REPORT

OF THE

Canadian Dairymen's Association

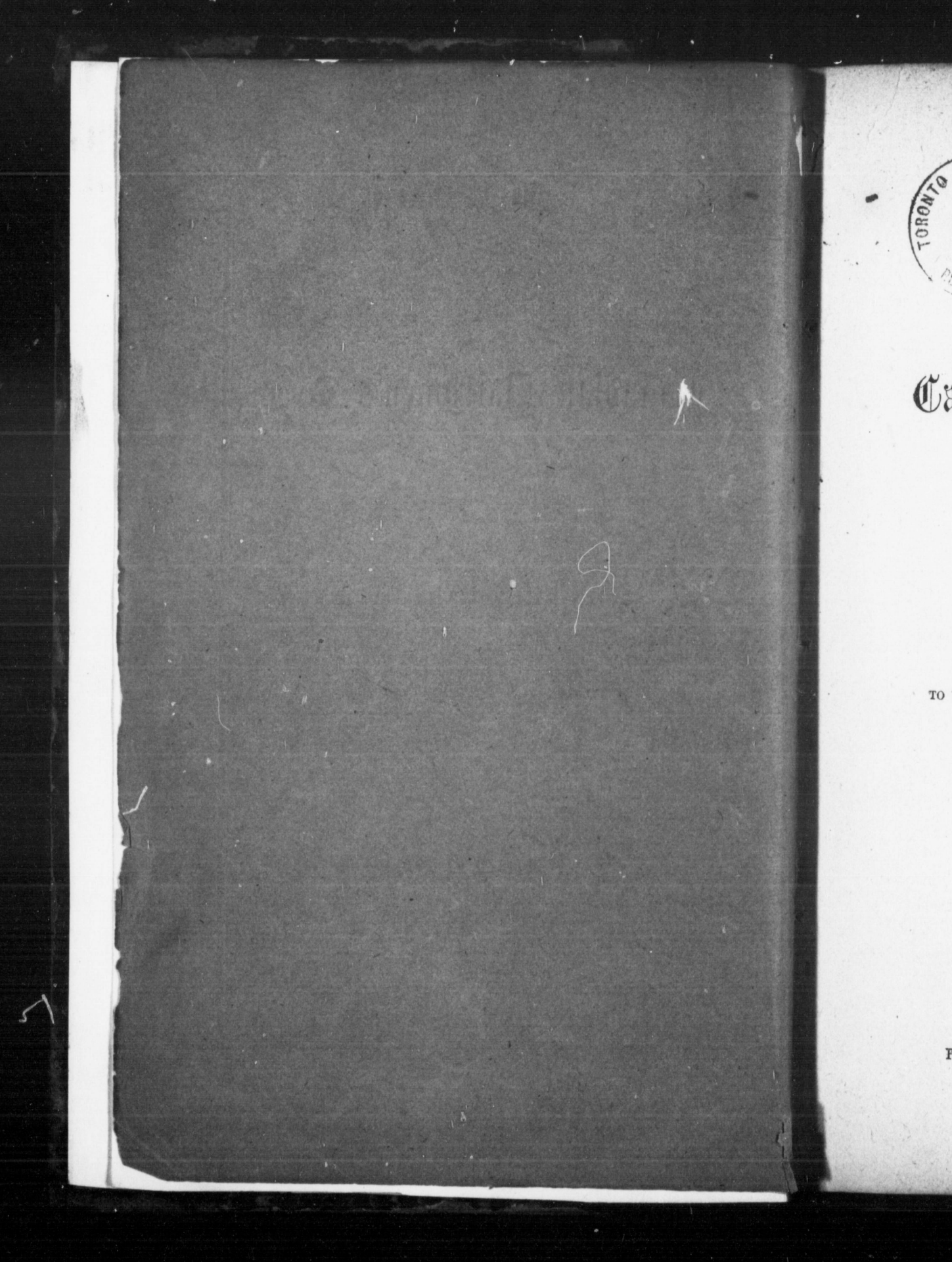
WITH ACCOMPANYING PAPERS, &c.,

FOR THE YEARS 1867 AND 1868:

TO WHICH IS ADDED, BY PERMISSION, THE ADDRESSES OF PROF. GAMGEE AND OTHERS BEFORE THE AMERICAN DAIRYMEN'S ASSOCIATION FOR 1868

PUBLISHED BY THE ASSOCIATION.

TORONTO:
PRINTED BY THE GLOBE PRINTING COMPANY, KING ST. EAST.
1869.



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INTRODUCTORY REMARKS.

HEREWITH is presented to the public the first published report of the CANADIAN DAIRYMEN'S ASSOCIATION, embracing the proceedings of the first, second and third meetings of this important organization, representing an agricultural interest of no ordinary importance among the material resources of our country. It is gratifying to those who have been identified with this organization since its first inception, to find that a growing interest is manifested in the deliberations of this Association, the officers of which may congratulate themselves that their labors are beginning to be appreciated by those for whose benefit the organization was formed; and although much has been done to prove the usefulness and value of these annual gatherings in disseminating knowledge appertaining to the dairy interest, this good is capable of being very largely increased by the hearty co-operation of dairymen and those interested in working up this great revolution in the manufacture of cheese, till the quality produced shall be upon a par with that of any other country. The attendance at these meetings of practical dairymen from all parts of the country, and the earnest manner in which knowledge is sought after by them on these occasions, as well as the importance of the topics introduced, and the ability with which they have been presented, are convincing proofs that this branch of industry has sufficient talent, energy and means invested in its prosecution to insure success. The quality of Canadian cheese has no doubt vastly improved in the past few years; which improvement must be largely attributed to the introduction of the factory system;

and if dairymen consult their own interest, no efforts will be spared on their part to take advantage of any legitimate means whereby the quality may be still more improved, and Canadian cheese made to compare favorably in the markets of the world with that of any other country. These annual meetings will contribute largely to the accomplishment of this desirable end. There is no dairyman, however skilful, however practical, or however successful he may have been in the management of his factory, but must feel that, although he may know much, yet he has still much to learn; and we hope that the published reports of the Canadian Dairymen's Association may yet prove valuable authority to those engaged in this productive branch of industry. Cheese factories are spreading over a large area of our country, requiring a very large amount of capital to work them, and this capital to be successfully manipulated; also requiring a large amount of brain power wisely directed through a cultivated and well-ordered intellect; and this is largely aided by an association of ideas brought about by contact; hence the great necessity that dairymen should unite as a body, and co-operate in the dissemination of knowledge, thereby increasing their own gains and influence. In addition to the actual transactions of the Association, this report embraces several valuable articles taken from the American Dairymen's report, prominent among which is the very valuable address of Professor Gamgee, on diseases of cattle, and the influence of these diseases on milk. We ask a careful perusal of this very instructive address from every dairyman into whose hands this report may fall. Due credit has been given for all such articles so copied, and we trust that our American cousins will feel no unpleasantness towards us for thus making use of their knowledge. As we feel that we have advanced so far as to be able to report anything that has a tendency to improve this very great interest, we shall be most happy to reciprocate. Arrangements are in progress to report in the DAILY GLOBE the state and condition of the market; and in carrying this into successful operation, the Ex-

ecutive Committee solicit the assistance of the dairymen from all quarters, who will be expected to report to the Secretary of the Association an account of all sales made, prices received, and stock on hand; this will be imperatively required to make the Market Report a success. There will be added to this Report, advertisements of reliable parties, dealers in dairy implements and stock required in the manufacture; and as great care has been exercised in this selection, those requiring such articles may rely upon these firms. Hoping that the arrangement, style and matter of this report will be satisfactory to the members of the Association, it is respectfully submitted by the Executive Committee.

INGERSOLL, MAY 1st, 1869.

AN ACT

TO

Protect Butter and Cheese Manufacturers.

ASSENTED TO 4TH MARCH, 1868.

WHEREAS it is expedient and necessary to encourage and protect Butter and Cheese Manufacturers in this Province: Therefore, Her Majesty, by and with the advice and consent of the Legislative Assembly of Ontario, enacts as follows:—

1. Whosoever shall knowingly and fradulently sell, supply, bring, or send to be manufactured to any cheese or butter manufactory in this Province, any milk diluted with water, or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as "skimmed milk," or whoever shall keep back any part of the milk known as "strippings," or whoever shall knowingly and fraudulently sell, send, bring or supply milk to any cheese or butter manufactory that is tainted or partly sour from want of proper care in keeping pails, strainers, or any vessel in which said milk is kept, clean and sweet, after being notified of such taint or carelessness, either verbally or in writing; or any butter or cheese manufacturer who shall knowingly and fraudulently use, or direct any of his or her employés to use for his, her, or their individual benefit, any cream from the milk brought to any cheese or butter manufactory without the consent of all the owners thereof, shall, for each and every offence, forfeit and pay a sum not less than one dollar nor more than fifty dollars, in the discretion of the presiding Justices before whom the case shall be heard.

2. Any two or more Justices of the Peace, having jurisdiction within the locality where the offence has been committed, may hear and determine such complaint upon the oath of one or more credible witnesses, and shall have power, in case the penalty and costs

awarded by them be not forthwith paid upon conviction, to levy the same by distress and sale of the goods and chattels of the offender by warrant under their hands and seals, or the hands and seals of any two of them, and the penalty, when recovered, shall be paid over by such Justices, one-half to the person complaining, and one-half to the Treasurer of the Municipality, District or place where the offence shall have been committed; and in default of payment or sufficient distress, the offender may, by warrant signed and sealed as aforesaid, be imprisoned in the Common Goal for a period not less than one day nor more than twenty days, at the discretion of such Justices, or any two of them, unless such penalty, costs, and the charges of commitment be sooner paid.

3. Any party aggrieved by such fraudulent conduct as aforesaid may at his or their election sue the offender in any Civil Court of competent jurisdiction and recover from him the amount of damages sustained, and levy the same with the costs according to the ordinary practice of the Court in which such suit shall be brought.

4. Provided, always, that no Justice or Justices having any pecuniary interest in any such Butter or Cheese Manufactory, as aforesaid, shall hear or determine any such complaint.

5. In case of summary proceedings under this Act, any person, complainant or defendant, shall have the right of appeal as provided in chapter one hundred and fourteen of the Consolidated Statutes of Upper Canada.

ARTICLES OF ASSOCIATION.

WHEREAS it is deemed expedient to form a Canadian Dairymen's Association, through which, as a medium, results of the practical experience of Dairymen may be gathered and disseminated among the dairying community, therefore be it

Resolved, that we, the undersigned, do hereby associate ourselves together for mutual improvement in the science of cheese-making, and more efficient action in promoting the general interests of the dairy community.

Article 1st.—The name of the organization shall be "The Canadian Dairymen's Association."

Article 2nd.—The Officers of the Association shall consist of President, first and second Vice-President, Secretary and Treasurer.

Article 3rd.—The President, Vice-Presidents, Secretary and Treasurer shall constitute the Executive Board of the Association, three of whom shall form a quorum for the transaction of business.

Article 4th.—The Officers of the Association shall be elected at each regular annual meeting, and shall retain their offices until their successors are chosen.

Article 5th.—The regular Annual Meeting shall be held on the first Wednesday in February in each year, and at such place as shall be decided upon by the members of the Association at the Annual Meeting.

OFFICE

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OFFICERS OF THE ASSOCIATION,

FOR THE YEAR 1869.

President:

CHARLES E. CHADWICK, Esq.

1st Vice-President:

K. GRAHAM, M. P. P.

2nd Vice-President:

GEORGE HAMILTON, Esq.

Secretary and Treasurer.

JAMES NOXON, of Ingersoll, Ont.

LIST OF MEMBERS

OF THE

CANADIAN DAIRYMEN'S ASSOCIATION,

FOR THE YEAR 1869.

Aitkens, John.....Putnam.
Almas, E. R.....Burgessville.
Adams, John.....Ingersoll.
Agur, Robert.....Ingersoll.
Adair, Joseph.....Ingersoll.
Bodwell, E. V., M. P.....Mount Elgin.
Brown, Thomas.....Ingersoll.
Byron, John..... "
Barker, Edward..... "
Bailey, George..... "
Barraclough, T. H..... "
Barker, Joseph..... "
Beatty, W. C..... "
Bobier, Joshua.....Wallacetown.
Beamer, Mrs. E.....Waterford.
Balantine, Thomas.....Sebringville.
Buchanan, John.....Ingersoll.
Balantine, James.....Sebringville.
Benson, James.....Ingersoll.
Bunga, L. F.....Norwich.
Bobier, Joshua.....Ingersoll.
Butler, John.....Mount Elgin.
Ballard, Austin.....Norwich.
Barlow, Robert.....Delta.
Cohoe, J. W.....Brownsville.
Caister, James.....Tavistock.
Cody, M. B.....Mount Elgin.
Crawford, Albert.....Ingersoll.
Cody, C. G.....Mount Elgin.
Collins, H. A.....Woodstock.
Charlesworth, Wm.....Bookton.
Casswell, E.....Ingersoll.
Chalcroft, M..... "
Charlton, Wm.....Duncrief.
Collins, Josiah.....Mt. Elgin.
Caldwell, O. B.....Ingersoll.
Carroll, D..... "
Christopher, A..... "
Cragg, C..... "
Chown, J. G..... "
Collett, Martin.....Toronto.
Chadwick, C. E.....Ingersoll.
Clarke, W. F.....Guelph.
Crawford, B. W.....Ingersoll.
Choate, Jacob..... "
Dagur, D.....Mount Elgin.
Daly, P. R.....Belleville.
Douglass, Wm.....Ingersoll.
Daly, A..... "
Dunn, John.....Harrietsville.
Dodge, Hemon.....Woodstock.
Dunn, Wm.....Ingersoll.
Elliott, Wm.....Beachville.
Ellis, R. Y.....Ingersoll.
Eastwood, W..... "
Elliott, D.....Mount Elgin.
Elliott, Samuel.....Ingersoll.
Facey, Robt.....Harrietsville.
Fowler, W. O.....Clinton.
Farrington, G. T.....Norwich.
Farrington, H..... "
Forfar, Thos. F.....Scarboro'.
Frederick, Peter.....Belleville.
Ford, G. T.....London.
Fewster.....Mount Elgin.
Fish, Wm. T.....Wicklow.
Galloway, George.....Ingersoll.
Gurnett, J. S..... "
Graham, K., M. P. P.....Belleville.
Garner, Anson.....Drummondville.

Hoover, P. R.....Whitevale.
Harris, James.....Ingersoll.
Hamilton, George.....Cromarty.
Harvey, John.....Branchton.
Hearn, H.....Ingersoll.
Hoytt, J. J..... "
Harwood, Henry.....Strathallan.
Harris, G. N.....Boston.
Harris, Wm.....Mount Elgin.
Haukins, Thos.....Ingersoll.
Hazleton, D.....Villanovia.
Harrington, John.....Strathallan.
Hill, L.....Ingersoll.
Hill, G. C..... "
Haskett..... "
Johnston, Stewart.....Beachville.
Jarvis, Edward.....Ingersoll.
Jarvis, Jonathan..... "
Jenks, George.....Milton.
Janes, R. A.....Ingersoll.
Johnson & Green.....Brockville.
Kerr, A. R.....Ingersoll.
Kneeshau Robert..... "
Kirkley, Peter.....Norwich.
King, James.....Ingersoll.
Losee, Henry.....Norwich.
Lawson, James.....Salford.
Moore, H. S..... "
Moore, Gilbert..... "
Moulton, John.....Mount Elgin.
Millar, Charles.....Utica, N. Y.
Morey, J. F.....Ingersoll.
Miller, T. D..... "
Moore, G. F.....Holbrook.
Miller, A. P..... "
Malcom, Andrew.....Farquahar.
McBain, Angus.....Galt.
McDonald, A. F.....Telfer.
McDonald, Robt.....Ingersoll.
McIntyre, Jas..... "
McMulkin, C..... "
McNaughton, R. J.....Straffordville.
McKindsey, T.....Ingersoll.
McLean, A..... "
Noxon, James..... "
Noble, Wm.....Telfer.
Nancekivell, Thos.....Ingersoll.
O'Neil, J..... "
O'Connor, A..... "
Piper, Isaac..... "
Partlow, John..... "
Pearce, P. S.....Tryconnell.
Pearce, T. L..... "
Pearce, John L.....Wallacetown.
Prouse, Thos.....Ingersoll.
Pound, James.....Sparta.
Pike, John.....Markham.
Phelan, D.....Ingersoll.
Pickard, Wm.....Hornby.
Raney, Homer..... Salford.
Richardson, J.....St. George.
Robinson, James.....London.
Rhymple, Jerome.....Mount Elgin.
Raymer, J. N .. ..Cedar Grove.
Sager, James.....Troy.
Scott, E. D..... "
Shaw, Angus.....Lakeside.
Sackrider, John.....Newark.
Smith, George.....Culloden.
Smith, Nicholas.....Salford.
Sweet, John.....Orwell.
Shearer, W. R.....Vittoria.
Sorley, C. H... .....Ingersoll.
Scott, J. W .....Bowood.
Teeple, S. W. L.....Orwell.
Titus, Jonathan.....Otterville.
Thornieroft, J. .....Thamesford.
Wilmot, T. H.....Milton.
Wilkinson, W. W.....Ingersoll.
Wells, Thos. ..... "
Wood, W..... "
White, D..... "
Weld, W.....London.
Watson, Wm.....Ingersoll.
Weir, Henry V .....Cathcart.
Woodcock.....Ingersoll.
Whitelaw.....Beachville.
Webber, Robt.....Strathallan.
York, Jekiel.....Union.

CONDENSED REPORT.

The following Table gives the number of pounds of milk, the quantity of cheese, the number of cheese, average weight, price per pound, and the average quantity of milk to a pound of cheese from a number of the factories that have sent in full reports:

Name of Factory.	Post Office.	No. lbs. milk.	No. lbs. Cheese.	No. of Cheese made.	Average Weight.	Price per lb.	No. lbs. milk to lb. of cheese.
Union	Cannifton	744,675	78,310	1294	61	.....	$9\frac{1}{2}$
Greenbush	Greenbush	689,030	68,985	990	69	$9\frac{3}{4}$	10
West Oxford	Ingersoll	768,760	75,294	1000	75	10 to $11\frac{1}{4}$	$10\frac{21}{100}$
Maple Leaf	Ingersoll	491,534	47,938	700	$68\frac{1}{2}$	9 to $10\frac{3}{4}$	$10\frac{18}{100}$
Harris Street	Ingersoll	389,259	38,200	540	70	.....	$10\frac{19}{100}$
Butternut Grove	Holbrook	208,792	21,143	302	70	.....	$9\frac{97}{100}$
Avon Cheese Co	Avon	247,246	25,533	387	66	$10\frac{1}{5}$	$9\frac{68}{100}$
East Oxford	Woodstock	235,529	23,000	352	65	9 to 11	$10\frac{16}{100}$
Lawson's	Salford	883,205	87,244	1283	68	9 to $11\frac{3}{4}$	$10\frac{1}{8}$
North Valley	Haysville	539,424	51,370	920	$58\frac{1}{2}$	9 to 11	$10\frac{1}{2}$
Cedar Grove	Cedar Grove	228,468	22,850	457	50	12 to $12\frac{1}{2}$	$9\frac{94}{100}$
Farmers' Own	Delta	198,853	20,562	338	58	10	$9\frac{67}{100}$
London	Telfer	142,042	13,642	272	50	9 to 11	$10\frac{19}{100}$
Beaver	Union	628,620	59,643	931	64	$11\frac{1}{2}$	$10\frac{53}{100}$
Winona	Winona	200,000	20,000	400	50	$10\frac{1}{2}$ to $12\frac{1}{2}$	10
Haldemand	Wicklow	481,699	48,674	750	65	10	$9\frac{90}{100}$
Middlesex	Bowood	634,179	61,247	980	$62\frac{1}{2}$	.....	$10\frac{35}{100}$
Luckrider's	Newark	685,140	70,192	1004	70	9 to $11\frac{1}{2}$	$9\frac{74}{100}$
Morton	Morton	1,158,000	115,354	2301	50	.....	10
Lakeside	Lakeside	268,517	26,145	415	63	$9\frac{1}{2}$ to 11	$10\frac{23}{100}$
Maple Grove	Strathallan	370,243	38,844	607	64	.....	$9\frac{54}{100}$

Cedar Grove	Cedar Grove	228,468	22,850	457	50	12 to 12½	9 94/100
Farmers' Own	Delta	198,853	20,562	338	58	10	9 67/100
London	Telfer	142,042	13,642	272	50	9 to 11	10 19/100
Beaver	Union	628,620	59,643	931	64	11½	10 53/100

Winona	Winona	200,000	20,000	400	50	10½ to 12½	10
Haldemand	Wicklow	481,699	48,674	750	65	10	9 90/100
Middlesex	Bowood	634,179	61,247	980	62½		10 35/100
Luckrider's	Newark	685,140	70,192	1004	70	9 to 11½	9 74/100
Morton	Morton	1,158,000	115,354	2301	50		10
Lakeside	Lakeside	268,517	26,145	415	63	9½ to 11	10 23/100
Maple Grove	Strathallan	370,243	38,844	607	64		9 54/100
Harrietsville	Harrietsville	669,270	67,268	933	72	10 90/100	9 79/100
Garner's	Drummondville	88,400	8,840	170	52	11	10
Tyrconnell	Tyrconnell	316,000	31,875	507	63	9¼ to 12½	9 71/100
Brownsville	Brownsville	1,386,294	132,512	1893	70	9 to 12	9¾
Selby	Selby	722,177	74,532	1350	55	10	9 10/16
Smith's Falls	Smith's Falls	544,355	53,090	833	64	9½ to 10	10¼
Wilson's	Ingersoll	443,693	43,557	621	70		10⅕
Mapleton	Mapleton	295,083	30,265	445	68	9 to 12½	9¾
T. Hawkins'	Ingersoll	348,102	33,847	529	65		10¼
Tynedock	Vittoria	85,447	7,763	124	63	10	11
Vittoria	Vittoria	158,824	17,729	266	63	10	11
Beckett's Bridge	Humberstone	129,399	12,660	230	55	10 to 11	10 22/100
West End	Clinton	271,752	27,269	535	51	10 to 12½	9 96/100
Boston	Boston	120,743	11,309	174	66	11	10 22/100
West Zorra	Ingersoll	810,125	82,939	1217	68		9 76/100
Silver Spring	Farmersville	592,351	59,985	923	65	9¼ to 11	9 14/16
Elgin	Sparta	241,530	22,699	402	54	10½	10½
Artic Spring	Farmersville	447,945	45,247	697	65	10	9 9/10
St. George	St. George	517,322	51,732	877	59	10½	10
Erin	Erin	84,450	7,454	150	50	12½	11
Wolfard	Easton's Corners	454,025	45,302	675	61	8½	10
Frankville	Easton's Corners	579,468	57,932	650	64	8½	10

Name of Factory.	Post Office.	No. lbs. milk.	No. lbs. Cheese.	No. of Cheese made.	Average Weight.	Price per lb.	No. lbs. milk to lb. of cheese.
North Middlesex	Dunerief	.....	7,000	120	50	10	$9\frac{3}{4}$
Branchton	Branchton	75,493	6,733	160	45	$10\frac{1}{2}$	11
Springbrook	Waterford	54,477	5,448	85	68	10 to 15	10
Summerville	Otterville	320,582	32,894	480	68	$10\frac{1}{2}$	$9\frac{14}{100}$
Quinte	North Port	534,860	52,213	652	80	9	$10\frac{4}{100}$
Thames Road	Farquhar	367,048	38,529	593	65	$10\frac{1}{4}$	$9\frac{1}{2}$
Poplar Hill	Coldstream	298,823	29,248	487	60	10	$10\frac{91}{100}$
Springford	Springford	677,472	65,438	909	72	10 to $11\frac{1}{2}$	$10\frac{6}{100}$
Durham Centre	Mount Elgin	212,242	22,460	331	68	9 to $12\frac{1}{2}$	$9\frac{45}{100}$
Hornby	Hornby	65,940	6,594	156	42	$11\frac{1}{2}$	10
Front of Sidney	Belleville	1,940,000	194,000	2970	65	.....	10
Union	Newmarket	189,783	17,700	.....	.....	$11\frac{3}{4}$	$10\frac{72}{100}$
Cromarty	Cromarty	251,132	25,211	.....	.....	$10\frac{3}{8}$	$9\frac{80}{100}$
Ontario	Norwich	717,152	72,670	1040	70	$10\frac{1}{2}$	$9\frac{87}{100}$
Bloomfield	Bloomfield	439,848	42,029	698	60	9	10

DAIRYMEN'S CONVENTION.

Pursuant to public notice, an important meeting was held in the Town Hall, Ingersoll, on the 31st July and 1st August, 1867, for the purpose of organizing a Dairymen's Association, and otherwise promoting the dairy business interest in the Dominion of Canada. Upwards of two hundred Dairymen from various parts of the country were present, and the greatest interest was manifested in the proceedings. The Convention was called to order soon after ten o'clock, on the first day of meeting, and a temporary organization effected by the appointment of W. Niles, Esq., of Nilestown, Chairman, and James Noxon, Esq., of Ingersoll, Secretary. A large Committee on organization and general business was then appointed, after which the Convention adjourned until half-past one. On resuming, the Committee reported, when it was resolved that the consideration of the report be deferred until after the hearing of some addresses, out of which hints might be obtained that would help to shape organization and business. This action was taken, more especially, in order to afford all present an early opportunity to hear X. A. Willard, Esq., of Little Falls, New York, who had come on special invitation, to address the Convention, and who, from his thorough acquaintance with all matters connected with the dairy business, was expected to throw much light on the subject. Mr. Willard was therefore at once introduced to the meeting, and proceeded to deliver the following most interesting address:—

MR. WILLARD'S ADDRESS.

