Summer to recover from wintering, and which is insufficiently pastured at the end of July. Green fodder (especially west Indian corn) is of great help to get over the dry season. With one arpent of west Indian corn well cultivated ten cows can be kept and cared for during three weeks or a month, on a middling pasture. Indian corn continues to grow if the first cutting is made at ten or twelve inches from the ground, above the first knot.

J. M. ARCHAMBAULT,
Association Inspector.

JOS. L. PAINCHAUD,
Government Inspector.

Prizes Awarded at the Competition for Canadian Cows.

The prizes at the competition for Canadian cows were granted as follows:

1st prize,	$50.00.	Mr. Ignace Plamondon's cow,	St. Raymond de Portneuf.
2nd "	40.00.	Mr. Philias Jérôme's "	Ste. Thérèse.
3rd "	30.00.	Mr. Damase Paradis' "	St. Sébastien de Beauce.

Messrs. Calixte Thérien, Georges Carrier, Médéric Lebeau and Louis Boutin's cows were judged by the expert employed by the Association, Dr. Couture, not to have all the characteristics required by the Association for admission to the competition.

J. de L. TACHÉ,
Secretary.

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