Mr. President and Friends:—

I am glad to meet you here to-day upon Canadian soil, and to assure you of the good-will and respect which all men of liberal views in New York hold towards the people and Government of these Provinces. We are separated by an imaginary line, and though living under different forms of government, we recognize both as founded upon all those great and essential principles which ensure freedom, happiness, development and progress in the human race.

We of the New World scarcely appreciate the privileges we are enjoying, and it is only by observation and by contrasting our own condition with that of people on the Continent of Europe, that we

begin to realize, properly, how much we owe for all that makes life desirable to the freedom of the institutions under which we live.

There is no place I looked upon while abroad with more interest than the little island in the Thames, opposite Runnymede, and just below the royal castle at Windsor. It was here the barons in old time forced from King John the Magna Charta, the grand old compact, that gave birth to English and American liberties. The stone is still preserved there, upon which the king signed the document more than six hundred years ago; and as I looked upon it, I thought how different might have been the destiny of the Anglo-Saxon race, had the great Charter not been given, and how great its influence in moulding and educating the people in the rights of manhood, and in establishing our civil and religious liberties.

Surely no two countries ought to be more closely united in friendship than Great Britain and the United States. Our commercial relations, to say nothing of race, language, religion and laws, make it desirable; and I trust that no unkind feelings may ever be engendered between such near neighbors as the States and Provinces. As dairymen, we of the States desire that all political or sectional differences be laid aside, and that you unite with us in elevating the standard of American cheese, until it has no rival in the markets of the world. We hail, therefore, the inauguration of a Canada Dairymen's Association, hoping that it will make common cause with us in our competition with European manufacturers.

The product of cheese now manufactured in America is very much beyond the consumptive demand of our people. Large quantities must be exported abroad, and unless remunerative prices be obtained, other branches of farming must be taken up, and our herds and factories abandoned. Britain is our principal foreign market. The peculiar condition of her wants is a fortunate circumstance for us, and gives hope that we shall ultimately succeed in producing for her the great bulk of this product. She now divides her imports, purchasing from Holland 80,000,000 pounds of cheese per annum—nearly double what she takes from us.

England, as you are aware, is densely populated, and is devoted to manufactures. She has long since ceased to produce the food needed for her people, and draws largely from other nations for every kind of eatable. The product of the dairy is a concentrated food, cheaper of transportation than the more bulky articles of grain and live stock, and this would seem to indicate that the time must come when dairy-farming in England will be abandoned for the fattening of stock for the shambles, and the growing of those crops, the cost of transportation upon which makes it expensive for her to import. Could the dairy-farmers of England be induced to abandon the business, American cheese dairying would the most reliable, remunerative and enduring branch of industry in which we could engage. We should have a steady export trade of all we could make, and at good prices, because *there* cheese enters into general consumption, and is regarded as one of the staples of life. But we never can effect this object, or break the Holland trade, so long as we continue to flood her markets with an inferior cheese, quick of decay and liable to waste upon the dealers' hands. I regret to say, that with all our appliances and skill, there has been but small improvement in the manufacture of American cheese the present

season. There have been immense quantities of poor and immature cheese brought forward, and at a time, too, when there never was more necessity for greater skill and caution in its manufacture and curing.

The causes are various, and need not be enumerated in detail, but some of them may be mentioned. The present season in the States has been wet and cool, and the quality of pasturage, up to the middle of June, has not been of its usual good character. The curing rooms at most factories are defective, and it is a nice point to adapt your cheese machinery to variations in weather. There are many new hands in factories, who lack observation and experience, and lastly, there is still negligence and want of cleanliness with the milk among patrons. Some of the early cheese was rather soft and insufficiently salted, while that more recently made is stiff and dry, requiring age and a proper temperature to ripen it up into a mellow, flaky condition. Some of our cheese-makers, too, have fallen into the impression that they have reached the end of the art, and nothing more is to be learned. Many of these have signally failed this season, and are now trying to discover the cause.

I warn your cheese-makers of Canada, as I have our own dairy-men, that nothing is more prejudicial to success than the self-conceited opinion among men, that nothing new may be learned. It paralyses all effort for improvement. It has been the fault of the Cheshire dairymen of England, who have seen their prestige as cheese-makers fade away, and who are now beaten by the Somerset dairymen and by our American factories. It is the oldest cheese district in England, and had acquired great favor, upon which they rested, forgetting that we live in an age of new ideas, when progress in every department of science is marching rapidly onward.

When I visited Cheshire I was surprised to find they knew so little of the fundamental principles of cheese-making, and astonished at the useless waste of labor, and its unintelligent direction in the dairy. The Cheshire process is old and curious. The milk is set at a very low temperature, and its subsequent handling is so badly managed, that it is difficult to get rid of the whey, which often taints the cheese, or renders it rancid in taste. In some dairies so much rennet is added as will perfect coagulation in an hour, while in others this part of the process is protracted to an hour and a half. The curd is cut across with a long-bladed knife, and in a few minutes the breaking is commenced with a breaker of wire or tin, the operation being performed carefully and gently, and is perfected in thirty or forty minutes. As soon as the curd sinks a portion of the whey is laded out, and the process of sinking and gathering is commenced. The dairy-maid and her assistants press the curd toward the bottom with their hands and arms, and as the whey separates, it is dipped off, and when this operation has been continued for a considerable time the curd is slowly turned over. It is then drawn with the hands towards the side of the tub, the whey laded out, and the curd cut into square lumps. They now put it in a cloth, spread over a basket dripper, and after being subjected to a slight pressure, it is again cut in squares and broken with the hands, when it is returned to the cloth and subjected to an increased pressure. This process is repeated several times, until the whey ceases to flow freely. The curd is then passed through the curd mill, or thoroughly crushed with the hand,

and when salted is in a soft pulpy state, easily formed in rolls like butter. It is salted by guess and packed into the hoop. A strip of tin four or five inches wide is placed about the curd on the inside of the hoop and above it, so as to raise the curd above the top of the hoop, and it sinks down with the curd as pressure is applied.

The hoops with the cheese are now placed in the warmest part of the dairy for an hour or two, with a small weight placed upon the follower. It then goes into a brick oven and is heated to about 100°, in order to accelerate a flow of whey from the cheese. In the evening it is taken out and turned, receiving a clean cloth, and is returned to the furnace. On the following morning it is again turned in the hoop, the cloth changed, and is placed upon a bench for one or two days, the cloth being changed two or three times, and the skewering continued. On the third day the cheese is put in press, with a change of cloth twice or thrice a day, and the skewering still continued. It is kept in press for three days or longer, according to the time the cheese is required to dry. When taken from the press the marks and chipped edges are closed up with a hot iron, and the cheese rubbed over with grease.

They are then bound around with a stout linen bandage, and after remaining a few days in a cool place go to the cheese curing room, where they are placed upon straw or dried grass, regularly turned each day, and often rubbed and greased. They will generally be ready for market in three or four months, but are longer maturing in some of the best dairies. They receive great care and attention in the cheese room, and various expedients are practised to impart to them an old and ripe appearance. Some keep a cabbage-leaf or a plate upon the centre of the cheese, to give a damp and mouldy appearance.

I have gone into the various details of Cheshire cheese-making as explained to me by Mr. McAdam, whom I met in Cheshire, and as I saw it in operation in England, that you may readily compare its laborious manipulations with the American factory process, with its labor-saving appliances and systematic operations.

When I went down into Cheshire, it was so painful to see men floundering along in this primitive way that I could not help explaining our American system, and leaving among some of the best farmers copies of the reports of the American Dairymen's Association; and I see these reports are beginning to awaken attention.

Last month there was a great meeting of farmers and land owners at the Corn Exchange in Chester, which was presided over by the Mayor of that city, and the discussion was upon the propriety of forming a company for establishing a factory for the manufacture of cheese. A friend in Cheshire sends me the *Chester Courant*, of June 26th, which gives a synopsis of the discussions. They are significant, and may possibly be the beginning of a revolution in European cheese-making.

From the reports of the various addresses delivered it appears that the principal cause which made a change of system desirable, if not necessary, was the loss of cows on many farms from the ravages of rinderpest. This had so reduced the amount of milk that many farmers could not afford to keep the usual number of dairy hands, and had not work for the dairy-

maids; and it was thought that if the factory system could be introduced in some central situation, many of the small farmers would save the expense of keeping up the dairy hands, and by sending their milk to the factory, still make good use of their diminished quantities. It was also admitted that much of the cheese was manufactured without any regular system, and as it were by guess, in consequence of which it varied in quality exceedingly. It was contended by several gentlemen who had made themselves familiar with the American factory system, that its introduction would secure uniformity of quality, and by the adoption of the latest improvements in the mode of manufacture, would insure also the highest standard of excellence. Another cause, of an opposite character to the first mentioned, was also adduced as having led to the projected change of system, namely, the increased price of labor, and the rise in wages that had taken place, and was likely to increase. This enhanced the difficulties of conducting the small private dairies, and pointed to the associated system as the readiest method of relief. In the discussion which took place very little was advanced in the way of opposition or even hesitation. It was merely suggested, that where, as in England, the population was so dense and the demand for milk so large, the price of that article would always render dairying even for the milk alone a profitable business, and constituted an important difference between the condition of that country and the more thinly populated districts of North America. One speaker with conservative attachment to the old ways, and prejudice against change, thought that "every farmer ought to have a wife that could make cheese, and if he had not, was not fit to be a farmer." But on the whole the meeting was remarkably unanimous, and resulted in the appointment of a committee to take the matter into consideration and report at a future meeting.

I heard while abroad that they were trying to introduce our system into Northern Europe, and I feel anxious that we may improve the quality of our cheese, and establish such a reputation, that our goods will always be preferred at ten to twenty per cent. above all competition.

English CHEDDAR CHEESE, I see from English advices, still keeps in advance of our best grades by eight to ten shillings per cwt. It is a superior grade of cheese, of clean, pure flavor, but containing less butter than that of our factories.

REQUISITES IN CHEESE-MAKING, &C.

In other English methods of cheese-making I was greatly disappointed. The Wiltshire, the Double and Single Gloucester, and other processes, are defective and extremely laborious. The implements are outlandish, and belong to a past age of the world. The dairy people are tenacious of their practice, and adhere to it with a dogged pertinacity, notwithstanding their cheese brings a much less price in the principal markets than that made under an improved system. Much of this cheese is manufactured by guess, and varies in character, according to the skill and experience of the dairy-maid. There is scarcely a thing in any of their processes that would be of any service to us, and if introduced here would be a positive damage. American cheese is richer and better made, and is acknowledged by the best judges in Great Britain to surpass in every respect these styles, as

they are generally made. The Cheddar, however, is a very high character of cheese, and commands a very high price. Its good qualities have not been overrated. Their best samples have rarely been equalled, and never have been surpassed in American dairies. The quantity made is comparatively small. It takes its name from a small village at the foot of the Mendip Hills, in Somerset Co., its manufacture there having commenced more than a hundred years ago. Various improvements have been made in the process, until it has been reduced to a system which is at once simple and philosophical. It may be said to be a chemical process, requiring judgment and skill in the management of acids, until the curd has passed through its different stages and is properly developed for the press. Its leading principles have been understood and practised by our best cheese makers, for some years, and it is due to these that American cheese has been able to obtain such a firm foothold in the English market. The early expulsion of the whey in the English process, together with the exposure of the curd a longer time to the atmosphere, the pressing, grinding and salting, are doubtless improvements upon our practice.

I need not go into details upon these points; they have been fully explained in my recent address before the American Dairymen's Association; but I allude to them here, that proper credit may be given to English Dairymen. I must say this also, in their favor: nothing, while abroad, struck me with more force and admiration than the perfect neatness and cleanliness of the dairy. The milk rooms are located beyond the reach of bad odors likely to taint the milk. They have stone floors, the joints nicely cemented together, so that no slops or putrid matter can find an entrance. The floors, the utensils, and everything connected with the establishment, are as bright, clean and sweet, as the table and crockery of the most fastidious house-keeper. Many of the farmers will not allow the milkers to come into the milk-room, but have conductors by which the milk is conveyed to the tubs from the outside.

It is this perfect cleanliness of the dairy, together with the favorable condition of the climate, and a more uniform temperature of curing rooms, that enable them to secure that mild, pure flavor, which is characteristic of some of their nice grades of cheese. The best American cheese has more butter in its composition and is better manufactured as a whole than the English. The great defect in much of our cheese is its flavor.

We have a hot, bad climate to contend with; we are too careless in milking, and in handling the pails where taints can be absorbed. We put the warm milk in cans, confining it with a close-fitting cover, and haul it a long distatce in a blazing sun to the factory, and it is often in a putrid condition before going to the vats. What wonder, then, that much of our cheese, rich in butter and splendidly manufactured, is out of flavor, and vast sums in consequence are lost.

American dairymen have been trying for years to discover wherein this defect of flavor can be remedied. A great deal of time has been spent in the investigation of the subject, and a great many theories suggested, but it has all amounted to nothing. From my observations both at home and abroad, I am convinced that first principles have been overlooked; that we have been trying to make a finely flavored cheese from imperfect milk, a

condition which manufacturers *never have been and never will* be able to accomplish.

A reformation *must* be had, in securing clean and perfectly pure milk, together with better curing rooms; and then, under our improved system, American cheese will stand, where our nice grades already do, as the richest and finest that the world produces.

I went up to see the Royal Dairy at Windsor, and if every dairyman in America could go there, he would come back with greatly improved views, in regard to the importance of cleanliness in dairy practice.

PRINCE ALBERT'S MODEL FARM AND THE ROYAL DAIRY.

The model farm and dairy is but a short drive from the royal palace, and is exceedingly interesting to one who has a taste for farming. The cluster of farm-yard buildings, including that for the steam-engine, stand together and are of brick. The whole yard as well as the alleys are paved with stone. Under one of the long sheds were arranged the various machines for preparing the ground for crops, and in another building the machines for harvesting crops. The stalls for horses and cattle are arranged quite differently from ours in New York. The buildings are rather sheds than barns, being one-story, and divided into compartments, each having an open arch-way leading into an enclosure of the yard. One or two horses occupy each compartment, where they have liberty to be, either under cover, or in the little division of the yard adjoining the stall or box, which is fenced with iron railings. The cattle stalls are arranged in the same way. Each stall has feeding boxes and a tank of water in the same range, and in front of which there is a broad alley on a level with the feed box, where persons in charge can deliver the food or pass down and see that all is right. Every part of the yards and buildings has stone pavements and floors, with gutters for conducting off the liquid manures, so that there shall be no waste. Straw is used extensively for bedding, or to be tramped up for manure. In one of the stalls were some fine specimens of cattle from India.

THE ROYAL DAIRY.

The dairy buildings stand apart, and are some distance from the farm buildings. The dairy house is a beautiful structure of brick, with cupola and pointed roof, its outward appearance having a pleasing effect. The interior, however, is, beyond question, all that is neat and tasteful in dairy decoration. The floor, the walls and the ceiling, are of china, fashioned after the most graceful designs. The pans for holding the milk are of china, white, with a heavy line of gilt around the edge. They are elliptical in shape, with a nose or scallop at one end, for emptying the milk; they stand upon broad, white marble slabs, highly polished. The windows are of stained glass, and on each side of the room are fountains of china, arranged with unique figures and graceful devices. Tiny jets of water spin up from these, and fall into the china basins with a musical ripple. The ceiling has open spaces arranged so as to have the appearance of Mosaic work, and there are three compartments between the ceiling and roof, so as to secure a perfect ventilation. All about the sides of the room are medal-

lion heads of the Royal Family, elegantly pictured on china, and the whole reminds one of the charming descriptions of fairy life which we read in childhood.

BUTTER-MAKING AND THE IMPLEMENTS.

It was three o'clock, and the milkers were bringing in the milk, which is strained in an adjoining room. It is then placed upon the marble slabs, and the cream is taken off when the milk has stood twenty-four hours. In twelve hours after it is skimmed again.

The cream is churned when forty-eight hours old, the churning being performed in the adjoining room. The churn is of tin, barrel-shaped, and revolving. It has compartments at each end for hot or cold water, so that temperature can be regulated without mingling the water with the cream. The butter is washed in an oval tub unpainted, and after being washed, is worked upon two thin wooden paddles.

The cream and milk for the royal tables are put in small tin cans with covers, and these again are placed in a larger tin receptacle with cover, when they are sent away to the palace, either to London or the castle, as the case may be, where the Queen is staying. The butter and milk, of which we tasted, had a purity of flavor and sweetness that could not be surpassed.

THE MILKING STABLES AND COWS.

From the dairy we passed through a long, broad, stone hall, to the stables where the milking was being conducted. There are about sixty cows in milk, thorough-bred Short-horns, mostly of the Booth strain of blood, and a half-dozen Alderneys. The milking stables are a perfect model of cleanliness, having a glass roof in the centre, and admirably arranged for ventilation. The cattle stand upon a stone floor, which inclines towards the drop or gutter, and there is a broad space back of the cows.

Each cow is tied, and has before her a feed box and water tank, two cows standing in a division. The centre alley is raised considerably higher than the floor of the stables, where the cows stand, and is reached by an inclined walk.

Here were some beautiful animals, though I could not see that the quantity of milk given was anything beyond that of our best milking stock. Those I saw milked were giving, perhaps, ten quarts each. In another building, arranged upon a plan similar to the cattle boxes in the farm-yard, were a half dozen bulls, all fine specimens of the Short-horn and Alderney blood. Opposite the milking stables, and across the open court, is the piggery, where swine of the Prince Albert breed are kept. I went into the pastures and upon the meadows, and saw much that was of interest, but must not weary you with details.

PROGRESS OF THE FACTORY SYSTEM.

The dairymen of New York have never been alarmed at the progress of the factory system until this season. The first factory was erected in 1851, by Jesse Williams of Rome, N. Y., and in nine years thereafter, only twenty associations dared to try the experiment In 1860, 17 new

factories were put in operation; in 1861, 18; in 1862, 25; in 1863, 111; in 1864, 210; and at the end of 1866, we had more than 500 factories in successful operation in New York alone.

Meanwhile, the last four years have seen the system carried largely into the Eastern, Western, and Middle States, and into these Provinces. I can not give you with accuracy the number of new factories that have been erected during the past year, but we have track now of a thousand.

From this it will be seen that the dairy business is largely on the increase in America; but it must not be supposed that these 1000 new factories represent new districts. A considerable proportion has been erected in old districts, and has not increased the annual quantity of cheese, only diverted it from family to factory manufacture. We are told by the speculators that immense quantities of cheese are being made, and that we are producing in such quantities as to flood all the markets of the world. These statements are mere matters of guess-work, to frighten farmers, and get cheese forward at low figures. They have been successful in this operation, and the farmers of New York are actually selling their cheese at a less price than the cost of producing, and many will come out in debt at the end of the season.

We live under disadvantages which do not reach you here. Our taxation is high; labor of all kinds is expensive. The success of the last few years has led many to invest in lands, at 150 to 200 dollars per acre, and in cows at eighty to one hundred dollars per head. Our dairymen had looked for an average of 15c to 16c net on their cheese; but instead of that, family dairies have been selling at the Little Falls market at from 8c to 10c in our paper currency, and factories in various parts of the State at from 10c to 13½c.

We are all in the dark as to the quantity of cheese being produced, and both dealer and manufacturer are, I fear, led astray on this point. I hope one of the first things your association does, will be to inaugurate a plan for obtaining the weekly production, and amount of cheese on hand in the Province. Let the figures be sent to the Secretary, so that every factory in Canada may have the means of knowing what the quantity is on hand, and you will not be at the mercy of speculators, or of vague reports, unauthorized by any actual knowledge.

We have been shipping very largely abroad, and hurrying forward immature cheese, which has lowered the market on the other side, while shippers have taken advantage of the times, and made large sums from the trade. Some arrangement should be made by factories for shipping direct to Europe, and it would pay them to unite in sending one of their number, or some person, abroad, to look after the condition of cheese as it arrives, and the sales, even when consigned to European houses.

CLEANLINESS: TIN PAILS FOR MILK, ETC.

In new sections where the dairy is being established, it is important to start with correct principles. The old districts have much to unlearn; and unless they speedily change some of their practices, they will be outdone by the new districts, which are making greater exertions for success. The old wooden pail as a milk pail is a nuisance, and its use entails thousands of

dollars loss to the dairy interest. I urged the use of tin pails for milking at our Convention, more than two years ago, and suggested how they should be made. They should have concave bottoms with no sharp corners, where milk can lodge and be difficult to cleanse. They should have a narrow rim upon the top, turning over, so as to slip down, and nicely fit in a wooden pail, which encases it for protection. Every factory should urge upon its patrons the use of the tin dairy pail. It is just now beginning to be adopted in the old districts, and must come into general use, because it is so difficult to keep wooden pails clean, that often the most scrupulously neat fail to do so. It is wonderful what a small quantity of ferment will taint a large quantity of milk. The accumulation of old and decomposed particles about the corners and sides of a wooden pail, communicates its poison to the good milk and sets it into a ferment which the cheese maker is often unable to control. Painted pails are objectionable, because the paint imparts its taint and poison to the cheese.

My friend, Mr. Farrington, who used to deal largely in cheese at our market, whom we were sorry to lose from New York, and who was regarded as one of the best judges of cheese in the State, was the first, I think, to bring this matter of milk poison from paint before the public. In several samples of poisoned cheese, condemned in the city as poisonous, he traced it to newly painted tubs and pails, which were then in common use among the dairymen of Herkimer.

I have alluded to cleanliness in milking, and about the dairy, as an important element in securing good flavor in cheese, and it cannot be urged too strongly upon your attention.

The feeding of swine at factories, unless far removed from the buildings, cannot be recommended. Some of our new factories in Oneida have entirely banished them from the premises, and the whey is taken home by patrons. I have seen some of these factories, where everything is kept sweet and clean both at the factory and among patrons, and the cheese made is becoming noted for its delicate flavor.

These questions are just beginning to be understood and appreciated by cheese-makers, and you will do well to profit by that which we have been so long in learning.

RECENT IMPROVEMENTS IN FACTORY BUILDINGS, ETC.

In the arrangements and fitting up of factories, some important improvements are now being introduced. Substitutes for the steam engine and boiler are being tested. One of the devices recently brought out is an arrangement of gas pipe set in a furnace, upon which the fire comes in direct contact, heating the water by this means. Another device just put in operation is a nest of hollow cast iron boxes connected by pipe, and set in a brick furnace, the fire applied underneath. Mr. Sears, of Madison Co., who owns two factories, has taken out his steam engine, and has tested this contrivance. He says they are the most perfect heaters that have yet been invented, and that he would not use an engine if furnished without cost. This new heater, for a large factory, only costs $150; it is simple, substantial, and gives perfect control of temperature. In a test at his factory of the wood consumed, he finds that three-fourths of a cord of three feet wood will manufacture 12,000 pounds of cheese.

The placing of the sink below the vats, by which the whole mass of whey and curds may run out of the vat through a shute at one end, is another labour-saving appliance. There are machines for cooling the milk in the vats at night and preventing the cream from rising, operated by clock work, and by waste water from the vats. The application of wind power, for raising water to supply factories, has been found to work successfully.

Then there are the two processes for extracting butter from whey, which are claimed to make good marketable butter, adding largely to the receipts of the factory.

The paper cheese box is another new invention which promises to be successful. The curd mill, though long in use in England, is now just beginning to be introduced in America, and with the best results. Its use is not only a saving of labor, but it improves the texture of cheese, rendering it more compact or less porous.

In the Cheddar process the curds are put in hoop and pressed for ten minutes, then taken out, ground in the curd mill, and salted. This I think is an improvement upon our process, and should at once be adopted. By it you get a more uniform distribution of the salt, and know precisely what is being done, because the curd is drier and the salt is not carried off in the whey, as in our process. It is claimed, too, that by salting before pressure, and while the curd is not sufficiently cool, the salt has the effect of forming a shining, tough pellicle about the particles of curd, not only enclosing whey or moisture, but on account of which the union is less perfect, and the cheese in consequence less compact.

Again, the Cheddar dairymen, as soon as they can begin to distinguish an acid condition of the whey, immediately commence drawing it from the vat, and allow the acid to further develop itself in the curd spread out or heaped up in the vat and sink. This I think is another important improvement, which should be adopted at the factories. It is very difficult to regulate the final condition of the curd under all circumstances in the whey. The acid is often pushed forward upon the curd too rapidly, especially in hot and sultry weather. Then, if there be taints in the milk, the longer the curd is steeped in the whey, the more distinct and marked will they be in the cheese; but if you get rid of it early, there is more hope of preserving clean flavor, since every moment the whey stands under the influence of heat and decomposition the stronger becomes its odor and taint, as every practical cheese-maker has observed. It is to be doubted whether an uniform fine flavor can be maintained under all the variable conditions of milk unless this principle is recognized. At any rate, under this process there is less difficulty in obtaining desirable results.

There is another suggestion in regard to rennet and annatto, which is not understood even by our oldest and best cheese-makers.

At many of the factories great complaints are made that the rennets are weak, and extraordinary large quantities are often used at heavy expense. It is true there is great difference in the strength of rennets, and the quantity of milk they will coagulate, but the trouble is often aggravated by not properly understanding the nature of the materials employed. The annatto commonly used is cut by potash, a powerful alkali. Rennet is an acid, or

at least its action is similar, and is directly opposite that of an alkali. The one neutralizes the other. Now, if annatto is cut with very strong lye, or a strong solution of potash, when it is added to the milk it neutralizes or destroys the effect of a large quantity of rennet. Hence, the annatto should always be cut with as weak a solution of potash or lye as will properly dissolve it. I am satisfied that if factories would act upon this suggestion many thousands of dollars would be saved throughout the dairy region.

UTILIZING WHEY.

The utilizing of the whey from factories has received considerable attention, and various suggestions have been made as to its value and most profitable employment. Its analysis shows that it is too valuable to be thrown away. Some contend that it can be turned to the most profit when fed to cows, while others stoutly affirm that more can be realized from it as food for hogs. While in England I was told by the dairy farmers, and it was confirmed by provision dealers of London, that a very superior quality of pork was made by feeding whey mingled with barley meal; that in fact no bacon was equal to it in the delicacy of its flavor, and that it sold for most money in the markets.

Of the solid constituents of whey, the sugar of milk is in the largest proportion, being very much in the same ratio that it is in the milk. Some effort, it would seem, ought to be made by the dairy associations, with a view of extracting this material and fitting it for commerce. The milk sugar that we find at the shops is imported from Switzerland, and is retailed at $1.00 per pound. An estimate has been made of the annual yield of sugar from thirty factories averaging four hundred cows each, and it amounts to the enormous quantity of two millions of pounds, or 10,000 barrels; but suppose the price is put at only ten cents per pound, then a factory of a thousand cows, on the above estimate, would yield eight hundred pounds of sugar per day, which would amount to $80, or $2,400 per month.

When in London, I had some conversation with Prof. Voelcker, the great chemist of the Royal Agricultural Society, on this subject, and he was surprised that no effort had been made by the American factories to turn this constituent of the whey to account, since the large quantities of milk received at one point make it more feasible than when the milk was scattered over the country and worked up in family dairies.

Good milk contains from 8 to 9 per cent. of butter and caseine, and 5 per cent. of milk sugar. The analysis of whey shows that it yields 4½ per cent. of milk sugar, or half as much weight as the butter and caseine of the milk combined. In Switzerland milk sugar is made by allowing the whey to trickle down the sides of mountains in wooden gutters or troughs. Threads are placed in the gutters, upon which the sugar adheres as the watery portions of the whey pass off in evaporation.

It must be evident that the source of income from the dairy would be very much increased could some practical and inexpensive method be invented to take this article from the whey. Whether evaporating pans could be constructed, and heat used properly in securing this object, is a

question for investigation; and it seems to me that the Dairy Associations of America combined might profitably employ some chemist to make the proper experiments. If every factory would contribute fifty cents each, good talent could be secured for such an investigation, and a report upon it, even if it amounted to nothing practical, would in many ways be valuable to science.

STYLES OF CHEESE.

I cannot say how it may be among the Canada factories, but on our side many of the factories still continue to make a large sized cheese. They find them difficult of sale during the hot weather, and are making a decided loss. For the English market, the most popular shapes are the small Cheddar of from forty to seventy pounds. The larger Cheddars are fifteen and a half inches in diameter, by twelve and a half inches high, and in the smaller sizes these proportions are maintained.

The London dealers told me they could make extra sales, if factories would in part adopt the single Gloucester style, or Derby shapes, pressing in fourteen and fifteen inch hoops, about four inches high. Cheese of this description could be sent forward, *two in a box*, by introducing two heavy scaleboards between the cheese. A few of this style have been shipped abroad in this way, and they realized about a penny a pound more than the finest American samples of the old shapes. I am not sure whether the truckle shapes could be made profitably at factories for exportation, but they would command extra prices. They are pressed in six inch hoops, and are from eight to ten inches high.

SHIPPING DIRECT.

In closing, I have but a word to say about the shipping of cheese direct from the factory to European markets. Those who have watched the trade must see plainly that our present system is in many ways defective, and one under which a good share of the profits are taken by the speculators and various dealers, through whose hands it passes, before reaching the other side. Some have advised that an American agency be established abroad for the sale of factory cheese. There would be difficulties in the way of successfully carrying out this work. The provision trade in England seems to be mapped out with much more system than in this country, and the different classes seem to be banded together to protect any infringement of the general custom. The cheese dealers in England are divided into four classes: the importer, the broker, the middleman, and the grocer or cutter.

The middlemen have immense storehouses in every town and city, and keep large stocks on hand. They purchase from the shipper or importer, and sell to small dealers, and each has a line of customers of whose responsibility he keeps well posted, and he sells to them in a wholesale way, either for cash or on time.

The importer sells (generally on short time) to these middlemen, who are for the most part persons of wealth, who have been long in the trade, and are well known. The broker acts as salesman between the importer and middlemen, advising the latter of arrivals, prices, &c. The whole

system is so perfected as to reduce the risk of all parties as much as possible, and make expeditious sales. The importer keeps track of the responsibility of his customers, the middlemen; and the middlemen, in turn, of the small dealers; and they, in turn, of their customers, the consumers; while the broker receives his commission from first hands. Now, in the establishment of an American house, we should have to contend against the combined influence of many of these men, and unless cheese was sold for cash, there would be great danger of losing, since it would be impossible always to know the responsibility of purchasers.

The more feasible plan, it seems to me, would be for our Dairy Associations to employ some reliable man under a salary, send him to Liverpool or London, and then make shipments direct to the old and established houses. The duty of the agent would be to give advices to factories, to look at the cheese as it comes in, and keep watch upon transactions, in order that no advantage be taken in sales, &c.

Under this arrangement I think better prices could be obtained for our cheese, and at the same time a safe business done, since the shipper handling the cheese advances the money for it and guarantees all sales. The whole work of selling, guaranteeing sales, and advancing money, can be done for a minimum of five per cent. There are London and Liverpool houses, of the highest responsibility, who will advance seven-eighths of the market value of the cheese in New York, as soon as it reaches that city, and then pay over the balance as soon as sales are made. Had the American Dairymen's Association organized a movement of this kind, I am certain better prices could have been realized for cheese than at present. The factories would then have had two sources through which to dispose of cheese. If home prices were not satisfactory, then the cheese could be shipped abroad direct. Now they have but one course to pursue, and they are forced to take what the dealer offers, or see their curing rooms crowded to repletion, with a prospect of no better prices for holding.

These are some of the questions which it seems to me can be profitably considered at this meeting.

I ought, perhaps, to say, in view of the future prospects of dairying, that the South is poor and has no money to pay for cheese. This gives us scarcely any trade in that quarter this season.

As the Southern States become reorganized and business again becomes prosperous, they will take large quantities of our dairy produce, and this outlet must have a marked influence on sales and future prospects. I shall hope that this Association may co-operate with and form part of the American Dairymen's Association, and that all may work together for the best interest of American dairying.

The Rev. W. F. CLARKE, editor of the *Canada Farmer*, was then called on, and spoke at some length, taking occasion to reciprocate some well-timed and happily expressed sentiments of international friendship to which Mr. Willard had given utterance at the commencement of his address, and taking up in detail several important practical matters connected with the development of dairying in

Canada. He especially dwelt on the absolute necessity of the most scrupulous cleanliness in every part of the cheese-making process, from the milking of the cow to the arrangement of the curing room. At the conclusion of his remarks, he drew attention to the subject of Sunday cheese-making, regretting that the practice very largely prevailed among American dairymen, and urging several weighty considerations against such a practice coming into existence in this country.

After the delivery of these addresses, the Convention proceeded to consider the report on organization and general business, and having pretty thoroughly discussed the various recommendations embodied therein, unanimously adopted the following preamble and resolutions, thereby organizing "THE CANADIAN DAIRYMEN'S ASSOCIATION."

Whereas it is deemed expedient to form a Canadian Dairymen's Association, through which, as a medium, results of the practical experience of dairymen may be gathered and disseminated among the dairying community, therefore be it

Resolved, that we, the undersigned, do hereby associate ourselves together for mutual improvement in the science of cheese-making, and more efficient action in promoting the general interests of the dairy community.

Article 1. The name of the organization shall be "The Canadian Dairymen's Association."

Article 2. The officers of the Association shall consist of a President, twenty Vice-Presidents, a Secretary and Treasurer.

Article 3. The President, Vice-Presidents, Secretary and Treasurer, shall constitute the Executive Board of the Association, seven of whom shall form a quorum for the transaction of business.

Article 4. The officers of the Association shall be elected at each regular annual meeting, and shall retain their offices until their successors are chosen.

Article 5. The regular annual meeting shall be held on the first Wednesday in February of each year, and at such place as the Executive Board shall designate.

Article 6. Any person may become a member of the Association, and be entitled to all its benefits, by the annual payment of one dollar.

The following officers were then elected:

PRESIDENT.—C. E. Chadwick, Esq., Ingersoll.

VICE-PRESIDENTS.—M. H. Cochrane, Montreal; Henry Wade, Port Hope; T. H. Wilmot, Milton, A. G. Muir, Grimsby; Thomas Balentine, Stratford; J. H. Scott, Lobo; James Harris, Ingersoll; Benjamin Hopkins, Brownsville; George Galloway, West Oxford; Richard Manning, Exeter; James Collins, Dereham; Steven Hill,

Paris; John M. Ramer, Cedar Grove; —— Graham, Belleville; John Adams, Ingersoll; P. Bristol, Hamburg; J. M. Jones, Bowmanville; H. Farrington, Norwich; Hon. David Reesor, Markham.

SECRETARY.—James Noxon.

TREASURER.—R. A. Janes.

On motion the Executive Board was empowered to choose delegates to represent the Association at the American Dairymen's Association from year to year.

Mr. NILES then vacated the chair, and Mr. CHADWICK, President of the Association, took the official position to which he had been elected. In doing so he returned thanks for the honor done him, and pointed out the benefits likely to result from the organization, if properly worked. A vote of thanks was then passed to Mr. Niles for his services as temporary Chairman, when it was moved by Adam Oliver, Esq., seconded by Hon. D. Reesor, and

Resolved, That the Executive Committee be instructed to publish in pamphlet form, to distribute among the Dairymen of the Province of Ontario, a detailed statement of the number of dairies and factories in operation in each township, together with an alphabetical list of owners' names; the number of cows in use, and the estimated amount of cheese likely to be made this present year.

The Association then proceeded to enrol its membership, when upwards of seventy persons gave in their names, and paid each his dollar to the Treasurer, according to Article six of the Constitution. After the completion of the roll of members, adjournment was had until half-past seven in the evening.

On reassembling, the report of the Committee respecting topics of discussion was taken up. Three subjects were submitted to the attention of the meeting; viz.: the best course to be adopted toward securing a cheese market; the enactment of a law against the adulteration of milk; and the question of Sunday labour.

In regard to the best method of obtaining a market for the cheese manufactured, Mr. FARRINGTON was of opinion that the Association should send an agent to England, to open up channels of information and establish a reliable business connection for the Dairymen of Canada. Our New York neighbours had found it necessary to do this, and he knew of no other effective mode of protecting and advancing our interests. Direct communication between the market and manufacturer was required, in order that the manufacturer might know what prices to ask or to accept. An agency would establish such communication.

Hon. D REESOR approved of the course suggested by the preceding speaker, but thought the step would be found expensive. Some $4,000 or more would be required to send an agent to England and pay his salary and expenses for a year. Still he

believed it would be a wise outlay if the means could be procured. He then proceeded to speak of the development of the factory business in Canada, the demands and requirements of the English market, urging strongly the importance of producing a prime quality of cheese, that it might bring the highest price going and be as remunerative as possible.

Mr. FARRINGTON said he was so convinced of the propriety of sending an agent to England, that he would be responsible for any sum not exceeding fifty dollars toward the cost, and he believed, if all the factories in Canada would bear their part, the expense would fall but lightly on each.

Hon. D. REESOR enquired how many cheese factories there were in the Province of Ontario.

The Secretary, Mr. JAMES NOXON, replied that he estimated them at about 235, and he thought twenty-five millions of pounds of cheese would be likely to be manufactured at them the present season. He approved of the agency proposed, and would give the same guarantee as Mr. Farrington had done toward the cost of it. Such a course would give a character and reputation to Canadian cheese, and if we produced a superior article it would be sure to bring a good price.

Mr. DAVIS, of the firm of Davis & Co., Toronto, said that they could only succeed by making cheese that would be in accordance with the requirements of the English markets. The firm of which he was a member was ready to ship any quantity of cheese to England at moderate profits. If the cheese was good, plenty of buyers would be found; if it was not, a dozen agents could not sell it. It was highly desirable that Canada should secure the same high reputation for her cheese which she has for her ham, bacon and flour.

Mr. FAULKNER, of Utica, N. Y., said he had been identified with the cheese interest since 1837. He had lately visited the principal cheese factories in the neighborhood of Ingersoll, and was happy to say that they compared well with many of the best cheese factories in New York State. The business of cheese-making had grown to such enormous dimensions of late, that it was only by making a good article that a ready sale could be obtained. Buyers were particular, especially at this season of the year, but good cheese would always find a ready sale. He suggested the idea of dairymen holding meetings in their different neighborhoods and discussing amongst themselves the latest and best methods of making cheese.

Mr. FARRINGTON warned the dairymen not to send a pound of cheese to market on commission at this season of the year; business was always dull about this time, but after the middle of September prices would doubtless take a rise.

Mr. DAVIS said it was very desirable that the dairymen should have boxes and sale boards on hand, as buyers often had to ship at a day or two's notice. He recommended, also, that the boxes be branded with the name of the factory where the cheese is made. He thought their cheese was not of high enough color. Perhaps Mr. Willard would tell them what color was most preferred in England.

Mr. WILLARD replied that the London market desired a highly colored cheese. In Manchester they would take cheese of a paler color, but the London market was the best, and to meet its wants, it would be well to aim at a rich cream-color, not so high, however, as to be red.

Mr. JOHN HASKETT said that the firm he represented, that of Buck, Robertson & Co., of Montreal, was prepared to ship cheese direct to England. He would be at Ingersoll from time to time, and would be prepared to buy any quantity of good cheese at a fair price.

Mr. CLARKE approved of appointing an agent to open the way for the advantageous disposal of Canadian cheese in the English market. In business two things were necessary—to have a good article of cheese for sale, and then to advertise it effectually. He considered that our factory-men had a good article of cheese to sell; now they wanted to make their wares thoroughly known. For that purpose he thought an agent would be of great service. In his opinion an agency need not be so costly an affair as some appeared to think. It was not essential that he should spend a year in England. A few weeks, or at most months, would accomplish what was wanted. He thought the proposed agency need not cost over $2,000, which would be $10 each for 200 factories. Mr. Willard's visit to England had secured for the New York factories an average of two cents per pound higher price for their cheese, which had netted a single factory about $8,000, and greatly enhanced the gains of all. Yet he believed Mr. Willard's visit did not cost the American Dairymen's Association more than $2,000 in greenbacks. He recommended immediate and energetic action in this direction. He further suggested that Mr. Harris's mammoth cheese be sent out in charge of the agent. It was, he understood, first-class as to quality, and this, added to its extraordinary size, would make it a capital advertisement.

Mr. A. H. PETITT, of Grimsby, asked what sample of cheese would do to ship to the English market.

Mr. DAVIS replied that the cheese should be of a close texture, very rich in quality, of a proper color, very clear, of a flavor free from everything that might be called bitter, or sweet, or rancid. A good flavor was very desirable.

Mr. CHARLES BANBURY said there need be no apprehension that cheese-making would not be remunerative. He believed it would be, even at a lower rate than what they were now receiving. He had sold cheese at one time at eight cents, and thought he was doing well. He advocated the establishing of a market at Ingersoll, where buyer and seller could meet, thus saving a great deal of trouble to both parties.

It was then moved by Mr. Niles, seconded by Mr. Clarke, and *Resolved*,—That in the opinion of this Association it is highly desirable, if practicable, to send an agent to England, and that the Executive Board be instructed to use its best endeavors to accomplish this object; and, if possible, to secure the transmission of Mr. Harris's Mammoth Cheese to the English market.

After some further discussion, the resolution was carried, with but one dissenting voice.

The subject of a law to put a check upon the adulteration of milk, next came up for discussion, when it was moved by Mr. Clarke, seconded by Mr. Niles, and unanimously resolved:

That the Executive Board be requested to take such action as may be necessary to secure the passage of an Act by the Legislature at the approaching session of Parliament to protect cheese manufacturers from the adulteration of milk by unprincipled persons—said Act to be similar in its provisions to the law on this subject now in force in the State of New York.

The mover of the above resolution stated that the New York enactment consisted of a single paragraph, and was as follows:

"Whoever shall knowingly sell, supply, or bring to be manufactured to any cheese manufactory in this State, any milk diluted with water, or in any way adulterated, or milk from which any cream has been taken, or milk commonly known as skimmed milk; or whoever shall keep back any part of the milk known as 'strippings;' or whoever shall knowingly bring or supply milk to any cheese manufactory that is tainted or partly sour from want of proper care in keeping pails, strainers, or any vessel in which said milk is kept, clean and sweet, after being notified of such taint or carelessness; or any cheese manufacturer who shall knowingly use, or direct any of his employés to use, for his or their individual benefit, any cream from the milk brought to said cheese manufacturer, without the consent of all the owners thereof, shall, for each and every offence, forfeit and pay a sum not less than twenty-five dollars, nor more than one hundred dollars, with costs of suit, to be sued for in any court of competent jurisdiction, for the benefit of the person or persons, firm or association or corporation, or their assigns, upon whom such fraud shall be committed."

The question of Sabbath work in cheese factories was next taken up, when a memorial from the Ministerial Association of

Ingersoll was read by the Secretary, urging on the meeting that it should discountenance all violations of the sanctity of the Sabbath in connection with the business of cheese-making.

Mr. NILES moved that the memorial be received, and as far as possible its sentiments adopted.

Mr. CLARKE seconded the motion, and in doing so reminded the Association that Sunday cheese-making was as much forbidden by the law of the land as the carrying on of any other business of a public nature. The law took no cognizance of private violations of the Sabbath, but it did of any publicly transacted business, and the operations of cheese factories clearly came within reach of the statute in such case made and provided.

The resolution was unanimously adopted, and very general concurrence in the impropriety and needlessness of Sunday cheese-making was manifested by the factory men present.

At the request of several gentlemen, Mr. Farrington then explained some of the more important practical principles of cheese-making as carried out by him in his factories.

The Association then adjourned, to meet next morning at nine o'clock.

AUGUST 1st.—A small number of members assembled this morning at the Town Hall, pursuant to a notice of adjournment, the majority having left the previous evening for their homes.

Hon. D. REESOR moved, That with a view of having this Association fairly represented in every county in Canada, the Executive Board be authorized to add to the number of Vice-Presidents from time to time.

Mr. NILES seconded the motion, which was carried after a brief discussion.

The names of Messrs. Niles and Carlyle were then added to the list of Vice-Presidents, after which the Association adjourned *sine die.*

CANADIAN DAIRYMEN'S ASSOCIATION.

The first annual meeting of this important organization, formed July 31, 1867, was held in Ingersoll on Wednesday and Thursday, February 5th and 6th, 1868, pursuant to the call of the Executive Board. The President, C. E. Chadwick, Esq., of Ingersoll, called the Association to order at 11 a.m. on the 5th instant, when some 100 dairymen were present from various parts of Ontario. A large attendance being expected by the noon trains, the only business transacted was the appointment of the following committees:

1. Committee on the nomination of officers.
2. Committee on the order of business and programme of proceedings.
3. Committee on finance.

The Association then adjourned until 2.30 p.m.

At 2.30 a much larger assemblage had convened, arrivals from east and west having well nigh doubled the number of delegates in attendance. The President, in calling the meeting to order, made some introductory observations as to the objects, progress and prospects of the Association. This movement had undoubtedly been of benefit to the dairy business, and he believed it was destined to be yet more useful in time to come. He had attended, in company with Mr. Farrington, the recent Dairy Convention at Utica, where they had received the utmost courtesy as delegates from this Association. The Utica meeting was well attended, and the interest shown was very great. Much useful information had been brought out by such meetings, and the opportunity they afforded of comparing views and experience was very valuable. The Utica convention showed that a large number of the ablest New York agriculturists were engaged in the dairy business. The manner in which the various subjects were handled showed that not a stone was left unturned which could add to the importance and success of their enterprise. Since the last meeting of this Association, the Secretary and himself had done all they could to advance the interests of the Association by obtaining such statistics and information as they could from the different factories. Many of these had answered the questions sent them in the most satisfactory manner, but he was sorry to see the reluctance displayed by many factorymen to furnish returns to the Association. It was highly important that facts and figures should be put in the hands of dairymen.

The knowledge obtained by Mr. Willard when in Europe had been of the greatest service to the cheese business of this country. He hoped efficient means would be taken to obtain statistics both at home and abroad. They had been trying to get a Bill passed by the Legislature of Ontario for the protection of cheese factories. It was nearly through, and he expected would soon become law. He relied on the meeting to give him its support as chairman, and felt sure that the most perfect order would be maintained.

Reports of committees were then received.

The committee appointed to nominate officers for the ensuing year reported the following list:

PRESIDENT.—C. E. Chadwick, Esq.

SEC. and TREAS.—James Noxon, Esq.

VICE-PRESIDENTS.—M. H. Cochrane, Montreal; Henry Wade, Port Hope; T. H. Wilmot, Milton; A. G. Muir, Grimsby; Geo. Hamilton, Mitchell; G. H. Scott, Lobo; Harvey Farrington, Norwich; James Harris, Ingersoll; Benjamin Hopkins, Brownsville; Geo. Galloway, West Oxford; Richard Manning, Exeter; Josiah Collins, Dereham; Stephen Hill, Paris; John N. Raynour, Cedar Grove; K. Graham, Belleville; John Adams, Ingersoll; P. Bristol, Hamburgh; J. M. Jones, Bowmanville; H. D. Reesor, Markham.

The committee on the order of business reported the following subjects for discussion at the convention :—

1. Purity of flavor in cheese, what are the requisites, how best procured?

2. Are curd mills beneficial, and would their general use be advisable?

3. What constitutes the superiority of the Cheddar system of cheese-making, and could it be adopted with advantage in Canada?

4. Statistical Circular—could it be made useful in equalizing and maintaining the best price for cheese the current year?

5. How long is it desirable to press cheese? Would two or more days improve the quality or texture?

6. Is it not practicable to adopt the American system of making cheese once a day, and would it be preferable to making twice a day, as practised by our factory-men?

7. Best stock for dairy purposes.

8. What is the best hour and plan for milking?

9. What kind of salt is most suitable in cheese-making, and how does the Goderich salt compare with the Liverpool dairy salt?

The committee also recommended that the address of X. A. Willard, Esq., be given this evening at half-past seven, and as that gentleman had kindly offered to supplement his address by giving the valuable statistics furnished by him to the American Dairy-

men's Association to-morrow, the committee recommended that the same be given to-morrow morning at ten o'clock.

The committee on finance reported the recommendation of an increase in the membership fee to $1.50, to meet the increased expenses of the Association, and to enable them to publish a full report of the minutes of this convention in pamphlet form.

On motion, the above reports were adopted.

Mr. FARRINGTON wished to know whether each member of the Association was to be furnished with a copy of the pamphlet referred to in the report of the Finance Committee.

The CHAIRMAN replied that such was the intention.

The CHAIRMAN then proceeded to introduce the topics of discussion which had been put on the programme. As these topics had been selected by the Executive Board, and notice of them sent to the members of the Association some time ago, he had no doubt the gentlemen had come to this meeting fully prepared to do justice to the discussion of them.

1. Purity of flavor in cheese, what are the requisites, how best procured?

Mr. FARRINGTON observed that purity of flavor was of the first importance in cheese. Variations of age and lesser defects can be put up with, but there must be a pleasant flavor. In proportion to the importance of it, is the difficulty of securing it. Out of 50,000 boxes received weekly at New York last season, it was difficult to find 200 of really good flavor. The first requisite to excellence in this particular, is—you are all ready to answer—*purity of milk.* But don't we have this? No. Not even if you milk in the cleanest pails, pails of glass, if you like. Milk is 98 degrees when drawn from the cow. Kept at or near that point, decomposition at once begins. We must arrest this. How? By cooling. The animal heat must be taken out of it. During and after milking something may be done towards this, but after it comes to the factory, means should be taken to thoroughly cool the milk. We want more vats in order to distribute the milk, to spread it out on a large breadth of surface, so as to aërate it. If milk is kept in a large body the heat will remain. Cooling it by water is not enough. Jesse Williams, the originator of cheese factories, had a spring as large as a man's leg for cooling purposes, yet he had sour cheese occasionally. Not water only, but air is needed. Milk must be spread and ventilated. Three things are needed. Clean milk pails, provision for cooling while milking, means of spreading out the milk at the factory. These things properly done, I'll warrant you will make as good cheese as they do in the State of New York. We have as good grass as they have, and there is no reason why we should not equal them if we abolish the

wooden pail, and properly cool and aërate our milk. Defective flavour in cheese is by no means peculiar to Canada. The necessity of keeping it on hand a long time last season, owing to low markets, made the flavor worse than usual. American factory-men sold every month or two months during the season, and hence our long-kept stocks competed with them at a disadvantage. Another cause of bad flavour is ill-cured rennets. Our butchers are very careless about the way they prepare rennets, and should be taught better. Again, impure salt is blamed by some. I do not attach much importance to this. I have used Liverpool salt, common and factory filled Onondaga, and Goderich salt, with equally satisfactory results. I have had good success with all. Not a single cheese of my manufacture has been rejected by the buyers. Salt is often blamed by cheese-makers for their own faults. Another fruitful cause of bad flavour is a tainted atmosphere. This is a hackneyed subject, but it is impossible to say too much about it. Any odour that affects human nostrils will affect the quality of cheese. A pure cheese cannot be made in an impure atmosphere. We want no hog-pens or hog-yards near our factories—no slops, no waste whey—no rubbish—no decomposing matter of any kind near them. We have gone on the principle that if the hog is kept out of the vats it will do. But it won't do. He must be kept out of smelling distance. Nor is this all. The great butter-makers in the State of New York find it necessary to banish everything but milk from their milk cellars, to prevent all taint. Equal care is needed to preserve cheese from taint. Mr. Farrington closed by reading a paper he had prepared on the effect of wet seasons on cheese-making. During such seasons cheese was more liable to be out of flavour than at other times. He attributed this to the increased development of ammonia in such seasons, which unfavourably affected the milk.

Mr. James Harris observed that he was no public speaker, yet he had a few words to say on the question before the Association. Is it true that a large proportion of our cheese is "off flavour," as the saying is? Some contend that this is a slander of the buyers to get our cheese at low prices. He did not believe this. There was too much truth in the complaint of ill-flavor. The preceding speaker had referred to the animal heat in the milk after it was drawn from the cow. But the evil often commenced before it was drawn from the cow. Decomposition not only begins immediately on milking, but sometimes has set in before milking. Cows are driven long distances in the heat too hurriedly. Sometimes dogs and wild boys chase them, so that the milk becomes heated and feverish while in the udder of the animal. Then there is great impurity in the after process. Milkers do not come to their work with clean hands. The pails and utensils are not properly scalded.

Another cause of impure flavor is the failure of pasture in summer, causing the cows to wander in the woods and eat weeds that give a taste to the milk. Dairymen may remedy this by raising green corn, vetches, &c., to feed the cows when the pastures fail. Bad as the past season has been, by feeding my fifty cows with green fodder, turnips and the like, they have yielded within a ton of what they did the previous year. Both factory-men and their patrons ought to give attention to this matter, and unite to secure strict cleanliness. There is no reason to be discouraged, though prices have of late ruled low. Shall we go back to the old plan of wheat farming? We used to have depression and failure enough in that. Six and eight bushels of wheat per acre were all we could get some seasons. Bad annatto is also a frequent cause of ill flavour in cheese. How is this to be remedied? We spend a great deal of money on this colouring material, and it is money thrown away. It pleases the eye of the consumer but hurts the cheese. It is to be hoped the time is not far distant when the use of annatto will be done away with. Another cause of bad flavour is occasional unhealthiness in cows. When a cow is ailing from any cause, her milk should not be sent to the factory. Mr. Farrington has correctly observed that bad rennets often injure the flavour of milk. There is yet another evil, namely: improper temperature of the drying room. It is often too hot in summer and too cool in the fall. Thus many little things require close attention in order to secure purity of flavour.

A MEMBER present asked the best method of preparing annatto.

Mr. FULLER, of Utica, N.Y., was asked to reply, and gave the following as a good recipe:—4 lbs. potash, ½ barrel of water, put in as much pure annatto as the liquid will dissolve.

Mr. FARRINGTON read a recipe from the Oneida Co. circular: Dissolve 6 lbs. concentrated potash and 1 lb. saltpetre in 5 galons of warm water, then add 30 gallons cold water, put in as much choice annatto as the liquid will dissolve, heat gently to a boil, put into a cask, and store in a cool place.

Mr. FULLER stated that they used to boil the mixture, but do not do so now.

Mr. BAILEY, of Norwich, furnished another recipe:

4 lbs. annatto.
2 lbs. concentrated potash,
5 ounces saltpetre,
1½ lbs. sal-soda,
5 gallons boiling water,

Put the ingredients into a tub, pour on the boiling water, put the annatto in a cloth and squeeze through it. About two ounces of this mixture is enough for 100 lbs. curd.

Mr. HARRIS offered two resolutions, one recommending the substitution of tin pails for wooden ones; and the other urging the patrons of cheese factories to appoint at their annual meeting a committee of inspection to examine the utensils used by parties sending milk to factories.

Rev. W. F. CLARKE suggested that a subject of so much importance as purity of flavor in cheese demanded the appointment of a committee to report resolutions to the Association for its adoption. Mr. Harris' resolutions could be referred to such committee, and be embodied in its report.

On motion Rev. W. F. Clarke, Messrs. Farrington, Harris and Ballantyne were appointed said committee, and the resolutions refered to them.

2. Are curd mills beneficial, and would their general use be advisable ?

Mr. WILMOT, of Milton, read a short paper in reply to this question, and from trial of the curd-mill recommended its use by cheese-makers. Bad flavour was very much the result of the whey remaining in the cheese. You get it out by the use of the curd-mill.

Mr. FARRINGTON and Mr. GALLOWAY, of Norwich, spoke in favour of the curd-mill. Mr. Galloway had used one with the most satisfactory results.

Several questions were asked the above named gentlemen as to the construction of curd-mills, time they take to grind, &c. It was replied that they could be made very simply. Messrs. Wilmot and Galloway made their own. The mill consists of a cylinder of wood, full of small iron spikes, half an inch or so apart. Nails with their heads filed off will do. The cylinder may be from 8 to 12 inches long. It is hung in a semi-circular trough, also having spikes in it. Cog wheels and a handle to turn with are all the machinery needed. About 15 minutes' grinding will do for an ordinary batch of curds.

3. What constitutes the superiority of the Cheddar system of cheese-making, and could it be adopted with advantage in Canada ?

Mr. FARRINGTON was of the opinion that this question was virtually comprehended in the two preceding ones. It was his impression that the two characteristics of Cheddar cheese were : 1st, cleanliness, and 2nd, grinding the curd.

Mr. BALLANTYNE, of Perth, observed that he believed there was another peculiarity about Cheddar cheese, namely : the development of acid in the whey to a given degree, and that this was a point of no small delicacy and importance.

Rev. W. F. CLARKE said Mr. Ballantyne was quite right. He understood that a minute account of the Cheddar process would be given by Mr. Willard in the address which had been made the order of the day for half-past seven, p.m., and he would suggest that the further consideration of this question be postponed until after the delivery of Mr. Willard's address, which was at once agreed to.

4. Statistical circular—could it be made useful in equalizing and maintaining the last price for cheese the current year?

Rev. W. F. CLARKE thought the Asssociation would be better prepared to discuss this question to-morrow morning, when Mr. Willard would lay before the meeting some very valuable satistics prepared by him for the recent Convention of American dairymen of Utica. He moved that the question be laid on the table until then, which was carried unanimously.

5. How long is it desirable to press cheese? Would two or more days improve the quality or texture?

Mr. FARRINGTON remarked that he had been a cheese-maker for thirty-eight years. In the early period of his dairying he always pressed two days; latterly he had only pressed half the time, but he believed his earlier practice was the best. Indeed, he thought three or four days would be better than two, but whether it would pay to provide the extra hoops, presses and space requisite for such long pressing, was another question.

Mr. COLLINS, of Dereham, had tried various lengths of time, and preferred 48 hours.

Mr. SCOTT, of Lobo, had been obliged, by hurry of work and limited space, to take some cheeses out of the hoops at ten hours, and could never see any difference between them and those that were longer in the press.

Another speaker (name unknown) had often taken cheese out of the hoops at four hours, and they were just as good as those that were in longer.

Mr. FARRINGTON referred to the subject of huffing in cheese. He did not think this resulted from want of pressure, as many supposed, but from some chemical cause, which no amount of pressure could remove.

6. Is it not practicable to adopt the American system of making cheese once a day, and would it be preferable to making twice a day, as practised by our factory-men?

Mr. YORK, of Elgin, stated several advantages he had found to arise from making up once a day. It was every way preferable to the practice of making twice a day. It was easily managed, if you

have a stream of cold water to flow underneath the vats. He had a half inch stream, temperature forty degrees, flowing under each of his vats.

Mr. FARRINGTON thought there was a better system even than the American, and that was never to make up new milk. Leave a milking, if possible, twelve hours to cool. He had made eight cheeses on this principle, and they were the best he ever made. He had no doubt, if we would adopt this practice, we should beat the Americans all hollow.

The question was asked if it was advisable to put ice in the milk. Mr. Farrington replied that he had tried it, but in his opinion there were objections to it.

The Association then adjourned, until 7, p.m.

Shortly after that hour, a large assemblage had convened, the general public of Ingersoll being pretty well represented, in addition to the cheesemen from different parts of the Province. The President called the meeting to order, and stated that the chief business of the evening was to listen to an address from X. A. Willard, Esq., agricultural editor of the *Utica Herald*: without any preliminary observations from the chair, he begged to introduce that gentleman to the audience.

ANNUAL ADDRESS

Delivered before the CANADIAN DAIRYMEN'S ASSOCIATION, *at Ingersoll, Ontario, Feb'y* 5, 1868.

BY X. A. WILLARD, A.M., OF HERKIMER CO., N.Y.

Mr. President, Ladies and Gentlemen:—

It is very gratifying for me to appear again before a Canadian audience, and to have the privilege of assuring you that my countrymen entertain the most profound respect for the people and Government of this Dominion.

I do not wish to hide or extenuate the fact that we have inflammatory elements, knots of men and partizans, anti-British.

To a people loving the excitement of politics, where the broadest latitude of speech is common, much will always be said which does not represent the deeper and better feeling of the nation. Surface issues must from time to time arise, be discussed, and fade away, but these can scarcely influence the deep under-current of kindly feeling and substantial good-will of the nation.

That I express correctly the high regard held by the people of the United States toward Canada and the Canadians, I need but refer to the resolution passed unanimously at the late Convention of American Dairymen at Utica, welcoming the delegates from Canada, and the hearty sentiments tendered to them in open convention. I trust that this feeling, so auspiciously begun, may ever continue, and though living under different forms of government, that we may be united on questions of common interest.

There are so many things to be said about the Dairy, that one is at a loss as to what facts it would be most profitable to group together in an hour's talk.

Earnest practical men, I have assumed, are better satisfied with that which is useful and applicable to their business, though related in plain language, than with speculative theories elaborated into rounded periods and eloquent diction. If I have made a false assumption I cannot expect to hold your attention, for I have counted entirely upon your interest in the questions to be presented.

I come to you from the oldest Dairy District in America. I knew the man, in his old age, who first began cheese dairying in New York. He came on foot from New England to Herkimer, eighty years ago. He was rich in health, with eight silver shillings in his pocket, an axe upon his shoulder, and two stout arms to swing it. Nearly the whole county was then a dense forest. His great arms felled the timber on many acres. He built his log house, and established a herd upon the soil. Then he took to wife a Cheshire girl, who made the first cheese dairy in the State of New York. This man's name was *Arnold*. He accumulated large wealth, and went to his rest honored and respected. From such beginnings sprang the mighty giant that is now stalking over the continent.

American Dairying now represents a capital of more than six hundred millions of dollars. The cheese product of this year has sold for more than twenty-five millions, and the butter product for at least a hundred millions.

In 1865 the butter product of New York alone was estimated at sixty millions of dollars; that year there were thirty millions of gallons of milk sold in the State, which at four cents per quart, would amount to nearly five millions of dollars, ($5,000,000.) From these figures it will be seen that Dairy farming is a most important branch of American agriculture, and is destined, from year to year, to hold a still more elevated place in furthering the commercial interests of the country.

The idea of Associated Dairying is claimed to have originated in Europe. The system, it is true, has been practised to some extent in Switzerland, and in France, but it differs materially from that of this country. The European system grew out of a necessity. It was the offspring of poverty, rather than of wealth.

The peasants of a neighborhood each having one or two cows, united them in one large herd. They employed a herdsman in common, and sent him with the herd to the mountainous pastures of the Alps.

Here the herdsman and his assistants take charge of the cattle for a certain number of months, turning the milk into cheese, which at the end of the season is divided among the owners of the cows, in proportion to the number furnished by each. Cheese cannot be manufactured to advantage from one or two cows, but under this system the poorest peasant makes the product of his one cow compete successfully in the market with that made from the large herds of the wealthy, since it is similar in shape and quality, though the quantity is small. In other words, he has a merchantable article which he could not obtain singly and alone. Now, the European system accomplished no grand results. It did not spread or become generally

adopted among the nations. It developed no new principle, either in the art of manufacturing the milk, or in the economy of labor-saving appliances. It attracted no particular attention, because it developed nothing new.

Men in all ages have associated together in cases of necessity for the accomplishment of certain purposes; but farmers have not generally recognized the principle as applicable to their business. Associated Dairying in America may be said to be the first successful movement in this direction. What distinguishes the American system is, the constant effort to reduce the whole art and practice of Dairying to a science. The building, the appliances, the manipulations in the various departments, are matters of study and of progress and economy.

The grand principle sought is to make associated capital pay better than non-associated capital. It is a new application of an old principle. It is adapting the rule to farming that has been found successful in commerce and manufactures. Who shall say that this development has not been for some wise purpose of providence—to elevate the farmer in his profession, in his social relations, to point out more clearly the principle that association and division of labor can lift heavy burthens from the arms of toil?

Up to within the last twenty-five years the farmer's life has been one of patient drudgery, but little removed from serfdom. Exhaustive labor, rigid economy, abnegation of simple luxuries, of culture, taste and the higher requirements of his nature, conspired to make the farmer feel his inferiority, and rank his calling on the lowest scale of the professions.

He now finds himself emerging from this slough; new principles have been brought to bear upon his labors; iron, steel and wood, are made to perform wonders, and brain is of more account upon the farm than muscle.

Looking back upon the past, I can but think that we are upon the threshold of grand results in agriculture, and that God in his infinite goodness wills that science, mechanism and intelligence, are to be the main forces to open up to us the resources of nature.

It is a most hopeful sign of progress that farmers everywhere through the country are organizing societies for the purpose of obtaining useful information in their specialities, and operating together for the protection of their interests.

Though the Dairy farmers of America may justly claim to have been the first among agriculturists to apply practically the principles of association upon an extensive scale, the old districts did not anticipate the wide-spread adoption of their system.

What is to be the result of this expansion we are not prepared to state; one thing at least must obtain—it compels to exertion for improved manufacture of dairy products, since poor goods become a drug upon the market and a decided loss to the producer.

In the remarks I have to offer I hope to point out briefly the more important requisites for success in dairy management.

When milk is viewed under a microscope it appears as a transparent fluid, in which floats innumerable small, round, egg-shaped globules. These globules consist of fatty matters, enveloped in their shells of curd or caseine; should we separate these globules completely from the fluid, we find remaining the following substances in solution:—

1st. Curd, or casein; 2nd. Albumen; 3rd. Milk-sugar; 4th. Mineral matter.

It is these substances that render the specific gravity of milk greater than water, and cause the variation shown by the lactometer in the two fluids.

When subjected to analysis, milk of an average good quality is composed in 100 parts as follows:—

Water	87.40
Butter	3.43
Caseine	3.12
Milk-sugar	5.12
Mineral matter	93
	100.00

Milk varies in character from various causes, but chiefly in the butter and milk-sugar, the casein showing but slight variations. Now the great art sought by the cheese dairymen is, in extracting two of the above constituents of the milk, caseine and butter, and so combining them with water in such proportions as to make a palatable article to suit a certain arbitrary taste. I say arbitrary, because taste is educated, and different nations have different standards as to what is palatable. When I was in Switzerland I saw gentlemen, apparently of the highest respectability, eating cheese of a most intensely disagreeable odor. They ate this cheese with a relish and pronounced it excellent, while to my taste it had all the peculiarities of badly tainted food, the very odor of which was nauseating. The Germans, also, like a strong and rancid cheese.

The English taste, both for butter and cheese, has changed materially during the last half century.

What is now required in cheese is a mild, clean flavor, with a certain mellowness of texture, readily dissolving under the tongue, and leaving a nutty new milk taste in the mouth.

The English demand a cheese of solid texture, that is, free from porosity, because a porous cheese usually indicates an imperfect separation of the whey. Such cheese often have a sweetish taste, which is owing to the excess of the sugar-of-milk in the whey, and they invariably turn with a bad flavor.

The market value of cheese does not entirely depend on the amount of butter which it contains. In my address before the American Dairymen's Association, three years ago, this point was broached and discussed. It was new doctrine, which the dairy-public, and especially dealers, were not then prepared to adopt.

The experiments at factories since that time have proved the assumption, and shown that cheese made from milk partially skimmed was not even suspected by the dealer at home, and was pronounced first quality in the English market. The fact has also been established by Dr. Voelcker, in the analysis of different samples of cheese.

The common or ordinary American, he finds richer in butter than the best English Cheddar, which is the highest grade of cheese known to English taste.

It may not be out of place in this connection to give Dr. Voelcker's language. He says:—"One of the chief tests of the skill of the dairymaid is the production of a rich-tasting and looking, fine flavored and mellow cheese from milk not particularly rich in cream. That this can be done is abundantly proved by the practice of good makers.

"One of the finest Cheddars I ever examined was made by Mr. Joseph Harding, of Marksbury, Somersetshire, and analysed by me when six months old. Like all good cheese, it of course contained a large amount of butter, though as I found by experiment, not nearly so large an amount as its appearance, rich taste, and fine mature condition seemed to imply.

"Though only six months old, it had a much more mature appearance than a Cheddar cheese had, which was at least eleven months old, when analysed, and thanks to Mr. Harding's skill and experience, had a much fatter and more mellow appearance and richer taste, than a specimen which actually contained 2½ per cent. more butter.

"In the opinion of good judges," he goes on to remark, "the Cheddar cheese No. 1, notwithstanding the large amount of butter, and smaller amount of water it contained, was worth a penny a pound less than the specimen made by Mr. Harding.

"The peculiar mellow appearance of good cheese, though due to some extent to the butter it contains, depends in a higher degree upon a gradual transformation which caseine or curd undergoes in ripening.

"Now if this ripening process is badly conducted, or the original character of the curd is such that it adapts itself but slowly to the transformation, the cheese when sold will be, comparatively speaking, tough, and appear less rich in butter than it really is, whilst in a well-made and properly kept cheese this series of changes will be rapidly and thoroughly effected.

"Proper ripening, then, imparts to cheese a rich appearance, and unites with the butter in giving it that most desirable property of melting in the mouth. On examining some cheeses deficient in this melting property, and accordingly pronounced by practical judges defective in butter, I nevertheless found in them a very high per centage of that substance—clear proof that the mellow and rich taste is not owing entirely, or indeed chiefly due to the fatty matters which it contains."

I do not introduce this topic for the purpose of advising factories or manufacturers to skim the milk for cheese-making, but rather as a suggestion, that no effort should be spared in acquiring that skill in manufacturing which is able to bring about desirable results, and to show you that even with the best material, a cheese may be tough, poor and unpalatable.

Now it may not be uninteresting to know what are the component parts of what is considered the highest grade of cheese in the English market, such as we are attempting to furnish.

It at least gives us some general idea of the proportions of water, caseine and butter, which has effected the highest results.

The analysis of Mr. Harding's cheese gives the following in one hundred parts:—

Water	33.92
Butter	33.15
Caseine	28.12
Milk, sugar, lactic acid, and extractive matter	00.96
Mineral matter	3.85
	100.00

The 28.12 parts of caseine contain 21.50 parts of nitrogen, and of the 3.85 parts mineral matter, 1.15 was common salt. It will be seen, then, that good cheese, properly cured, has about thirty-four per cent. of water, and less than 1 per cent. of milk, sugar, lactic acid, &c.

From the analysis which I have seen of different samples of the best English and American cheese, when cured, it appears that the proportion of water should not be above 34 per cent. Any considerable increase above this almost invariably indicates bad flavor.

There is no doubt but that a due proportion of water in cheese imparts to it a smooth, and apparently rich texture, and it is to this point manufacturers should direct their attention. When too much water is taken out of the curd we have a dry, stiff cheese, the transformation of the caseine or curd being imperfect, and the cheese appears less rich than it really is. Any system of cheese-making, then, by which we may be able to judge the most accurately as to the amount of moisture to be retained in the curds, will be the most successful, other things being equal.

THICK AND THIN CHEESE.

Another point which demands investigation, and it is one which no writer on the dairy has as yet discussed, is this:— Whether the shape of cheese may not have more or less influence upon its flavor while curing. I have been led to believe that such is possible, from observing this fact— that it is very difficult to preserve the flavor in skimmed-milk cheese when made thick.

So important is this influence, that we may lay it down as a rule (and it is a valuable one for manufacturers,) that skimmed-milk cheese should always be made flat, since thick ones will be found nearly always to deteriorate after two months.

When there is a good proportion of butter in the curds, thick shapes, like the Cheddar and Stilton, seem well adapted to secure clean, mild flavor.

I shall not attempt to explain the reason of this: it is enough for the present to refer to practical results.

In regard to the saline taste sometimes complained of in old cheese, in other respects rich and good, Dr. Voelcker attributes it to ammoniacal salts, developed during the ripening process. He says:—"During the ripening of the cheese, a portion of the caseine or curd suffers decomposition, and is partially changed into ammonia; the latter, however, does not escape, but combines with several fatty acids, formed in the course of time from the butter. Peculiar ammoniacal salts are thus produced, and these, like most other salts of ammonia, have a pungent, saline taste.

"The longer cheese is kept, within reasonable limits, the riper it gets, and as it ripens, the proportion of ammoniacal salts, with their pungent,

saline taste, increases. It can be readily shown that old cheese contains a good deal of ammonia, in the shape of ammoniacal salts. All that is necessary is, to pound a piece with quick lime, when, on the addition of a little water, a strong smell of spirits of hartshorn will be developed.

"In well-kept, sound, old cheese, the ammonia is not free, but exists in the form of salts, whose base is ammonia, in combination with butyric, caprinic, caprylic, and other acids, generated, under favorable circumstances, by the fats of which butter consists.

"Ripe cheese, even if very old, but sound, instead of containing free ammonia, always exhibits a decidedly acid reaction, when tested with blue litmus paper. Rotten cheese, on the other hand, is generally alkaline in its reaction, and contains free ammonia."

I have alluded to some of the characteristics demanded in cheese to suit the English taste. There is another requisite which trade, and our own interest imperatively demands,—it is the production of cheese that is slow of decay,—that will sustain its good qualities a long time; one that can be kept either at home upon the factory shelves, or in the hands of purchasers, without fear of deterioration or loss.

English shippers and dealers have always complained of the early decay of American cheese, and the fear of loss from this source has had great influence upon the market.

When considerable stocks have been accumulated, the dealer has been over anxious to get rid of them, and has pushed them, at low prices, upon the market, on the assumption that the loss from deterioration, by holding, would more than cover any prospective advance in price.

Factories, too, have often pushed forward their goods on this account. It is true, there has been great improvement during the last few years in the keeping qualities of our cheese, but there is room for more improvement, and no factory should make a pound of cheese the coming season but what can be kept without deterioration, at least several months.

There is not much doubt but that our stocks, the coming year, will have to be held to a greater extent than ever before, or low prices accepted, and we should be prepared to meet the emergency.

But it should be remembered that the manufacturers cannot accomplish this result without the earnest and hearty co-operation of patrons.

The first requisite to success is pure, clean, healthy milk.

In the division of pastures and meadows the pastures should, so far as possible, be upon the uplands, and the wetter portions of the farm employed for meadows. I do not care what theorists may say; experience shows that milk of the best quality, and cheese of the best flavor, comes only from good upland pastures.

Then the herds should be driven very leisurely to the stables. Dogs are a great curse to dairy farming; they have done, and are still doing immense damage to the dairy interest. No cow that has been chased by dogs, or brought to the stable in a heated condition in warm weather, can give good milk. It is so unhealthy that I have known sucking animals killed by taking it.

Dairy farmers ought to understand these facts; and if their natures are so coarse, and their feelings so seared as to have no compassion for the

dumb beast galloping over the pasture, violently swinging an extended udder at every step, in excruciating pain, then they should be made to feel a loss by the rejection of such milk at the factory.

When I see the cruelty to animals, the dirty practices of milkers, the reeking filth of the milk, I cannot wonder that so much of our cheese is condemned as ordinary and poor.

I was the first to raise voice against these abominations in New York, and I can assure you, dairymen of Canada, if you wish to succeed you must avoid these errors.

FERMENTS.

One of the good things done at the recent Convention of American dairymen, at Utica, was the resolutions condemning the use of the wooden pail for milking.

It is a great nuisance, and a most prolific source of ferment that does immense damage in the dairy.

The nature of milk ferments and milk taints is imperfectly understood by dairymen.

At the recent Dairy Convention at Utica, Mr. Foster gave an account of the influence which carrion in a field adjoining his pasture had upon the cows in tainting the milk even before it was drawn. He had great trouble in working up the milk for some time, and could not account for it; but at last, suspecting that the trouble came from a dead horse lying near the pasture, its decomposition poisoning the air for a considerable distance about, he had the offensive matter removed, and the trouble with the milk immediately ceased.

Mr. Brown, of West Edmonston, N.Y., gives me an account which shows the active character of ferments, and the difficulty in controlling them. One day at his factory a portion of the milk came in having an unusually disagreeable odor. The curds worked badly, and were inclined to float. He hastened forward the process, drew the whey, spread the curds in the sink, and put upon them a stream of very cold water until they were thoroughly cooled down to within a few degrees of the freezing point. They were salted and put in press. In two hours afterwards, when taking the cheese from press to bandage, a hole was cut down in its centre and the thermometer introduced. The mercury rose to 120°.

It must be evident that such a cheese could not by any possibility turn out to be good flavored.

I have known ferments in milk so active in hot weather that the curds could not be properly pressed together, but on removing pressure the follower would be thrown violently from the hoop. It is these ferments that are a source of porous cheese, and no cheese can huff during the curing process, even the least, without injury to flavor.

Small particles of milk in the corners of pails or upon utensils, when exposed to the air rapidly decompose, and operate upon the new milk with which they come in contact, in the same way as yeast. They re-produce themselves, and under favorable circumstances in great quantities. This is the peculiarity of all ferments, the fresh and active yeast is generated in great abundance in fermenting liquor, whilst the original yeast employed in

brewing is more or less decomposed, and becomes what is called inactive yeast.

A small piece of putrifying meat in contact with a large mass of sound meat, soon spreads putrefaction over the whole mass, and other ferments act in a similar manner.

They produce in other matters with which they are brought in contact, changes similar to those which they themselves undergo.

To kill these ferments with heat requires a temperature of 212°; nothing short of boiling heat will accomplish it. Hence, in cleaning pails and dairy apparatus, care should be taken that the water used be boiling hot.

Half the dairymen do not understand this fact, but it is of great practical importance in cleansing milk cans, pails and factory vats. I am glad to say that no modern built factory tolerates the pig-sty in its neighborhood, and the greatest caution should be exercised in having all the surroundings clean, sweet, and free from taints.

CARRYING MILK TO FACTORIES.

I have alluded heretofore to the practice of putting warm milk into cans, then confining it with close fitting cover and hauling long distances in hot weather to the factory.

It is prejudicial to fine flavor, and must in some way be obviated. What makes the matter worse is, that as soon as the milk comes to the factory it is run into the vats, and has no time to cool and get rid of its animal odor before the rennet is applied.

The action of the rennet still farther arrests bad odors passing off, and by long steeping the curds in the whey we still further incorporate impurities in the cheese.

We need some apparatus for spreading out the milk and cooling it before it is put into the cans. Something would be gained even at the factory, by letting the milk after it leaves the conductor fall upon a broad surface, so that it may be spread out thin, and in this way fall into the vat at the opposite end.

A large mass of impurities would be driven off even by this crude process.

The inventor who can get up a simple and practical machine for exposing newly drawn milk to the air, and freeing it of its animal odor, will at once make a fortune by it.

There is no doubt but that the exceedingly fine aroma which obtains in the best samples of Stilton, Cheddar and Cheshire cheese, is secured by manufacturing perfectly pure milk at low temperatures.

The chief characteristics of Stilton are a peculiar delicacy of flavor, a delicious mellowness, and a great aptness to acquire a species of artificial decay, without which, in the somewhat vitiated taste of the lovers of Stilton cheese, as now eaten, it is not considered of prime account.

To be in good order, according to the present standard, it must be decayed, blue and moist.

Considerable quantities of Stilton, however, are sold in London free from mould, and good samples have a peculiarly delicate flavor, and delicious mellowness, preserving these qualities for one or two years. Now, the

Stilton is set at a low temperatue, about 78°, and after coagulation is perfected, it is cut in blocks, and in a short time afterwards the curds are carefully lifted out into a willow basket to drain, and then put into a small hoop and turned frequently, receiving no pressure.

I do not propose to go into the details of Stilton manufacture, since it is not adapted to our factory system; but I introduce the main features to show in part the philosophy of cheese-making.

Here, in this most delicious of all cheeses, in which there is an extra quantity of cream, a very low temperature is employed, with scarcely any manipulation.

The chemical combinations are not hastened, but the cheese is left, so to speak, to do its own work.

The Stilton cheese are thick, but small; only weighing from six to eight pounds. Of course we could not make our large cheese in this way, as the whey would not readily separate and pass off. But it is a remarkable fact that these cheeses are capable of retaining a delicate flavor for a long time. In all the finest English cheeses coming under my observation, the temperature for setting the milk ranged at about 78° to 82°, never above 84°.

It is undoubtedly a fact, that if coagulation takes place when the milk is too warm, it becomes too adhesive, and the oily parts of the milk being kept in solution, escape with the whey.

THE AMERICAN AND CHEDDAR PROCESSES COMPARED.

The American process of manfacturing cheese, as now commonly practised, differs but little from the improved Cheddar process of England.

The night's and morning's mess of milk, mingled together, are taken to make the cheese.

One great feature in the Cheddar process is to understand pretty accurately the condition of the milk in regard to its approximate acidity at the time of commencing the operation of manufacturing.

They prefer, therefore, to have the milk in a condition so as to use sour whey at the time of adding the rennet.

When a large number of persons are delivering milk, as at our factories, it is impossible to judge so well how far the milk has progressed toward sensible acidity, as in a single dairy.

In the Cheddar practice the milk is set a temperature of about 79° to 82°, receiving sour whey with the rennet, according to the condition of the milk.

A quantity of rennet is added sufficient to coagulate the mass in from forty to sixty minutes.

When firm enough to break, the curd is cut across in checks. After it has stood from fifteen to twenty minutes for the whey to form, and the curd to acquire a firm consistency, the Cheddar dairymen commence breaking with a shovel breaker.

It is similar in construction to our factory agitator.

The curd is handled very carefully, until the whole is minutely broken, and they insist that this part of the process shall be done without any additional heat.

After breaking, heat is applied, and the temperature gradually raised to 98° or 100°, according to circumstances of weather, &c., the mass meanwhile being carefully stirred.

It is then left to rest, and only occasionally stirred, until a scarcely perceptible change toward acidity is indicated in the whey; the whey is then immediately drawn, and the curd heaped up in the vat, to drain and develop the requisite acidity gradually.

It remains in this condition for half an hour or more, the whey meanwhile flowing slowly from the heap, when it is taken out and placed in the sink or cooler.

It is then split by the hand into thin flakes, and spread out to cool. The curd at this stage has a distinctly acid smell, and is slightly sour to the taste.

It is left here to cool for fifteen minutes, when it is turned over, and left for the same length of time, or until it has the peculiar mellow or flaky feel desired.

It is then gathered up and put to press for ten minutes, when it is taken out, ground in the curd-mill and salted, at the rate of two pounds of salt to one hundred and twelve pounds of curd. It then goes to press, and is kept under pressure two or three days.

The curd when it goes to press has a temperature of from 60° to 65°, and when in the sink it is preferred not to go below this point.

A proper temperature is retained in the curd during the various parts of the process during cool weather, by throwing over it a thick cloth.

Much of our factory cheese has been injured by being put to the press at too high a temperature. The thermometer should always be used to determine the condition of the curd when put to press; and there is no doubt but the Cheddar dairymen have hit upon the proper temperature.

Mr. Harding, the great exponent of this system in England, told me he had made a great many experiments in this direction, and that a higher temperature than 65° when put to press was almost always attended with loss of flavor, undue fermentation, and as a consequence greater or less porosity.

He claimed that the curd could not be properly broken at 90° or above, and that a better separation of the whey and condition of the curd was effected by breaking at 75° to 80°.

What we are to learn by the Cheddar process is not so much following out blindly all its details, but seizing upon a few leading principles of the process, and adapting them to our use. These principles may be briefly summed up as follows:

1st. Studying the condition of the milk.

2nd. Setting at a temperature from 78° to 82°.

3rd. Drawing the whey early.

4th. Exposing the curd longer to the atmosphere, and allowing it to perfect its acidity after the whey is drawn.

5th. Putting in press before salting, at a temperature of 60° to 65°.

6th. Grinding in the curd mill and then salting.

These last two items are important, because you cannot regulate the salt accurately by guess, and can only get the right proportion by a uni-

formity in the condition of the curd. The application of salt, too, at a higher temperature than 65° is claimed to be prejudicial.

I am firmly of the opinion, not only from my observations abroad, but from my own experiments, that the exposure of the curd in small particles to the atmosphere is beneficial, and helps to secure a good flavor and mellowness of texture.

When curds are exposed to the atmosphere, the external parts become rapidly oxydized, which is seen in its heightened color.

Oxydation is the grand process by which the earth, air and sea are purified from contamination.

Water that has become foul and putrid is purified and sweetened by exposure to the air.

Of the 15 pounds of air over every square inch of the earth's surface, one-fifth is oxygen.

"The part played by oxygen in the scheme of nature," says Youmans, "is imposing in the highest degree. In virtue of its boundless abundance, its diffusive nature, the vast range and strength of its attraction, and the unchangeableness of its combinations, it would seem to have been appointed to the grand office of all other elements, and bringing them into an orderly and permanent system.

"The rocks and waters of the earth consist of materials given over to its custody. Saturated with it, they are in condition of the most perfect chemical affinity."

What we as dairymen and manufacturers need, is to understand principles, not simply a set of rules. To make American dairying a success, great progress is yet to be made. If we have a knowledge of principles we can make our own rules, simplifying here and there, lopping off errors one by one, and thus every year becoming more perfect.

I can assure you that, in the old dairy districts of New York, we are just beginning to discover some of the errors I have pointed out. If they could have been known and appreciated ten years ago, millions of dollars would have been saved us. You will do well to profit by the lessons we have been sixty years in learning.

BUTTER-MAKING.

The question of butter-making has now become one of great importance.

The cheese factory system has cut off the production, and in consequence, prices have advanced, on the fine qualities, so as to make this branch of the dairy exceedingly profitable. Indeed there is prospect of its being made more remunerative than cheese.

In my tour through Great Britain I took some pains to examine this subject, and compare butter-making abroad with our new system as inaugurated in Orange Co., New York.

The butter product of Orange Co. has long held a high reputation, but the new system became inaugurated only a few years ago. I went down to Orange Co. to study this system on its first introduction in the country.

I was induced to make the examination from noticing, in the market reports, quotations of Orange Co. pails at 70 cents per pound, while our

best grades, made in the central counties of New York, were selling at scarcely above half that price.

On my return I made an elaborate report, which was the first introduction of this system to the dairy public.

Subsequently the New York State Agricultural Society engaged me to embody my observations in a pamphlet, which was published by the State, and illustrated by plans and drawings.

It has attracted attention in this country and in Europe. The system has proved a great success, and is being rapidly introduced in new districts.

There is no doubt but that it is a decided advance over all previous systems, and this opinion is the result of considerable observation over the butter districts of Europe and America.

There is no people, perhaps, on the face of the earth, more fastidious about their food than the better classes in London.

Possessed of immense wealth, they pay liberally for extra qualities of food, particularly the products of the dairy. Good butter they *will* have, at any cost.

Their finest grades come from the Continent, Normandy and Holstein, and the Channel Islands.

It is worth to-day 140 shillings per cwt., or about 30 cents gold per pound, wholesale, while Canadian sells for 54 to 90 shillings per cwt., say 25 cents gold, and Irish extra brings 108 to 112 shillings per cwt. Their best butter formerly came from Ireland, but the complaint now is that Irish butter is too salt, and lacks the delicate aroma of that which comes from the continent. Irish butter is usually packed in stout oak firkins, securely headed. Normandy and Holstein butter is in small packages, flaring at the top, resembling the Orange Co. pail. I have seen and tested immense quantities of this butter in London. It is excellent in flavor and texture, very lightly salted, and of a rich golden color.

I saw them making butter for the Queen's table, at the Royal Dairy near Windsor Castle. The milk is set in porcelain pans resting on marble tables.

The walls, the ceiling, and the floor of the milk room are of china, and the arrangements for ventilation are the best that can be devised. Fountains of water are constantly playing on all sides of the room, which helps to maintain an even temperature. The churn is of tin, and the butter is worked with two thin wooden paddles.

The whole establishment, from the milk room to the stables, is the most perfect specimen of neatness that can be imagined. I need not say that the butter is excellent.

HOLSTEIN BUTTER.

My friend Thomas R. Downes, Esq., of London, Secretary of the London Board of Trade, furnishes me with a copy of his letter to the Right Hon. the Earle of Erne, Crom Castle, giving me Mr. Joseph R. Webb's account of Holstein butter-making.

The letter is dated London, Dec. 6th, 1867, and will be interesting, perhaps, as comparing the European with our system, since Holstein

butter in Europe, and Orange Co. butter in America, may be said to have reached the very acme of excellence in flavor and texture of all that pertains to the butter product. He says:

"In the large dairy farms in Holstein—having in many cases 100 to 200 cows, sometimes more—the greatest attention is bestowed on everything bearing upon the production of butter; for instance, feed and care of the cows, the manufacture of the butter, and the arrangements of the dairy buildings. The result is a very high average price obtained for their product, which commands the preference, especially in the northern markets of England.

"The make is divided into Winter, or Fodder Make; New Milk, Grass, or Summer Make; Stubble or Autumn Make.

"Fodder begins when the cows come in from the fields at the end of October, and is neither large in quantity nor superior in quality, as the cows yield but little, and purely old milk. This sort is not fitted for keeping, and is usually sent to market promptly.

"New milk begins, of course, according to the time of calving, usually some time at the end of February, and early in March. The quality of this make is very fine, sweet and fresh, and in March, April and May, usually meets a bare market, and realizes high prices. Being fodder made, however, it is not calculated for keeping beyond a few weeks.

"Grass butter begins when the cows are turned into the fields, about the middle to the end of May, (spring being late in that climate) and lasts till the month of August. This is a fine, rich, well keeping butter, though it sometimes suffers in the extreme heat of summer. This make is usually shipped in the late autumn, unless the market is sooner favorable.

"Stubble butter is so called from the cows being put, after harvest, on the after meadows, corn stubble, &c., where they are kept till housed for winter, about November 1st. This sort is usually of very superior quality, mild, rich, but yet capable of being kept for some months without much injury. Shipment is made about the last months of the year.

"The great characteristics of Keil or Holstein butter, as compared with Irish, are clean, solid, waxy texture, freedom from butter-milk, richness of quality, delicacy of flavor, and mildness of cure. It is rarely coarse in salt or texture, the defects to which it is most liable being bad flavor, as some farmers will occasionally overhold until it becomes rank or strong and tallowy.

"As to the feed:—In summer and autumn, while the cows are out in the meadows and stubble, they are sometimes tethered—by no means as a rule—and they remain out night and day. When once taken in doors they remain under cover entirely, in a warm, well ventilated space, and are fed something after the following order:—

"About five a.m., they have about as much meadow or clover hay shaken down before them, by degrees, as they will consume in about two hours; they are then supplied with water; chaff cut from oat or barley straw, mixed with 4 to 5 lbs. (sometimes more) of bruised oats or barley, is now given to the cows, moistened in their troughs; at one o'clock the second feeding takes place, similar to the first, and between the two some hay or straw to pick at as they choose while chewing the cud; for the evening and

night they must put up with plain straw. About 2 ounces of salt per cow is given daily, to relish the food and help digestion. Oats are considered to increase the quantity, barley the richness of the milk; equal parts from each form the mixture. Oil cake yields more milk, but affects the flavor of the butter unfavorably, as also do turnips, mangolds, swedes, potatoes, and all roots but red carrots, and therefore the latter only are given to cows in milk. It is very important that the cows should leave the stall when spring comes in good condition, and thus continue a full yield of milk when they first get out to grass.

MANUFACTURE OF BUTTER.

"The milk as it is brought into the dairy is strained into the pans, through a fine hair sieve, taking care that any splash of spilt milk is at once wiped up, lest it should taint the air in evaporation and taint the settings. To secure a fine flavored and well keeping butter, the utmost cleanliness in all utensils, and a pure air in the dairy are of course essential, but after that, much will depend upon skimming the cream just at the proper moment. This must always take place before the milk can become sour, and in order to get the largest amount of cream, an even temperature in the dairy is of the greatest help. Pure air does not mean a strong draft, as the surface of the milk must not be ruffled. What the proper moment for skimming is, depends upon the temperature and atmospheric conditions generally.

"In Holstein the rule is, in the heat of summer (temperature 55° to 60° Farenheit in the milk room) skim after the milk has stood for from 32 to 36 hours; in spring and autumn (at 48° to 50°) about 46 hours; and in winter (43° to 45°) about 60 hours. This should get the whole of the cream, but if at any time earlier the milk begins to sour, it is skimmed at once, the cream is removed, is strained into the cream tubs, and kept occasionally stirred. It remains then until it has sufficiently thickened and has acquired a pleasant acid taste.

"It is as well to repeat that choice keepable butter can only result where the milk has kept perfectly sweet, as the souring develops curd. The cream on the contrary should have an acid taste before churning, which must not, however, be confounded with the sourness just mentioned, which is altogether different, and arises from the whey, from thunder, or close atmosphere, sometimes from standing too long, from badly cleaned utensils, or from general want of care or cleanliness.

"In summer the cream generally stands about twelve hours before churning, in winter about twenty-four hours. The room may require cooling in summer and warming in winter, but with pure air, free from bad smells, smoke, or such like, as the cream easily takes up the flavor.

"Potatoes, roots, herbs, or anything of the sort should never be stored in the same place. The temperature of the cream considered best for churning is about 57° to 60°, though that varies somewhat with circumstances. The churn is rinsed out before putting in the cream, in summer with fresh cold water, in winter warm water is used, as a certain moderate range of temperature much facilitates the coming of the butter, and the addition of a pailful of iced water in warm weather and warm water in winter

into the churn is sometimes made for this purpose, during the churning. When the butter comes, it is taken out, and the whey pressed out to some extent, put into trays, and carried away to the butter cellar. Here it is placed in a long trough, slightly on the incline, with a few holes at the lower end to carry off the moisture. The trough is first rinsed with hot water, and then with cold to prevent adhesion, and the dairymaid washes her hands in the same order. She now breaks off with her hands a lump of some 5 or 6 pounds of butter, and presses it against the side of the trough with both hands opened, rolls it up and presses it out again till all the buttermilk is got rid of. It may require the operation 40 or 50 times, before this is thoroughly effected. Piece by piece the butter is treated in this manner, until the whole churning has been manipulated and placed on one side; then wipe out the trough again with a cloth and hot water, rinsing off with cold, ready for salting and coloring.

"We may remark, in passing, that color is added in the winter months, for which purpose annatto is used, prepared previously by melting down in a small quantity of butter. In salting, fine, dry, clean salt, free from mineral taints only is used, which must have been stored away from all possible contaminations by dirt or bad odors. At the rate of about 3½ per cent. it is first strewed over the surface of lumps of butter, about 30 or 40 lbs. each, and then distributed through the mass with the hand, fingers extended, but kept close together. At this stage it is not kneaded in, but when fairly spread, the butter is again worked up in 5 or 6 lb. lumps, as at the earlier stage. It is then left for twelve hours or longer, if there is not sufficient to fill a cask. Then for the third and last working add 1 lb. more salt per cwt. Spread fairly through, and work up the butter till all the liquids not belonging to it are expelled. A cask should be filled at one packing, to get a perfectly even color and quality, and should be firmly and closely packed, so that all sides are filled. The system of washing the butter itself in cold water is never followed in Holstein, as it is found to impair the delicacy of the flavor.

"The casks are made of young red birch, felled in December, when the timber has least sap, and seasoned in the open air before it is stored, to dry perfectly previous to use. The cooper is required to furnish packages water-tight, and that when closed will be nearly air-tight. Before use fill the casks for 24 to 48 hours with strong brine, in which is a dash of saltpetre, then wash with hot water, rinse with cold, and rub dry with salt.

"These precautions will largely prevent sidey, mouldy or tallowy butter, even when kept some time, provided the casks have all along been kept dry and clean.

"From the foregoing statement it is easy to gather that the prominent points in the Holstein treatment are extreme cleanliness and regulated temperatures.

"These can only be obtained by suitable arrangements of buildings and free space. Hence their Dairies are models of order, and on a large estate the buildings devoted to butter (almost always detached) are the first consideration, to which the other farm buildings take the second place.

"The rooms for setting the milk, making and storing the butter, depend much for their success on position and suitability.

"The building usually runs from south to north, with trees planted conveniently as a shade from the hot sun.

"The milk room has brick or stone walls, often double, the free space between tending to keep it cool in summer and warm in winter.

"It is usually sunk from 3 to 5 feet below the outer surface, with a height of from 15 to 25 feet, to give free vent to all exhalations from the milk. This is further provided for by roof ventilation through shafts, and by windows 7 feet wide, 5 feet high, 5 to 6 feet above the floor; shutters and louvres are also customary. The floor is lined with tiles or flags set in cement, sloping slightly to the gutter on each side, so that the water used in flushing runs off, leaving it easy to dry and wipe up all moisture. Nothing tends so much to sour the milk in summer, and thereby lessen the quantity of sweet cream, as dampness.

"The pans should have room to stand free, and not be placed one upon the other. The size of the milk room depends of course on the number of cows kept. In a dairy of 140 cows the measurements were for the milk room, 50 feet long, 35 feet wide, 20 feet high from roof to floor, which was sunk 5 feet lower than the outer surface. The other rooms were in proportion, with ample space for storeroom and ventilation.

"All store rooms are separate, and the dairy building is always far removed from the cow-houses, pig-sties, dung-heaps, or anything whatever that is offensive or can taint the air. In regard to the utensils mostly used, there is nothing of such marked difference as to call for special notice, except that the old-fashioned round pans, whether of wood or ware, are largely going out of use. The preference is now given to pans of cast iron, enameled white inside, about 6 feet long, and 2 feet wide, for which it is claimed that the cream rises more quickly and in larger quantity."

AMERICAN SYSTEM.

Now, the new American system of butter-making rests mainly upon five great principles:

1st. Securing rich, clean, healthy milk, milk obtained, if possible, on rich, old pasture, free of weeds.

2nd. Setting the milk in a moist, untainted, well ventilated atmosphere, and keeping it at an even temperature while the cream is rising.

3rd. Proper management in churning.

4th. Washing out, or otherwise expelling thoroughly the buttermilk, and working so as not to injure the grain.

5th. Thorough and even incorporation of pure salt, and packing in oaken tubs, tight, clean, and well made.

Cleanliness in all the operations is of imperative necessity, while judgment and experience in churning the cream and making the butter must, of course, be had. What really distinguishes the American system is the manner of setting the milk so as to secure an even temperature and applying to butter-making the principle of association, so that the highest skill in manufacturing may be obtained; in other words, the inauguration of butter factories.

In the butter factories the milk room is constructed so that good ventilation is secured. It is provided with vats or tanks for holding water.

These should be sunk in the earth in order to secure a lower or more even temperature of water, as well as for convenience in handling the milk.

The vats should be about six feet wide, and from twelve to twenty-four feet long, arranged for a depth of eighteen inches of water. There should be a constant flow of water in and out of the vats so as to secure a uniform temperature of the milk after it has been divested of its animal heat. The milk is set in pails eight inches in diameter by twenty inches in length, each holding fifteen quarts of milk.

As fast as the milk is delivered the pails are filled to the depth of seventeen inches and plunged in the water, care being taken that the water comes up even with, or a little above the milk in the pails.

The temperature of the water should be 48° to 50°.

A vat holding 2,000 quarts of milk should have a sufficient flow of water to divest the milk of its animal heat in less than an hour.

Good pure milk will keep sweet thirty-six hours when thus put in the vats, even in the hottest weather.

When milk is kept thirty-six hours in the water, nearly all the cream will rise.

The Orange Co. dairymen claim that it all rises in twenty-four hours. They say, too, that they get as much cream by setting in pails on the above plan, as they can to set the milk shallow in pans, and the cream is of better quality, because a smaller surface being exposed to the air, there is not that liability for the cream to get dry, which has a tendency to fleck the butter and injure its quality.

The old notion that cream cannot rise through a depth of milk greater than seven inches is believed to be an error.

Desiring to test this matter, I took glass cream jars, in which were graduated scales, and set milk of the same quality at different depths, 2 to 18 inches. The depth of cream was always in proportion to the quantity of milk.

One of the troubles of butter-making on the old system is in regulating the temperature of the milk room, and in knowing when to skim the cream. It requires close watching.

In our variable climate it is almost impossible to keep the milk at a uniform temperature, when set in jars in the ordinary way. By the new system, we always have a uniform temperature without trouble, and therefore have perfect control of the milk. Again, in the new system, the shells of casein enclosing the butter globules are not so liable to decompose and injure the flavor of the butter, for it is this caseinous matter that spoils the butter, and even under the best management it cannot all be taken out; but by exposing only a small surface of the milk to the air, we effect an important gain.

The Orange Co. butter makers have tried a great many patent churns, and they find none which they like so well as the old barrel dash churn. At the butter factories they use the barrel and half size, and about fifty quarts of sweet cream are put into each churn; the cream is diluted with water by adding cold water in summer and warm in winter, at the rate of sixteen to thirty quarts to each churning.

The temperature of the cream in summer, when the churns are started,

is about 60°, but in cold weather they are started at 64°. In warm weather ice is sometimes broken up to put in the churn, to reduce the temperature to 56°, but it is deemed better to churn without it, if the cream does not go above 64° in the process of churning, as butter made with ice is more sensitive to heat. It requires from forty-five to sixty minutes to churn, when the butter should come solid and of a rich yellow color; it is then taken from the churn and thoroughly washed in cold spring water. In this process the ladle is used, and three times pouring on water is generally all that is required. It is then salted at the rate of eighteen ounces of salt to twenty-two pounds of butter; for butter intended for keeping through the winter, a little more.

The butter, after having been salted and worked over, is allowed to stand till evening, and is then worked a second time and packed. A butter worker, consisting of a lever fastened to an inclined table, is used for working the butter. Sometimes, in hot weather, after salting and working the butter, it is taken to the spring and immersed in water, when it is taken out, worked over, and packed in sixty pound pails.

White oak firkins are used for packing, and the greatest attention is given to have them strongly hooped and perfectly tight, so as not to allow the least leakage. They are thoroughly soaked before using, in cold water, then in hot water, and again in cold water.

After being filled with butter, they are headed up and strong brine poured in at the top to fill all the intervening spaces. Another advantage resulting from this butter factory system, is that the skim milk is turned into skim cheese; but I shall not dilate upon this point.

Wherever butter is made for sale, it seems to me this system should be adopted.

The butter factories, so far as introduced, if managed by competent persons, have proved a success, and have revolutionized the dairy product of the neighbourhood.

They effectually do away with grease, and put upon the market a high flavored, high priced article.

Wherever butter factories are established consumers go into ecstacies over their introduction. "We now know," they say, "where we can always lay hands on a prime article, and we do not mind the cost, for it is a rare delicacy."

It is sometimes contended that the practice of washing the butter detracts from its fine aroma. Doubtless this is so when the washing is excessive. It is difficult and laborious to expel the buttermilk simply by working or kneading.

The more completely we remove the casein the better and longer will the butter keep without spoiling. One objection to the Holstein butter is deficiency in long keeping qualities. Washing, therefore, in water seems to be indispensable in removing more perfectly the caseinous particles and securing butter that will keep. The Orange Co. Factories are provided with butter cellars, cool, well ventilated, and perfectly free from all taints of decaying substances. It is needless to say that these are indispensable to the butter maker.

In closing, I cannot but recommend this system of butter and cheese factories combined to your attention and consideration.

By manufacturing a portion of the cream into butter, mingling the skim milk with new, or "whole milk," and making a small fancy-shaped cheese, good flavored, but less meaty, there is a chance open for better profits in the future than in cheese-making alone. At least, with all the appliances at hand, you are always prepared to take advantage of prices, and produce that article which pays you best. To private or family dairies, where butter alone is produced, the system is well adapted. The appliances are not expensive, and compared with the great advantages over old methods, cannot be over-estimated.

Rev. W. F. CLARKE moved, seconded by E. V. BODWELL, Esq., M. P.,—That the cordial thanks of this Association be tendered to X. A. Willard, Esq., for his able and interesting address, and that it be requested for publication.

Both the mover and seconder of the above resolution addressed the meeting at some length, remarking on several points of importance included in the address, and urging on the dairymen present attention to the valuable counsels they had heard.

The resolution was then put and carried unanimously, after which the Association adjourned to meet at 9, a.m., on Thursday morning.

On Thursday morning, Feb. 6th, the Association met soon after 9 o'clock, pursuant to adjournment. The discussion on making cheese once a day was resumed for a short time, and various opinions were expressed as to the use of ice, a decided preference being expressed for a stream of cool water underneath the vats. At 10 o'clock the order of the day was called up by the Chairman, and Mr. WILLARD proceeded to give a variety of statistical tables, which, though prepared for the New York Convention, he said might be of service to Canadian dairymen, if in no other way, by giving them examples for the preparation of similar tables here. The importance of having a statistical circular was also shown, and, in general, the advantages which must accrue to dairymen from being posted in regard to factory production and market prices. Mr. Willard stated that considerable depression existed among the New York dairymen from the fact that cheese-making appeared to be no longer a paying business. He would submit some figures on this subject which New York dairymen considered pretty near the mark. It takes on an average 200 acres of good land, including the wood lot, to carry forty cows, together with the usual supply of teams and sprinkling of young stock. Now at the average of forty cows at 400 lbs. per cow, a liberal estimate among factories, we have 16,000 lbs., which at fourteen cents per pound

Amounts to		$2,240
Out of this amount must be deducted for manfacturing cheese at 2 cents per lb.	$320	
Carting milk	50	
Labor, 1 man 1 year	300	
Hired girl 1 year	150	
Extra work in haying	60	
Board of help at cost	200	
Salt, plaster, &c	60	
Blacksmithing, wear and tear of utensils, waggons, harness and repair buildings.	200	
Average depreciation of stock	100	
Taxes	100	
Insurance and incidentals	50	
	$1,590	
Balance to Cr		$650

I put the farm at nothing, the stock and utensils at nothing, and have reduced the hired help to the utmost limits, on the suppostion that the farmer and his family are strong and healthy, and able to do more than hired help. I have supposed the farmer to raise his own flour, grain for the stock, and that household expenses are paid by sales of odds and ends from the farm. Thus estimated, we have the enormous sum of $650 remaining, out of which the farmer is to clothe himself and family, and pay all the miscellaneous expenses of his domestic establishment. No margin here for the purchase of camel's hair shawls, or investments in lands or stocks.

At the close of Mr. Willard's statistical details, the Association resumed the discussion of the topics on the programme.

7. Best stock for dairy purposes.

Mr. HAMILTON spoke in favor of the Ayrshires, and recommended crossing the best native cows with good Ayrshire blood.

Mr. JANES did not agree with the previous speaker as to the Ayrshires. He was in favor of an infusion of Short-horn blood into the native stock of the country. He believed, however, that quite as much depended on the feed as on the breed. Cows must have plenty of good succulent food and access to water. He would give the Association the items of his own balance sheet during one season. He kept thirty-two cows and one bull. His pasturage consisted of thirty acres of grass and rather more woodland—say two acres—one cleared and one woodland—to each animal. The cows are one-third my own raising from good native stock, crossed with Short-horns. These grades prove very satisfactory milkers. I have taken from some of them, three-quarter Short-horns, fifty-four pounds of milk per day. I have also ten or twelve other good grade cows, also of the Short-horn cross. The rest are just what could be picked up of native stock. Two of my grade Short-horns have yielded in proportion as much as three of the common cows.

During the season of 1866, my herd averaged 470 pounds of cheese per cow. My cows go till August on grass. When pastures fail we use green corn and rape—no roots. Sowed corn cannot be recommended too highly. My first year's average was only 400 pounds of cheese per cow. Had no succulent feed that year.

The question was asked if the feeding of rape affected the taste of milk?

Mr. JANES replied that he had found no ill effect from feeding turnips even, by feeding immediately after milking.

Some one asked—"How much corn to sow per acre?"

MR. JANES replied, it depends on the kind used. I sow the large western variety, 2 bushels to the acre. It will grow ten feet high, or more; but though the stalks are nearly as large as a man's wrist, they are so soft and juicy that cows eat them eagerly.

It was asked if the corn should be sown broadcast, in drills or in hills?

MR. JANES replied, broadcast will do; but I prefer to use a drill. Hill planting does not answer for green foddering. I like to take an old meadow, plough it with a subsoil plough, leaving plenty of loose soil on the top of the buried sward. Sown with a drill on such land, a large yield is certain.

MR. WADE, of Port Hope, said—We want stock that will give a good yield of milk, make a rich quality of cheese, and when their milking days are over, produce the most beef. I rank the breeds as follows:—

1. Durham and Durham grades.
2. Ayrshires, if for milk only.
3. Devons, natives and miscellaneous, to be selected with judgment.

We rear our own stock as far as possible, and feed the young calves with whey, and meal stirred in it. Durham blood predominates in our herd, but we are this year using an Ayrshire bull, which ought to make a good cross. We practice liberal feeding. If grass fails we use green oats, vetches, corn, &c. The long winters of this country are the great drawback to dairy farming.

Mr. LOCKHART strongly advocated root-growing, especially turnips. He believed this was highly advantageous in many ways; among the rest, it prepard cows better than any other winter feed to take to grass.

Mr. MALCOLM, of Perth, said there were some objections to turnips. They had become a very uncertain crop. Used to get 800 bushels to the acre easier than 300 or 400 now. Cannot get a good crop of wheat after turnips now as formerly. There is also difficulty in keeping turnips through the winter. Question if peas be not more profitable than roots. Can always get good spring

wheat after peas. Year before last made near 500 lbs. of cheese per cow. Began to make early in the season, fed meal until a supply of grass came, and milked late into the fall. Also made on Sunday the same as week days. I feed all the early part of winter straw and turnips, and give hay and chopped stuff or meal towards spring. As spring approaches, the cows grow weary of straw and refuse it.

Mr. FARRINGTON urged that, whatever breed of cows were kept, the utmost care should be taken of the calves. Early and good milkers could only be had by so doing.

Mr. DALY, of Belleville, had found the large Durhams good milkers, but costly to keep. Large framed cows are unprofitable, the small animals are best. Had obtained most liberal results from a small brown kind of cow, called a native, but apparently a cross between the Devon and Ayrshire, having thin neck, full udder, and milking a ten quart patent pail-full at a meal. Would give the result of a dairy in his part of the country, made up chiefly of natives, but including a few Durham grades. It is known as the "Front of Sidney Cheese Factory," County of Hastings. Number of cows, 826; 4,300 boxes of cheese made, averaging about 80 lbs. each; average of cheese per cow, 416 lbs. Sales realized 8 cents per lb. to the patrons, exclusive of the cost of manufacture and carting. Sabbath milk not used, but made into butter by the patrons. One pound of cheese was got on an average from 9.55 lbs. of milk. Corn has been largely sown broadcast for green feed.

The Association adjourned from 12.30 p.m. to 1.30 p.m. On resuming business, question No. 8 was read by the Chairman.

8. What is the best hour and plan for milking ?

On motion, it was agreed to lay this question on the table.

9. What kind of salt is most suitable in cheese making, and how does the Goderich salt compare with the Liverpool Dairy salt ?

This question only elicited a very short discussion, which resulted in the following resolution :

That this Association, having learnt that Goderich salt is fully equal to Liverpool and other standard varieties, would recommend its general use among dairymen.

Several present stated they had tried the Goderich salt, and found it as good as any other salt.

The report of delegates to the Utica Dairy Convention was called for, when the CHAIRMAN, Messrs. FARRINGTON and NOXON, severally gave their impressions of the Convention they had attended.

It was then resolved that the report of the delegates be received, and thanks tendered them for their attendance at said meeting.

A report was then presented by the Finance Committee, which on motion was adopted.

The committee appointed to consider the best means of securing purity of flavor in cheese, reported as follows:—

REPORT OF COMMITTEE ON THE BEST MEANS OF SECURING PURITY OF FLAVOR IN CHEESE.

Whereas it is abundantly manifest that, in order to ensure success in the dairy business, purity and excellence of flavor in cheese must be secured; and whereas this depends on a variety of conditions, the observance of which cannot be too strongly insisted on, this Association hereby resolves as follows:

1. That one of the most essential requisites in the manufacture of cheese is pure, clean milk; and being fully convinced that a pure article of milk cannot be had so long as dairymen and their patrons continue to use wooden utensils for milking and storage, this Association earnestly recommends the use of tin pails for milking; also, that none but tin vessels be employed for conveying and storing milk, and that all wooden vessels be discarded, and banished from about the dairy.

2. That in order to lower as much as possible the animal heat of the milk, this Association would recommend that the cans in which it is put for sending to the factory be set in tubs of cold water, and kept in a shady place until called for by the carrier.

3. That all milk-waggons should be furnished with an awning or roof of some kind, to protect the milk cans from the rays of the sun.

4. That this Association would advise the election of a committee by the patrons of each factory, at their annual meeting, for the purpose of inspecting all vessels used for milking, storage, or conveying milk to the factories, and that it shall be the duty of said committee to use all practicable means to secure the utmost care and cleanliness on the part of all persons engaged in handling milk.

5. That much damage is often done to the quality of milk by reckless driving and over-heating of the cows on the part of ill-trained dogs, and wild, thoughtless boys; therefore this Association would urge the greatest care in this particular, and that not only is it important that cows be brought up from the pasture without hurry and excitement, but that kind usage and quietness be inculcated on the milkers.

6. That cows eating weeds which impart an objectionable taste to milk is one cause of bad flavor in cheese, and as this evil is not likely to occur except when the pastures become scant through heat

or drought, this Association would recommend patrons of cheese factories to grow a small quantity of green fodder to give cows when the grass fails; not only will the temptation to eat weeds be thus removed, but a liberal yield of milk will thereby be secured.

7. That experience proves the utter impossibility of making pure cheese in a tainted atmosphere; therefore it is of the greatest importance that there be no hog-pens within smelling distance of the factory; also that sour whey, slops, rubbish, and impurity of every kind be removed from the neighborhood of factories, and all the surroundings kept as clean and sweet as possible.

8. That badly cured rennets are one cause of ill-flavor in cheese; which evil may be easily prevented if butchers and others will observe the following simple rule: kill the calf twelve or fifteen hours after sucking, empty out any vestige of curd or other foreign matter that may be in the rennet, salt and stretch to dry.

9. That this Association would advise extreme caution and dealing only with responsible houses, regardless of cost, in order to obtain pure annatto, there being little doubt that an impure article is frequently a source of injury to the flavor of cheese.

10. That this Association would recommend a trial of curd mills on the part of dairymen, there being much reason to think their use would improve the flavor of cheese by effecting a more complete removal of whey, the remains of which, doubtless, often occasion bad flavor.

11. That it is advisable to avoid working up new milk, and to leave it, if possible, from six to twelve hours, as circumstances may admit, before commencing the process of manufacture.

12. That this Association cannot too strongly express its conviction of the absolute necessity of most scrupulous cleanliness in every process connected with cheese-making; and inasmuch as it is equally the interest of patrons and factors to secure this, it would earnestly press upon all concerned the use of every practicable means and a hearty co-operation to accomplish the desired end.

13. Finally, this Association would urge on all cheese-makers to thoroughly master the principles of their business; to verify them for themselves; not to go upon hearsay or blindly to follow the rules of others which they have not tested, and to bend their most assiduous, determined and persevering endeavours to raise the quality of the article they manufacture, until the Canadian cheese shall rank second to no other brand in the world's market.

All of which is respectfully submitted,

W. F. CLARKE, *Chairman of Committee.*

On motion the foregoing report was adopted.

Question No. 4, relating to the statistical circular, was then recalled for further discussion.

Rev. W. F. CLARKE said there could only be one opinion among practical and shrewd men as to the value of such a circular, if it only furnished correct information. He had learned that the American Dairymen's Association had appointed a committee to devise ways and means for issuing such a circular. The President of this Association was a member of that committee. He thought we should co-operate with the New York dairymen in this matter. He was about to move a resolution to that effect. But before doing so, he wished to refer to the calculation laid before the meeting by Mr. Willard, as to the small returns now obtained by American dairymen. It was clear that we could out-do our American neighbours in producing cheese for the foreign markets. He had made a rough calculation since Mr. Willard had given us the New York balance-sheet, and it convinced him that at the low figure of 9¼ cents per lb. for cheese, the Canadian dairymen could show a better balance to the good in gold than the American dairymen could in United States currency. He hoped the practical men in the Convention who could do this more correctly than he, would get up a balance-sheet to compare with that submitted by Mr. Willard. While he did not believe Canadians were about to make fortunes in the dairy business, he had no doubt it was a fairly remunerative branch of industry, and would become increasingly so if cheese of the first quality were produced. He begged to move:

That this Association, impressed with the necessity of having a periodical circular of statistics, hereby declares its readiness to co-operate with the committee appointed at the recent American Dairymen's Convention in regard to this matter, and the manufacturers present pledge themselves to endeavour to secure from their patrons a subscription of two cents per cow towards this object. Seconded by J. V. Bodwell, Esq., and carried unanimously.

It was then on motion resolved:

That the thanks of this Association be given to A. Oliver, Esq., M.P.P., for the service rendered by him to the dairy interest by the introduction of a Bill to prevent the adulteration of milk; also to K. Graham, Esq., M.P.P., for his co-operation with said measure.

That the members of this Association pledge themselves to the utmost of their power to avoid and discourage Sunday cheese-making, and all dairy work not absolutely required by mercy to animals and actual necessity.

That the thanks of the Association be presented to T. Swinyard, Esq., Manager of the Great Western Railway, for his liberality in granting free return passes to the members of this Association.

That the cordial thanks of the Convention be tendered to the editors of the CANADA FARMER and the Ingersoll *Chronicle* for their

attendance and the interest shown by them in the publication of the reports of this and the former Convention.

That this Association cannot separate without expressing its conviction of the many benefits resulting from such meetings as the present, and would extend an earnest invitation to all interested in the dairy business to be present at future gatherings of this kind.

Votes of thanks were then passed to the President, C. E. CHADWICK, Esq., for his conduct in the chair, and to J. NOXON, Esq., for his faithful services as Secretary, and for his successful endeavours to obtain return passes on the Great Western Railway.

The Association then adjourned until the first Wednesday in February, 1869.

REPORT

OF

SECOND ANNUAL MEETING

OF THE

CANADIAN DAIRYMEN'S ASSOCIATION,

FOR THE YEAR 1869.

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ANNUAL ADDRESS

DELIVERED BEFORE THE CANADIAN DAIRYMEN'S ASSOCIATION AT INGERSOLL, CANADA, FEBRUARY 3, 1869,

By X. A. WILLARD, A. M.,

OF LITTLE FALLS, HERKIMER COUNTY, N. Y.

Mr. President and Members of the Canadian Dairymen's Association:

I esteem it extremely complimentary to be called upon to speak to you again upon the dairy. I cannot attribute it to any oratorical device on my part, but accept it as a recognition of earnestness and devotedness to the special interest of American industry to which I belong. Born and living among dairymen, I have labored to elevate and ennoble the class with which I am indentified: and there is nothing which has given me more profound satisfaction than the progress which has been made in this branch of industry. It is a high honor for me to join hands with you again in the cause of improvement. There should "no North, no South, no East, no West," no United States, no Canada, among dairymen. We have a common interest to seek and maintain—the perfection of dairying on the American continent, and the superiority of its products in the markets of the world. We stand to-day on the threshold of great improvements in agriculture. There never was a time, it seems to me, in all the history of the world, when God, in his infinite goodness, has indicated to the agriculturist the means of progress more plainly than now. If a blind man thirsting for water, and groping hopelessly in its search, should hear in the distance a faint voice and turn his steps in that direction, until he came within sound of the babbling brook, he would reasonably infe- that some friend had given him special aid. So it seems to me, the wonr derful development of farm machinery—the application of steam as a motive power—the principle of associated labor and capital applied to the farm—the gathering of large bodies of farmers at fairs and at conventions—the discussion of topics relating to the farm at clubs and its widespread dissemination through the press—the inauguration of Agricultural Schools and Colleges—all are significant of a higher hand urging us onward to develop a new era in Agriculture. Whether we shall take advantage of these things, or stand idle and allow them to pass, is a question of great moment to thoughtful men. What seems the more remarkable index of the age, is the constant effort to shift the burden from human muscle upon

the inanimate shoulders of iron, wood and steel. The great obstacle in the way of improved farming has been the drudgery—the exhaustive waste of means and of human life upon ordinary farm operations. The farmer in moderate circumstances, who cut his grass with the sythe, his grain with the sickle, who threshed with the flail and hauled his surplus with teams to a distant market, had little time for improvement. It was little better than mere slavery for subsistence. Was it wonderful, then, that this kind of life proved unattractive to the ambitious youth, and that he impatiently broke away faom a calling in which he could see but the most meagre reward for long years of patient drudgery? If we are to have progress in agriculture in the New World, where men are held better than beasts of burden, it must be due in some respect to farm machinery. The drudgery must be performed by those willing, uncomplaining, patient, untiring servants of iron, which only ask to be directed by an intelligent master. Thank God, these have come and are coming, and the farmers of to-day can lift their heads from a slough that has for ages bound them down to serfdom. The immense strides that are made from year to year in farm machinery may well fill the mind with astonishment. We have scarcely ceased wondering at the triumphs of machines which have been brought into practical use when a new class of machines claims our attention. At the last N. Y. State Fair there were three novelties, each performing a distinct class of work of great importance to the farmer, and each pronounced a success by the committee who put them to the test—these were a ditcher which constructed a ditch 10 inches wide and 2 to 2½ feet deep, at the rate of 39 ft. in 9½ minutes; a sheep-shearing machine, with which it was considered impossible to wound a sheep, unless done intentionally, and would shear 150 middle-wool sheep or 50 af the wrinkled merinos in a day; and the corn-husker, which would do its work in a perfect manner, at the rate of 400 bushels per day. These, indeed, are additional triumphs which must gladden the heart of the farmer. A great deal has been said about Agricultural Colleges, and the hope entertained that we are to enter, through their teaching, upon an era in farming which we have never before seen. I am glad these colleges are springing up. They are needed now more than formerly, because farming is now to be mainly done by those iron arms which save human muscle and give leisure for brain labor. But the great need of the country now is for teachers in agriculture who are in earnest, and who can infuse enthusiasm in the hearts of pupils, men who can appreciate that agriculture is the most intellectual as well as the most ennobling of all callings; men who have taste for the æsthetics of farming—that can show the way to make farms pleasant, buildings commodious, appropriate and charming, men who can introduce order, system, and economy on the farm, and most of all, tell us how to make farming pay. The American people will always insist upon this last principle, for if it does not pay, it cannot long be popular with young men who have fortunes and a home to make, nor with older men who have gained wealth slowly and know its value. It should also be the duty of farmers and the public to give these schools their earnest support. They need our sympathy, confidence, and influence, and especially, a determination on our part to help them onward. And now that machinery is becoming so widely introduced, would it not

be well to let our young ladies be somewhat instructed in its use? I do not mean to advocate female field labor as it is known among the lower classes in Europe, nor to abridge one iota of any female accomplishment; but cannot we add another, that of managing horses in the application of machinery to farm work, not so much a task as a pastime, and as a means of interesting females in the general operations of the farm, and as a means of developing their physical constitutions. I can see no objection to any man's daughter or sister taking her seat occasionally on the mowing machine, the hay tedder, the wheel rake, or in the direction of light farm machinery, where she can gather strength and health in the open air. I am confident females enjoy such things, and are made happier, stronger and better, if they are taught that such work is not unwomanly, and the knowledge gained would be of immense service in after life in assisting the father, brother or husband, with suggestion and advice. In their education, I fear, we do not give our girls a fair chance in the race of life. The majority of American boys and girls do not like to make choice of farming as a livelihood. The farmers' educated daughters of to-day have little sympathy for the farm, and, if they marry a farmer, often urge him to abandon the business for something more genteel. In England they have better tastes, for their women have more fondness for country life than ours. When in Europe, I visited Sir Robert Piggot. Lady Piggot has one of the most noted herds of shorthorns in England. She has made it both a source of profit and reputation. Not caring to discuss this point, I only ask that we try and make farming pleasant and interesting to our wives and daughters, for without such help it is hard to make our farming successful. In cities it is fashionable to make girls helpless, and farmers have, of late, fallen into the same ideas, There are whole townships where farmers, becoming wealthy, have sold out to laborers, and are now trying to live more genteel. In many instances the experiment has proved a failure. Industrious and intelligent young men stand aghast at matrimony because they see no way of supporting a wife in the style in which she has been brought up. If she only understands the modern accomplishments, she can be of little use to a husband of moderate means.

It is within the province of our Agricultural Colleges to save our farming population, by giving our young men a practical education and correct notions of life, in turning the drift from the overcrowded professions to the farm. I do not presume on any extraordinary knowledge, but I have been much among farmers, and feel something of their needs, and am interested in the success of these schools, that our farming may be made better and the profession ennobled. And American dairymen, more than any other class, are opening up the way for their appreciation.

The interest which we represent to-day is, perhaps, the most progressive branch of farm industry that can be named. It embraces the widest range of topics and the most diversified employment of skill and intellect; first, the management of milk in all its relations, and its manufacture into dairy products; and back of this, the great arts of breeding and management of stock, the production of food, and all the details concerning the growth of special crops These it is important to understand, to ensure the largest success. The inauguration of the factory system and these

conventions have stimulated inquiry and a desire for improvement which marks a new era in agriculture. The discussions and experiments of dairymen have so sharpened the intellect, that there is now no class of men so critical, so exacting, or who can weigh a speaker's words with more precision than those who gather at these conventions. Mere eloquence is of no avail with these men, they demand the stubborn facts of knowledge, in such a way that they can be at once applied to their business and turned into money. I do not mean to say that dairymen are unappreciative, but they come here for knowledge, and there is no audience before whom I feel more diffident, because I know that no suggestion that has not the ring of practical utility will be tolerated.

THE DAIRY—ITS PROSPECTS AND PROFITS, &C.

In discussing matters pertaining to the dairy, not the least important question to be considered is its profits and future prospects. The large increase in dairy farming from 1864 to 1867 made it extremely difficult to determine with certainty what was to be the result of this wide-spread dissemination of the factory system.

We commenced the season of 1867 with no accurate statistics from which to estimate the probable production, and with insufficient knowledge as to the possible demand and consumption of cheese in this country.

The main data upon which shippers and others based their operations were, that England had taken from us about 50,000,000 pounds of cheese in one season. It was thought the amount of exports could be possibly increased from ten to fifteen millions of pounds more, providing prices were low enough to undersell with our superior article the poorer English grades. All parties greatly over-estimated the probable American production, and under-estimated our own probable consumption. Reasoning from these premises, the prospect of high prices looked extremely dubious. In addition, we had an army of agents and small dealers anxious to do business and obtain the per centage upon their purchases. They were honestly imbued with the general idea that cheese-making in America had reached the limit of over-production, and they with the shippers urged the necessity of pushing our goods forward to the utmost limit, regardless of the producers' interest, and looking, as was natural, to the saving of their own profits, and, as they said, rescuing the entire product from dire disaster.

It will be seen how depressing the influence among producers and the trade of an impression that we had upon our hands a large surplus product sufficient to glut all the markets of the world, and liable at any moment to completely break down prices, bringing ruin in its track. Every one who handled cheese during the summer of 1867 touched it with a feeling of insecurity. All parties seemed to be sailing through a heavy fog—black as night—and the consequence was that extreme low prices, often below the cost of production, ruled through the season. In November and December sales were so dull that factories sent forward "their goods" to New York, and held on their own account. An immense quantity of cheese was stored in the city, while a large amount lay over in the country.

Those who kept watch of my market reports that year will bear witness to my earnest efforts to sustain prices, and infuse courage in the minds of producers, and it was mainly through this advice that the factories shipped to New York and held on their own account—and I am glad to say that the result was better than was anticipated, as prices advanced during the winter, and sales turned out more satisfactory than in the fall. Some of our home dealers thanked me for these efforts, and one of these men said to me recently, that these market reports had been of immense service, not only to the producer, but to the dealer, and he was free to acknowledge they had saved him $1,500 in one transaction, by inducing him to hold goods which he had bought and was on the point of selling during the dull markets. But it was only on the final closing out of the cheese product of 1867 last spring that an estimate could be made of the whole matter, and future operations predicated

It was known that the cheese product of 1867 was the largest ever made. It amounted in America to 215 millions of pounds, and in Great Britain to 179 millions, making a total of 394 millions of pounds for the two nations. The English consumption in 1867 was 309 millions of pounds, and from careful estimates it appears that the consumption in the United States amounted to 160 millions of pounds. Here, then, we have a consumptive demand of 469 millions of pounds for the two nations, which is greater by 75 millions of pounds than the production.

In other words, to supply the consumptive demand for cheese in Great Britain and the United States, an importation from other parts of the world of 75 millions of pounds must be made to supply the two nations, above what they produce. The English supply this deficiency from Holland; but as France has recently entered into competition for Holland cheese, America must be the main source hereafter for her importations, especially as we produce an article greatly superior to the Dutch. But there is another point generally overlooked by those who have made estimates in this matter. England doubles her population in forty years, and Mr. Downs, Secretary of the London Board of Trade, writes me that statistics show that English cheese consumption always more than keeps pace with increase of population. The increase of population makes an annual increased consumptive demand in England of from eight to ten millions of pounds. From statistics, it appears that the increased consumption of cheese in the United States, from increase of population, is about eight millions of pounds, so we have an additional margin of sixteen millions of pounds per year which is to be supplied by an increase in the dairy business.

It may well be doubted, therefore, whether we shall be able for some years to come (if ever) to reach the limits of over-production, because the consumption of butter goes on in more rapid proportion, and a considerable proportion of the dairies must be devoted to that object. I should be extremely sorry that any careless word of mine should raise false hopes, or lead astray; but it seems to me, from the statistics I have given, that there is no branch of farming that promises to be so enduring and remunerative as the dairy. And in the past it must be confessed there has been no interest that has been so steady and sure in its rewards.

The past year (1868) has been, on the whole, a prosperous one for the dairy farming of New York. There has been an immense crop of hay stored in good order. The prices for cheese have been remunerative, but not near so remunerative as they might have been, had producers known all the facts concerning the production and demand. The drouth in England and Holland, with a rather short crop in America, has produced a scarcity in the market which we should have taken advantage of earlier in the season.

I have here an estimate of the quantity of cheese in New York, country and city, together with the stocks in some of the leading eastern markets during the first week in December of the two years 1867 and 1868.

The figures are of interest, and must indicate, to any sensible mind, that America will be stripped bare of dairy products by spring, and that high figures may be anticipated for the early make.

	BOXES. 1867.	BOXES. 1868.
In New York City.....	289,000	180,000
" Country	313,000	50,000
" Boston.	50,000	15,000
" Philadelphia.....	65,000	25,000
" Baltimore.....	45,000	15,000
" Jobbers' hands.	100,000	25,000
Total.	862,000	310,000

Now, we shipped during December, 1867, and up to the last of April, 1868, 234,348 boxes: a quantity more than is now in New York city and in the country. In the winter and spring of '67-'68 we needed for our own trade (home consumption) 528,000 boxes. For the same time, or up to last of April next, we have but 75,000 boxes, providing we ship abroad in the same ratio as in 1867--68. But with the scarcity in England, we may reasonably suppose that a larger exportation this winter would be demanded.

Seventy-five thousand boxes is no more than is needed to supply the Boston trade alone.

I have the statistics here of the exports for the different months of the two years 1867 and 1868, and I give them that you may know precisely how the record stands.

Comparative Statement Exports of Cheese from New York to all parts for seven months ending Nov. 20, 1867 and 1868.

MONTHS.	1867.	1868.	INCREASE.	DECREASE.	REMARKS
	BOXES.	BOXES.	BOXES.	BOXES.	
May	37,516	34,297		3,219	
June	93,518	53,969		39,549	
July	170,967	190,444	19,577		
August	188,614	190,270	1,656		
September	154,969	70,696		84,273	
October	69,229	108,429	39,200		
November	62,728	*60,679		2,049	*4th Decem. inclusive
Total	777,441	708,784		68,657	
December	44,175				
1868.					
January	38,811				
February	38,386				
March	60,410				
April	58,562				
Total	1,017,785				

I have occupied considerable time in discussing this branch of the question, because it is of the utmost importance that every dairyman and dealer should know the facts. Neither you nor I will care to engage in a business from which no profits can be realized; and it is upon this very point that correct information is most difficult to be had, and I trust, in some measure, these statistics will be appreciated, since they have occupied a considerable portion of time during the last twelve months in intense application to gather them together, and they are the first and only thorough exposition of the cheese interest that has ever been given.

CAUSES INFLUENCING THE FLAVOR OF DAIRY PRODUCTS.

In the matter of securing fine flavor in both butter and cheese, some points have been entirely overlooked in all previous discussions. We learn things slowly, and the history of discoveries presents the astounding fact that the great principles of science and life are often extremely simple, and would seem almost obvious to the commonest mind. It seems very remarkable for us to comprehend how ages and ages should have rolled on, with the idea that the earth was flat, instead of spherical, and so in regard to the laws of gravitation, and other great principles of science and mechanism. It is only recently that our attention has been directed to some of the true causes influencing the flavor of dairy products; among these, the question of clean, pure water for stock has not been sufficiently appreciated.

When we consider that milk of average quality contains 87 per cent. of water, and that pure water is preferred by, and is essential to the health of stock, it would hardly seem reasonable to expect that the animals could overstep the laws of nature and manufacture good milk from stagnant water, filled with vegetable decomposition, reeking with filth and abominable stenches. Yet such seems to have been expected and required of the poor animal, even in some of the best dairy districts of New York, and because manufacturers have not been able to make a good product out of such milk, they have been blamed as shiftless and incompetent. I do not wish to shield the manufacturer from any responsibility, but I can say this for them,—there is no class of persons that try harder to do well, and are more worried and feel more regret about a poor article, than they. I have never made cheese at a factory, but I have had long experience in my own dairy as a manufacturer, and I can say truly that there is nothing more discouraging or dispiriting than to have a lot of poor stuff on the shelves, the product of one's own hands.

The question of bad-flavored cheese during extremely hot weather is discussed year after year, and with all our knowledge and experience in New York, has not been obviated the past year. Much of the July cheese was badly "off flavor,"—floating curds were also very prevalent. I took some pains to study this question, and I found by examining farms in numerous instances, that stagnant, putrid water was one of the leading causes. There were other causes which I shall mention, but in no case where this putrid, stagnant water was taken by stock, was a clean-flavored cheese produced. June and July were hot and dry in New York, and water upon many of the farms became scarce, and hence the stock were compelled, in many instances, to drink what they could get.

In one locality of Herkimer great trouble was had at the factory from floating curds, and the milk of one of the patrons was declared as the cause, and his cows were drinking from frog-ponds. This man, to test the matter, changed his fences, so as to get good water, and the trouble ceased; in returning again to the bad water the difficulty returned. So from these experiments it was abundantly proved that *bad water* made *bad milk*.

Go among the best private dairies or factories of New York, and you will invariably find that an abundant supply of pure running water is provided for stock. In England I found particular attention paid to this matter by the best Cheddar Dairymen, and it cannot be doubted that the clean pure water on their stock-farms is one of the secrets of their success. I wish I could impress this principle indelibly upon the mind of every dairyman and cheese-manufacturer present, for I am convinced that this is one of the faults which some of you will be obliged to correct before yonr goods can reach the highest standard of excellence. Water was designed by the Creator as the great purifier, both of the atmosphere and of animate creation, but people should understand that the purifier must of itself be pure before applying it either externally or internally. Science has proved that water which has stood in an occupied bed-room over night, is utterly filthy—a deleterious poison, and unfit for drinking.

The water is a powerful absorbent of gases, taking in during the night all the poison that is thrown off by respiration.

But upon farms where springs and streams are deficient how is the defect to be remedied? By digging wells, and applying wind-power, for pumping it to the surface. Fortunately we have wind-mills so perfected that they regulate their own sails, are comparatively inexpensive, easily erected, and are durable. Let the tanks for holding the water be so arranged that all surplus water be carried back to the well, and thus by keeping it constantly in motion all the benefits of a living spring or stream are secured. Wells should be arranged in the pastures so as to be convenient, and obviate any extra travel of stock. This will pay in the larger yield of milk, to say nothing of its quality.

STABLES.

There is another point upon which the old dairy farmers of New York are in error, and which is the cause of great impurities in milk; it is the bad construction of milking-stables. Many of them are little better than a horrible pest-house, badly ventilated, steeming with ammonia and other gases, filthy and perfectly stifling with emanations of decomposing matter. Into these monstrous pens of disease the cows come, often over-driven and heated, from the pasture, in hot weather, where they stand until milked. I ask you whether it is common sense to crowd cattle together in such places, where their own heat and emanations are mingled with pestiferous gases, and expect to obtain good milk? I have seen delicate women, in hot weather, faint away in these places, while milking, for want of pure air, and I should be false in my duty to you did I not pronounce these things an abomination. Follow this milk to the factory after having been confined in the can, under a close-fitting cover, and you will find it most offensive in odor, and putrid. If there is any cheese-manufacturer living that can convert such milk into clean-flavored goods, I am anxious to see the man. If there be any here, let him stand up and explain his process. My friends, I do not come here to theorize, but to tell you important truths by which old and grim errors may be avoided. In this respect the English farmers are in advance of us. Their milking-stables are open on one side, sweet, clean, with ample ventilation, where the cows are kept cool and the milking is made a source of pleasure to both the animal and the milk-maid.

I am satisfied the whole system of milking-barns will in time be changed in New York, and ample ventilation and cleanliness secured. Many of our dairymen have not had their attention called to the subject, and hundreds are yet ignorant of nearly all the requisites for making good clean milk. I have said to our dairymen that the new districts would yet beat them in the markets, just as Somersetshire has beaten old Cheshire, in England, because the new districts are making greater efforts to improve, and are not wedded to old errors. We are losing millions of dollars annually in poor butter and poor cheese, simply because people do not know where the fault lies. Many do not appreciate that the time is right upon us when poor-flavored stuff, whether it be butter or cheese, is

not wanted in the great markets of the world. Dealers do not care to handle these goods—they give a bad reputation to every one who touches them. An inferior product must always be bought at a lower price than its real value, if bought by an expert, because he takes a large risk in looking up a customer to whom he may dispose of it. I have said that dairy-farming promises to be remunerative and enduring—the statement needs modification. It *does not* promise to be remunerative to those who make a poor and inferior product. To such it must most assuredly prove disastrous—disastrous not only to the producer but to the dealer who handles the goods; for it is the poor stuff upon which the money is lost. Almost any dealer will tell you this. He purchases such goods at a risk, hoping they may clear him a profit, but the chances are many times less than with a good article. I have watched the history of failures among provision merchants, and it is the poor stuff that in the end "breaks the camel's back." The New York dealers have begun to put in practice a system of discrimination in their purchases, which tells heavily upon an inferior product, so heavily as to compel some of our dairymen to abandon the business. My friends, I come here to do you a service, and I beg of you to avoid these errors of the old dairy districts.

MILKING.

After you have provided a clean, well-ventilated milking stable, let each milker take a pail of water and towel into the stable, wash the cow's udder and wipe dry with the towel, and then proceed to milk. You will have no filth then dropping into the pail, and the water is so cooling and grateful to the animal that she is quieted, gives down her milk at once, and will yield enough more during the season to pay the whole cost of milking.

Do not take the advice of those dairymen who advise you to "chop off the cow's tail" to get it out of the way of the milker; such things are common in some of the dairy districts of New York. It is an inhuman practice, as it deprives the animal of the means of defence against flies. The better way is for the milker to have a rubber band with clasp attached, by which he can in a moment fasten the tail to the leg during milking. It can be carried in the pocket, is cheap, can be applied or loosened in a moment, and would often avoid the exhibition of a great deal of bad temper in milkers, and abuse of cows.

In order to appreciate the importance of carefully milking cows, it is necessary that the dairymen should know something of the structure of the udder. Says a writer in the *Rural Cyclopedia*,

"The udder of a cow is a unique mass, composed of two symmetrical parts, simply united to each other by a cellural tissue, lax and very abundant, and each of these parts comprises two divisions or quarters, which consist of many small granules, and are connected together by a compact laminous tissue; and from each quarter proceed systems of ducts, which form successive unions or confluences, somewhat in the manner of the many affluents of a large river, until they terminate in one grand excretory canal, which passes down through the elongated mamillary body

called the teat. Its milk tubes, however, do not, as might be supposed, proceed exactly from smaller to larger ducts by a gradual and regular enlargement, because it would not have been proper that the secretion of milk should escape as it was formed, and therefore we find an apparatus adapted for the purpose of retaining it for the proper time.

"This apparatus is to be found both in the teat and in the internal construction of the udder. The teat resembles a funnel in shape, and somewhat in office, and it is possessed of a considerable degree of elasticity.

"It seems formed principally of the cutis, with some muscular fibre, and it is covered on the outside by cuticle like every other part of the body; but the cuticle here not only covers the exterior, but also turns upward and lines the inside of the extremity of the teat, as far as it is contracted, and then terminates by a frilled edge, the rest of the interior of the teats and ducts being lined by mucous membrane. But as the udder in most animals is attached in a pendulous manner to the body, and as the weight of a column of fluid would press with a force which would in every case overcome the resistance of the contractions of the extremity, or prove oppressive to the teat, there is in the internal arrangement of the udder a provision made to obviate this difficulty. The various ducts as they are united, do not become gradually enlarged, so as to admit the ready flow of milk into the teat, but are so arranged as to take off in a great measure the extreme pressure to which the teat would be otherwise exposed.

"Each main duct, as it enters into another, has a contraction produced, by which a kind of valvular apparatus is formed, in such a manner as to become pouches or sacs, capable of containing the great body of the milk. In consequence of this arrangement it is necessary that a kind of movement upward, or lift, should be given to the udder, before the teat is drawn to force out the milk; and by this lift the milk is displaced from these pouches, and escapes into the teat, and is then easily squeezed out, while the contractions or pouches at the same time resist in a certain degree the return or reflux of the displaced milk.

"This valvular arrangement is thus a very beautiful combination of exquisite mechanism with organic functions, and readily explains why a series of lifting actions are requisite in the artificial milking of the cow—why the calf, the lamb, and the colt, jerk up their nose into the udder; why the pig, the puppy and the kitten punch up the teat with their feet."

Preparatory to milking, the teats ought always to be well washed with a sponge and cold water, and when tender, with warm water. This is not only a cleanly habit, but it keeps the teats in good order, and frequently prevents inflammation. Moreover, the milk sometimes coagulates and stops up the passages, or the extremity of the teat is closed by a little resinous substance which has to be removed before the cow can be milked. In both cases the flow of milk can be restored by the prompt application of a warm fomentation.

If the cow has been treated kindly from her youth, and not roughly

handled, she will readily stand quietly and appear to enjoy the operation of milking. It should always be done by one person, and I prefer females because they are more gentle in manner, cleanly in habit, and patient in temper.

It would be impossible in the brief limits of an address to even touch upon many points of essential importance to the dairyman. Some of them have been already discussed and published in my addresses before the American Dairymen's Association, the N. Y. State Agricultural Society, and other Associations. The topics which I have chosen to-day have not previously received attention, because we have but recently discovered their importance. The dairymen of New York, strange as it may seem, have for 40 years labored under the mistake that both the quality of butter and cheese depended entirely upon peculiar manipulations of the milk—wholly overlooking its condition arising from the manner of its production. Of course much depends upon manufacture—*that* is not denied; but the manufacturer can no more produce fine goods from *bad* material, than can the woollen factory, with the best manipulation, produce fine broad-cloth from *bad wool*.

FAULTY CHEESE.

Fifteen years ago the great complaint against American Dairy products was—that the cheese was filled with whey and the butter with butter-milk. Neither would keep, but often rotted or became putrid in the hands of dealers. Manufacturers corrected this evil. In the matter of shape and of color, in the matter of porosity, in the matter of texture and rich quality, we have advanced to the highest English standard.

At certain seasons of the year, and under favourable conditions, our best manufacturers are able to make as fine goods as can be found in the world. But the goods are not uniform during the season; although the highest skill, and precisely similar processes are employed, considerable portions of the goods are out of flavor. What is the matter? and where is the remedy? has been the inquiry for the last ten years. I was the first to direct attention to some of the causes, the chief of which is bad milk; milk spoiled before it reaches the factory, or at the factory, by the stench from hog-pens, by putrid rennet, and the nasty practices of manufacturers.

I have been over the factories of New York several times, and often by invitation from manufacturers and patrons. And at first they accused me of "cutting and slashing," and unnecessarily wounding the feelings of persons in my reports—for wherever I found filth I denounced it. After a while men began to think and talk about these things, and the hog pens were removed, and premises were made neat and clean, and the result was an improvement in dairy products, and certain factories began to get a high reputation.

But it has been found that the highest skill and most scrupulous cleanliness in manufacturers at factories, has been unable to secure an uniform fine flavor. Sometimes you can trace the causes with unerring certainty, simply by the taste. The wild onion weed in pastures is clearly

indicated, even by persons who are not experts. When I was in Europe it was extremely mortifying, when testing American cheese, to trace bad flavor to manure from the stables, the result of unclean practices in milking. You cannot hide this from the English experts; they trace the cause at once, and I need not say that such cheese abroad is condemned, as it ought to be, as unfit for human use. I have seen cheese beautiful in shape and texture, rich in butter and well manufactured, hustled off to the first customer who would take it at a mere nominal price, and the reputation of the factory was ruined. Then there is the bitter taste often found in cheese, that puzzles many. It comes from the daisy and other bitter weeds in pastures. This bitter flavor, at certain seasons of the year and in certain sections, is very objectionable. Dealers abroad do not know what to make of it, but usually attribute it to burning the milk in the vats. You do not often get this kind of flavor in English cheese, because the English are particular to destroy and uproot all bad weeds. Now how are we to remedy these defects belonging to the farmers' negligence or ignorance, and not chargeable on the manufacturers? Will any effort be made to correct them? or are we to go on losing millions of dollars every year for the want of a little enterprise and care in the right direction? Will farmers here be convinced that these things are truths—plain, practical matters, which I have endeavored to present so as to meet the comprehension and common sense of all?

I warn you dairymen of Canada, that you can not expect to make dairying a success without these errors be corrected or avoided. Of poor butter and cheese we have already reached the limits of over-production. There is now more made in America than the markets can take, and somebody, either the producer or purchaser, is losing money on such goods. The poorer grades of American cheese have been quoted all summer at 25 to 30 shillings per cwt. (sometimes less) in the English markets. These are poverty prices. They are below the cost of production. You may eat nothing but the poorest food, and dress in rags, and live in hovels, and then be unable to produce cheese at these prices. I feel an earnest desire for improvement in this branch of industry. We can make it a great success. We can become the controllers of this great staple throughout the world; but in order to do it, we must show the world that we can produce the best article.

PROPERTIES OF MILK.

Before proceeding further, it will be well to understand some of the properties of the different constituents of milk. Cows' milk of average good quality has a specific gravity of 1·030, water being 1,000. When quite fresh it is generally slightly alkaline, while the milk of carnivorous animals has always an acid reaction when tested with blue litmus paper.

I have said that in a hundred parts of milk 87 parts are water. Of the solid constituents, the curd or casein is generally very uniform, being about 3½ per cent. Casein exists in milk in a state of solution, and is distinguished from albumen (which it resembles in composition and gene-

ral physical properties) by not coagulating on boiling, and by being precipitated by rennet.

New milk gradually heated to near the boiling point of water throws up cream, whilst at the same time a skin of oxydized casein is found on the surface. Thus in the noted "clotted cream" of Devonshire we find more curd than in cream collected in the ordinary manner. I wish to say a word here about this "clotted cream." When I was in Devonshire I was particularly interested in knowing how this highly esteemed English delicacy was made, and will describe the process as I frequently saw it in operation. The dairy house is of stone, usually in connection with the dwelling; stone floors, and stone benches for the milk to set upon, and all well ventilated, and scrupulously neat and clean. The milk at that season (May) is strained in large deep pans, and put in the dairy house, where it stands eight or ten hours, when the pans are taken out and the milk scalded by placing the pan in an iron skillet filled with water, and placed upon the range. At the bottom of the skillet there is a grate, on which the pan of milk rests, so as to keep it from the bottom, and from burning. The milk is slowly heated to near the boiling point, or until the cream begins to show a distinctly marked circle or "crinkle" around the outer edges; when the first bubble raises the surface of the cream, it must be immediately removed from the fire. Some experience is necessary in applying the heat to have it just right, otherwise the cream is spoiled. When properly scalded the milk is removed to the dairy, where it stands from twelve to twenty-four hours, according to the condition of the weather, when the cream is removed, and is in a thick compact mass, an inch or more thick, and quite different from our ordinary cream. It is then divided by a knife into squares of convenient size, and removed with a skimmer. It is more solid than cream obtained in the usual way, and has a peculiar sweet and pleasant taste. It is considered a great delicacy, and is largely used in England with sugar, upon pastry, puddings, or fresh fruits, and especially upon the famous "gooseberry pie." As it makes an extensive article of commerce, and is really a delicious article of food, the manner of its production may be interesting. I do not know as the cream has ever been manufactured in this country; but it certainly deserves to be introduced, and would prove profitable

The action of rennet on the soluble form in which casein occurs is peculiar, and as yet unexplained. It was supposed for a long time, says Dr. Voelcker, that the rennet coagulated milk by converting the sugar of milk into lactic acid, and that by neutralizing the free alkali was in reality the agent in effecting the separation of the curd in a coagulated condition. But this view is no longer tenable, for rennet at once coagulates new milk without turning it acid in the slightest degree. Curd exposed to air in a moist condition undergoes partial decomposition and becomes a ferment, which rapidly decomposes a portion of the neutral fats of butter, separating from them butyric and other volatile fatty acids, which impart the bad flavor to rancid butter. Caseine ferment also rapidly converts milk sugar into lactic acid.

Pure Caseine of milk has almost precisely the same composition as

vegetable caseine or Legumin, and possesses the same physical and chemical properties.

When the operation has been properly conducted by separating milk into curd and whey by rennet, a perfectly clear whey is obtained. On heating the clear and filtered whey nearly to the boiling point of water, a flaky curd-like substance separates itself. This substance is considered to be albumen. It exhibits all the distinguishing properties of the white of egg or albumen; but it has not yet been subjected to ultimate analysis. The albuminous matter which is not separated by rennet, but coagulates on boiling the whey from which the curd has previously been removed, amounts in cow's milk to from one-half to three-quarters per cent, or about one-quarter to one-fifth part of the caseine. It is somewhat remarkable, says Dr. Voelcker, that this albuminous matter does not coagulate when *new milk* is simply raised to the boiling point of water. In this case a pellicle of oxydized caseine is found on the surface, but no albumen separates; and it thus appears that the curd of milk has first to be removed by rennet before the albuminous matter can be obtained in a coagulated form.

Some cheese-makers have observed this albuminous matter on heated whey, and confounding it with caseine, have supposed that some defect in the process of manipulating the milk and curds has resulted in a great waste of cheesy matter.

I have known farmers to find fault with the manufacturer, charging him as inefficient and wasteful, and urging as proof a considerable amount of this albuminous matter collected from the heated whey. Manufacturers were not able to answer these charges, nor, with all their efforts, to arrest the supposed waste of cheesy particles. The distinction, therefore, between albumen and caseine, it will be seen, is important. Caseine coagulates at a low temperature, while albumen coagulates at a temperature quite too high to be employed in cheese-making.

Whether some practical method will yet be invented for arresting this highly nutritious constituent in milk, and incorporating it in cheese, remains to be seen; but up to this time none of the ordinary methods of cheese-making have sufficed. When I was at Mr. Harding's, the great Cheddar dairyman in England, he gave me an account of his experiments with albumen under the direction and in conjunction with the chemist, Dr. Voelcker.

Seventy gallons of whey were heated to the boiling point, and kept for some time at that temperature. The curdlike substance which separated was collected on a cloth, and after the addition of a little salt placed in the cheese press; after remaining there for three days, about a pound and two ounces of whey-cheese were obtained. This cheese had a peculiar granular texture, and even after long keeping did not ripen properly like other cheese. The high temperature at which it is produced, says Dr. Voelcker, evidently prevents the necessary fermentation which curd must undergo before it becomes mellow and saleable as human food. Dr. Voelcker made an analysis of this whey cheese, which, though very rich

in fatty matters, had a bad texture and quite inferior flavor. Its composition was as follows :—

Moisture	30.23
Butter	44.27
Caseine	21.50
Extractive Matters.—Lactic Acid	1.52
Mineral Matter	2.48
	100.00

EXPERIMENTS FOR SEPARATING WHEY FROM THE CURD.

Though a little out of order in the arrangement of topics, I may as well, perhaps, refer in this place to the experiments of Mr. Harrison of Forcester Court, Gloucester, England, which were made with a view of separating the whey from curds in order to retain the larger amount of solid constituents and avoid waste. He applied the ordinary centrifugal drying machine for the purpose of separating the whey. A small turbine or water wheel drives the revolving vessel in which the curd is placed in a cloth. As the vessel attains its velocity, the whey is driven outwards through the perforated surface which encloses it, and escapes. The curd in this case is either not broken at all unless by accident, or but imperfectly. Dr. Voelcker, who tested this machine, is of the opinion that instead of beating the curd and whey together into the revolving vessel, it would be better and more expeditious to break the curd coarsely, to let it subside for twenty minutes, to dip out as much of the clear whey as possible without disturbing the curd, and then place it tied in a cloth in the revolving vessel.

The object of this machine, it will be seen, is to get out the whey from the curds, and avoid loss both of curd and butter from a faulty or careless manipulation.

It appears from the experiments of Dr. Voelcker, made at Mr. Harrison's dairy, that as good and fine-flavored cheese can be made by the machine process as by hand, and the whey showed a slightly less per centage of albuminous and solid matters than that of the hand-made cheese, though the difference was not so great as to be of much account. The conclusion from these and other experiments is, that no matter how cheese is made, a considerable proportion of the nitrogenized compounds of milk is left in the whey, and that this loss is unavoidable, and not necessarily greater in the ordinary plan of operation than by use of the machine. As a means of lessening labor and reducing cheese-making to a more systematic process is another question, and hence this machine process may well occupy the attention of manufacturers; and it is possible, after due experiments, something may be gained in quantity and quality by the use of the machine.

I have had some correspondence with Mr. Gail Borden, who is widely and favorably known as the inventor of a process for condensing milk, and dessicating meats, who I understand has an invention for expelling whey from curds by a centrifugal machine. I have not had the pleasure of meeting Mr. Bordon, or making an examination of his process, and therefore cannot speak of its practical utility.

But I have samples of cheese here to-day, sent me by Mr. Borden on the 17th of last September, with the following descriptions:

Sample No. 1 was made of common curd, whey worked out in centrifugal machine on the 22nd July, 1868.

No. 2 was made same day, of the same curd, with one-tenth weight of the albumen of whey added, both worked in the machine.

These two samples were among the first made, and were insufficiently pressed.

No. 3 and 4 are pieces of curd taken from the machine with no further pressing—worked on the 5th and 11th of September. He adds further, that he had proposed to send me some samples more recently made, and better pressed.

At the time these samples came to the office at Utica, I was absent, lecturing, and did not get back until the middle of October. The cheese lay, therefore, about a month in the office without attention, and when I took off the papers the samples were badly moulded and in an unfavorable condition to test. Since that time they have been kept in a dry place. Cheese-makers here, however, may be interested in an examination of the texture and quality of these samples, and I have brought them for your examination.

Of the remaining constituents of milk, the butter and sugar of milk may now be briefly noticed.

The milk globules are small round or egg-shaped bodies, which enclose in a thin shell of caseine a mixture of several fatty matters. They are somewhat lighter than milk, and consequently rise on the surface when milk is set aside and remains at rest. In the degree in which the milk globules are thrown up and removed in the shape of cream, milk gets less opaque and assumes a more decidedly blue color.

By churning cream the caseine shells are broken and the contents of the milk globules made into butter. Butter consists mainly of a mixture of several fats, amongst which palmitin, a solid crystallizable substance, is the most important. Cream is lighter than milk, but slightly denser than pure water; hence it sinks in distilled water. Sugar of milk is less sweet than grape or cane sugar. It requires five to six parts of cold water for solution; dissolves readily in boiling water, and crystallizes again on cooling, in white, semi-transparent hard small crystals, which feel gritty between the teeth. In its pure state it may be kept unadulterated for any length of time, being then unsusceptible of fermentation; but if left in contact with casein and air, it gradually becomes changed into lactic acid or fruit sugar, which in its turn enters into alcoholic fermentation, producing carbonic acid and alcohol.

Under favorable circumstances milk may thus be fermented and converted into an intoxicating beverage; and it has been suggested that milk sugar, if extracted from whey, could be profitably used in the manufacture of alcohol, and perhaps in the production of sparkling wines in connection with the juice of the grape..

Others suggest that its employment for flavoring tea and coffee would give to those beverages a finer flavor than other sugars, but for this I cannot

vouch. I only refer to its use in the hope that some inexpensive process may be introduced for extracting this material from whey, which at a moderate estimate would give to the dairyman about half as much money from this source as he now receives from cheese or butter manufacture. It has, however, under the influence of partially decomposed casein, which acts as a ferment, a greater tendency to turn acid than to enter into alcoholic fermentation, especially when the temperature of the air is high.

The mineral matters of milk consist of phosphate of lime, magnesia, phosphate of iron, chlorides of potassium and sodium, and a little free soda.

1,000 pounds of milk, according to the analysis of Haidlen, contain from 5 to nearly 7 pounds of mineral matters, as follows:

	lbs.		lbs.
Phosphate of Lime	2.31	to	3.44
Phosphate of Magnesia	.42	"	.64
Phosphate of Peroxyde of Iron	.07	"	.07
Chloride of Potassium	1.44	"	1.83
Chlorlde of Sodium	.24	"	.34
Free Soda	.42	"	.45
	4.90		6.77

I have now given a pretty full account of the different constituents of milk as described by the chemist, and found by chemical analysis. It is important that those who manufacture milk into dairy products should have some general idea of the component parts of the material of which they have to do. And the facts given may not be wholly uninteresting by others, since milk, it would seem, was designed by the Creator to be the most perfect form of food, as it contains all the elements needed for health and nutrition.

COOLING MILK.

I have referred in my previous addresses to the importance of cooling milk immediately as it comes from the cow. Milk, as it comes from the cow, has a temperature of about 90 degrees, and if kept in this condition for any length of time, air being freely admitted, it rapidly turns sour; hence it is of consequence to reduce it, as rapidly as possible, to a temperature of 60°, and then in a good dairy, with proper attention, it may be kept from 14 to 36 hours without turning sour. When the process of acidification is once begun, it cannot be stopped by any available means, hence it is of great importance to cool down milk as rapidly as possible. This principle has not been fully understood or practised by farmers delivering milk at the factories. Large bodies of warm milk are thrown together in the can, mingled as it often is with the fœtid odors of the stable, enclosed with a cover, preventing both the escape of heat and odor, and carted to the factory. I need not dwell upon the fact known to every cheese manufacturer, that milk thus treated often arrives at the factory in a putrid condition. And it is also needless to say that such milk cannot make good cheese. It is rather surprising that this principle of decomposition was not earlier recognized by the factories of New York, since almost

everybody knows that warm meats piled up together soon taint; that any considerable mass of vegetable substances in a moist condition, and in hot weather, soon decomposes and rots. But this cause of milk taint is now pretty generally recognized, and people are just beginning to set about to remedy the difficulty. Within the past year a number of devices have been invented for cooling milk at the farm, before canning, but nearly all that have come under my observation appear to be defective, being too complicated, difficult to clean, and confining the milk while cooling so as to prevent odors and noxious gasses from passing off. There is one device originating in Canada, where the milk is exposed to a current of air, generated by fans worked similar to the grain fanning mills. This may be efficient, but requires extra labor in turning the mill, which farmers, it is feared, will not always spare for this purpose.

Mr. L. B. Arnold, of Ithaca, N. Y., has an apparatus somewhat similar to the above as regards the fan, but in this case the mill is worked by a weight. The milk passes over a series of corrugated tin plates, and is exposed to the air from the fans, and then falls into the can underneath. This is undoubtedly a very efficient apparatus, and would be of immense benefit if it could be introduced.

Mr. Hawley, of Syracuse, has a device which is applied directly to the can, consisting simply of an air-tight tin chamber, with pipes attached for conducting the water in and out. This apparatus floats on the milk in the can, and it is claimed to act on philosophical principles, as it cools from the top, which is found to be the most efficient way of cooling liquids. It is quite simple and easily cleaned.

A simple device, and one that appears to be efficient, and offers but few objections, is that invented by Col. Thayer, of Dunton, Ill. This consists of a long shallow tin pan, under which there is a constant supply of fresh water from a tank or the penstock, and the flow graduated by stop cocks to meet the variable conditions of the atmosphere. The milk, as it is strained, falls upon one end of the shallow pan, and is immediately spread out into a thin layer, and thus flows slowly over the cold surface of the pan until it reaches the lower end, when it is conducted to the can. The milk thus gets ample ventilation, and it is cooled down to the proper temperature. But what is of great practical importance in this invention is, that there is nothing but a plain surface to clean, having no sharp corners where milk can lodge, and therefore is well adapted to the purpose. I have been among farmers enough to be convinced of this fact, that no device for cooling milk difficult to clean will meet with success, however great its merits may be in other respects, for it necessitates so much additional labor as to induce neglect or the abandoning altogether of its use. I have heretofore urged upon dairymen the putting away of the old wooden pail in milking, and substituting one made of tin, having a concave bottom or beveled corners, so as to be easily cleaned. Tin pails enclosed in wood are now manufactured according to my suggestion, and have proved to be a great success, being favorites everywhere with the dairymaids, on account of the ease with which they may be kept sweet and clean. There is a recent invention, however,

which promises to supplant tin, being less expensive, light, strong and serviceable. The material is papier maché, and so far as I have tested, it appears well adapted to milk, being inodorous, a non-conductor, and easily kept clean. It is manufactured by the Papier Maché Co., New York City. I wish to impress upon you that these points in dairy management are of the utmost practical utility, and the sooner you adopt them, the sooner your dairy products will reach a high standard of excellence.

If you have faith in these doctrines, I ask of you their adoption in open Convention. Let them be embodied in a set of rules, printed, and pasted upon the door of every factory in Canada. Let them be addressed to farmers saying:—This is the unanimous voice of the Dairymen's Convention of 1869:

1st. That no milk is good which is made from filthy stinking waters of frog-ponds and sloughs.

2nd. No milk is good that comes from cows dogged and over-driven in hot weather from the pasture to the stable.

3rd. No milk is good that comes from cows pounded and kicked and cruelly treated by brutish men.

4th. No milk is good that comes from diseased cows; cows that have sores filled with pus, or that have udders broken and running with corruption.

5th. No milk is good that comes reeking with manure and filth from the stable.

If any farmer thinks the character of milk above described is unobjectionable, he is entitled to his opinion, but we advise him to retain such milk at home for family use, and particularly for his own consumption. And, FINALLY, this Convention believes and *insists* that all milk intended for factory manufacture shall be spread out as soon as milked, so as to be deodorized and cooled down to 60° before it is put in the can.

I can think of no better way to impress these facts upon farmers than to present them publicly, that all may read and learn. And a clause should be introduced holding that man responsible who delivers bad milk.

If this Convention will endorse these views, I shall feel that I have not come here in vain.

BUTTER MANUFACTURE.

Butter manufacture is becoming every year more and more important to the dairy interest. The cheese factories have been of great advantage to the butter-makers, since a considerable number of butter dairymen have been drawn into cheese dairying, and by this means the two interests have been better equalized. This is as it should be, because it has a tendency to keep prices at fair rates for both products. Some of our New York people complain very bitterly against the cheese factories, saying they have damaged the country, because butter cannot be bought in the streets any day at a shilling per pound. To pay forty and fifty cents per pound they think is an extortion, and many threaten to abandon its use altogether. Now, there are two sides to this question. In the first place

butter never could be made for a shilling a pound, but the farmer was compelled to sell it for that, because there was always such a surplus in the country that consumers took advantage of it, just as you or I have taken advantage of somebody's misfortune and purchased in the markets as cheaply as we could. I suppose this is human nature, which is about the same the world over. Last September there was a great freshet in the Mohawk Valley, carrying off bridges on the railroads, and for a day or so the transportation of freight was suspended. Just at this time several car-loads of fruit, on its way to New York, arrived at Utica, and could be carried no farther. Crates of large fine peaches were sold from the cars at forty to fifty cents a crate, which had cost $3 a crate before shipment. The most moral and religious people in Utica flocked to the cars and secured them; some of the particularly upright and honest bought several crates, without any regard to the poor fellows who were suffering under their losses. So I suppose the consumers care little whether the farmer is selling butter less than cost, if they only have the "screws in their own hands." I think every one who steps out and milks his cow and goes through all the manipulations and vexations attendant upon farming and butter-making will not hesitate to say, after obtaining the product, that a nice article is richly worth fifty cents per pound. Remember I am talking about that "golden ball," full of aroma, of such a delicious flavor, that if there be only good bread with it upon the table, one can always make a good meal. Of the intolerable stuff filled with slushy and rancid buttermilk, salvy,—the very concretion of dirt and nastiness, known under the name of "grease,"— I do not care how low it goes in the market, or how much the producer may lose in sending it out. It is villainous stuff, and if people will insist upon making it, I can only regret their lack of skill or want of information.

Cream of average richness, according to the analysis of Dr. Voelcker, contains in one hundred parts :—

Water	64.80
Butter (pure fatty matters)	25.40
Caseine, Milk sugar,	7.61
Mineral matters, (ash)	2.19
	100.00

He says on an average 1 quart of good cream yields from 13 to 15 ounces of commercial butter. Occasionally cream is very rich :—thus Mr. Horsefall states that a quart of cream in his dairy yielded one pound of butter, when the cows were out to grass, and no less than 22 to 24 ounces when the cows were fed in the barn with rape cake, and other substances rich in oil. The first portions of cream which rise are always thin, but rich in fat, a fact which is explained by the circumstance that during milking and the subsequent agitation to which milk is exposed, a portion of the milk globules get broken, in consequence of which their light fatty contents, liberated from the denser caseine shells, rise to the surface with greater facility, and then occupy less room than the unbroken milk

globules, which on account of their specific gravity are more sluggish in rising. Generally speaking, cream yields more butter when its bulk in proportion to that of the milk from which it is taken is small, and *vice versa*.

The leading principles to be observed in butter-making are cleanliness and temperature. *Experience* has shown that a temperature of about 60°, and not higher than 65°, is most conducive to the rising of the cream globules, and the more uniform the tempertaure can be kept at 60° through winter and summer, the more readily the cream will be thrown up, whilst the milk will be kept sweet, provided the dairy is dry and properly ventilated. On no account should the temperature fall below 55°.

In cooling milk for butter-making, this point is important. It must not be imagined that the lower the temperature is allowed to sink, the more cream will rise ; for we must bear in mind that with the reduction of the temperature the specific gravity of the liquid is raised, (greater) and the rising of the cream or milk globules checked accordingly. Every precaution as to habits of cleanliness, and the keeping from the milk and cream any article, plant, or impurity, which can by any possibility communicate a taint, should be rigorously adopted. The pails and strainer should be washed—*scalded* and well rinsed in cold water, and then suffered to dry in the open air. Every article connected with the dairy should be treated in a similar manner, as there is nothing so prejudicial to new milk as being mixed with ever so small a quantity of that which has become sour, and nothing so difficult to eradicate as the traces left in any vessel of that which has become stale and decomposed.

Perfectly good cream is often spoiled in the churn, when the dairy-maid has been negligent in properly cleansing it. When the wood once absorbs this milk-taint, it is very difficult to eradicate it by subsequent cleansing. I have known butter spoiled in this way where every effort was made to keep the milk and dairy sweet and clean, and the churn had to be thrown aside and another substituted.

During the process of churning a certain uniformity of temperature must be observed, or the butter will come soft and spongy, instead of firm and compact. The agitation also of the cream should be regular—neither too quick nor too slow. If the agitation is too quick the butter will make and unmake itself before the churner is aware of it, as too rapid motion induces fermentation, which, when it has reached a certain point, is entirely destructive of anything like the possibility of making even moderately good or well-tasted butter. If on the other hand the motion be too slow, the agitators in the churn fail to produce the desired separation of the component parts of the cream, and the consequence is, that after a good deal of time spent in lazy action, the churner is just as far from his butter as he was at the beginning of his labors. The best temperature for the cream in churning is from 55° to 60°.

Some years ago a series of carefully conducted experiments were made in Scotland to determine the temperature at which butter can be best and easiest obtained from cream. The following table exhibits the mean

temperature of the cream used in each experiment, and the quantity of butter obtained, per gallon of cream :—

Experiment No.	Mean temperature.	Quantity of butter per gallon.
1	57°	1 lb. 15 oz. 7-5 dwts.
2	60°	1 " 15 " 3-2 "
3	62°	1 " 14 " 0-0 "
4	66°	1 " 12 " 12-7 "
5	70°	1 " 10 " 10-6 "

The butter produced in the first experiment was of the very best quality, rich, firm and well-tasted. That produced in the second experiment was not perceptibly inferior to the former. That produced in the third experiment was soft and spongy, and that produced in the fourth and fifth experiments decidedly inferior in every respect to any of the former specimens.

From these experiments it appears that cream should not be kept at a high temperature in the process of churning, and the experimentors conclude that the best temperature to commence the operation of churning butter is about 55°, and at no time in the operation ought it to exceed 65°, while on the contrary, if at any time the cream should be under 50° in temperature, the labor will be much increased without any proportionate advantage being obtained.

Mr. Stevens well remarks, that when butter is properly churned, both as to time and temperature, it becomes firm with very little working, and is tenacious, but its most desirable state is that of waxy, when it is easily moulded into any shape, and may be drawn out a considerable length without breaking.

It is only in this state that butter possesses that rich nutty flavor and smell which impart so high a degree of pleasure in eating it, and which enhances its value manifold.

It is not necessary to taste butter in judging of it; the smooth unctious feel, on rubbing a little between the finger and thumb, expresses at once its richness of quality; the nutty smell indicates a similar taste, and the bright, glistening cream-colored surface shows its high state of cleanliness.

When butter forms, the churning should cease, and the mass be taken out and cleansed from any buttermilk which may still be incorporated with it.

The best test that this operation has been satisfactorily performed is the fresh water running from the butter as pure and bright as when poured over it.

It should be recollected that the less butter is handled the better. Warm hands, however clean, are apt to impart a taint, and the difficulty of keeping them so perfectly clean as is absolutely necessary appears to be almost insurmountable. The ladle and butter-worker, therefore, should be used in all the necessary manipulations.

A great deal of butter is spoiled by being packed in improperly made tubs. These should be well hooped, and made perfectly tight, so as not

to admit the least leakage. There are only a few kinds of wood adapted to packing butter. The most of them, like the ash, contain an acid that acts most powerfully on salt, decomposing it, making it run in a liquid. Good white oak is perhaps the best wood attainable for butter packages. Even these could be improved if the staves could be boiled under water, so as to free it from pyroligneous acid. The wood then, when kiln-dried, is fit for use. It becomes closer and more condensed from the fibres being contracted.

I gave a very full account in my address last year of the Holstein and American systems of butter-making, and do not propose to repeat any portion of that address. I may say, however, that I approve of the establishment of butter factories, because with all necessary appliances, and with high skill in manufacturing, a very fine quality of butter is generally secured. And again, larger profits are realized from the milk, because after the cream is taken off, the skimmed milk can be turned to more account in skim cheese than to feed it to swine.

The time is at hand, it is believed, when large profits will result from skim cheese.

The mission of the Chinese embassy, under the direction of Mr. Burlinghame, must open up to us a vast market in China for this class of goods. It is precisely the kind of food adapted to the wants of the Chinaman, and the shipments which have been made this year, I am told, have resulted in large profits.

Dr. Jennings, of Dunkirk, N. Y., has recently invented a pan by which the principles of maintaining even temperature while the milk is being set for cream, is pretty well secured. It is adapted to private dairies and factories where there is lack of running water, and is a valuable improvement.

The apparatus consists of a shallow tin vat, setting in a wooden vat, with space between the two, and at the sides and bottom, for water. The milk as it comes from the cow is strained in the tin vat to the depth of two or three inches, and water either from the well or penstock conducted between the vats, and in this way the temperature of the milk is reduced to 60° in a short time.

If the weather be cool and the temperature of the milk during the night is likely to fall below 60°, warm water may be added in the water-box, and thus an even temperature is pretty well maintained. When treated in this way most of the cream will rise in twelve hours, and the butter will be of beautiful color and fine quality. These pans are adapted to different sized dairies of from 20 to 100 cows, and are intended to receive the entire mess of one milking. The apparatus costs much less than pans—there is less waste of cream in skimming, and it is easily cleaned. There is a gauze covering which goes over the apparatus, preventing dust and flies from entering the milk, and yet allowing exposure to the air and proper ventilation. It is well adapted to private dairies and factories which have not an abundance of water to adopt the Orange Co. system, and at the same being so inexpensive that it may be commended to general use.

The annual make of and consumptive demand for butter in the United States is not far from five hundred millions of pounds. This gives each person about thirteen pounds of butter per year. At 40c per pound this production amounts to the enormous sum of $200,000,000 per annum. You will see then what an immense interest this branch of the dairy has become, and what a splendid field for prosperity to dairymen who can produce the finest qualities. Dr. Lyman, of New York, stated at the recent meeting of the American Dairymen's Association, that the best butter-makers of Deleware and Orange counties, New York, obtain a dollar per pound for their butter "all the year round." How important it is that improvements be made in this much neglected branch of dairying, and I hope the suggestions thrown out may help to elevate the standard of butter-making and bring prosperity to those who seek to improve.

CHEESE MANUFACTURE.

I have already detained you too long, and yet I have something to say about cheese manufacture. I do not wish to impose on your good nature, but the subject of dairying is so vast and embraces such a wide range of topics, each of which seems so important, that one is at a loss how to select, and crowd into the brief limits of an address those which are of most practical utility. If I have wearied you it would be well, perhaps, to stop here with the butter, for there are few things more pleasant of any kind than good butter. But if you have the English taste to finish up the last course with a bit of cheese before the cloth is removed for the wines of your discussions, I will go on. Shall I stop, or may I have the pleasure of passing to you the cheese?

Gov. Seymour, whom you all know politically—Gov. Seymour, who was elected President of the United-American Dairymen's Association, in his address at the recent Utica Dairy Convention, made some very true remarks about cheese. He said the American people had never truly appreciated the value of cheese as an article of food. It was twice as nutritious as beef. It contained all the elements of a perfect food in a concentrated form, requiring no cooking, easily transported, and is the cheapest article of food now in the markets. The United States has a population of thirty-seven millions of people, and yet we consume vastly less cheese than the thirty millions of people in Great Britain. He thought cheese ought to be introduced in the rations for our army and navy. A hundred pounds of cheese is more nutritious than a barrel of pork—the one can be packed and carried on horseback, the other must have waggon, team and driver, to transport it. To transport the barrel, the brine, the salt, the bones, and waste of salt meat, adds largely to the expense, since forage must be provided for teams, and food for the men engaged in their care. Again, fuel must be had to cook the meat before it is fit for consumption. Pork too is justly regarded with suspicion, but none of these objections could be urged against cheese.

He thought the local authorities in cities, where the poor are to be provided for at the public expense, would find it a matter of economy to distribute cheese liberally as one of the foods. Poor people who are

struggling in cities and towns to provide food for their families would find its use most economical. It is a great thing for the poor to have a food always ready for use, or requiring no cooking. The cost of fuel to cook meat is a great tax upon the poor.

The rich will always use cheese as a luxury, and as a matter of health, as it promotes digestion, and helps the assimilation of other foods. Cheese, he said, had been used in all the world's history; but the early settlers of this continent lost the art of manufacture, and to this fact he attributes the reason why it had not come into more general use. What our people need is correct information in regard to the nutritive qualities of cheese, and the economy of its use. The press can do immense service, by disseminating this information; and finally he said the American dairymen were the first to inaugurate a system of progress among farmers, by which the principles of science, mechanism, political economy, and the laws of trade are beginning to be learned by the farmers of the country. No such gathering of farmers and men of high intelligence, earnest, practical, intent upon improvement, had ever been gathered together on this continent for the special purpose of their art as at these immense Dairy Conventions. They had clearly inaugurated a system for the instruction of the people, and this concert of action of the dairymen of America, representing the highest intelligence, with vast capital, is a tremendous power in the land, working for the progress of the whole country, and it sweeps along with irresistible force. I am not of the same political creed with Gov. Seymour, but I honor him for these sentiments, because they are great truths which will in time be more generally recognized by the masses.

I have always insisted that the higher we develop this art of cheese manufacture, the more perfect the flavor and condition of the goods we send into the markets, the larger will be the consumption, and the more profitable will be the business of dairying, and my labors over many years have been directed to this object.

What the markets demand is a cheese of solid texture, that is, mellow under the finger, but yet of sufficient firmness to be safely handled; that will not decay and fall to pieces while in the hands of the dealer; that is of a clean nutty flavor, melting in the mouth, and having that delicious aroma that it forces itself upon the attention of consumers. A bad or poor flavored cheese does infinite mischief by cloying the appetite and disgusting those who try to eat it, just as a bad oyster taken by chance in the mouth will make you sick of oysters for a long time. Now what are the requisites on the part of the manufacturer for the production of a fine article? In the first place the night's mess of milk will be improved by the use of an agitator which, throughout the night, gently moves the milk at intervals, exposing its particles to the atmosphere. These agitators work on the top of the milk, carried by the waste water of the vat, and not only serve to cool the milk but prevent the cream from rising.

Then in setting the milk, high temperatures should be avoided. We should remember and understand the principle that ferments are most active between 90° and 100° degrees. It is an object, therefore, for the

cheese-maker to keep his milk out of the range of active ferments so far as possible, for these induce decomposition, bad flavor, and ultimate loss. This principle is not generally understood even by our best dairymen, and I am convinced that great losses are entailed on this account. Manufacturers are often careless about shutting off heat at the proper moment, and the milk is raised into the range of active ferments, where, if there happen to be any germs from bad milk mingled in the mass, they are developed with great rapidity, and decomposition has set in and been carried too far even before the curd is ready to be cooked. The heat applied in the scalding process still further promotes this ferment, and so during the heat of summer, in bad curing rooms, the cheese is almost certain to get out of flavor.

The cheese-maker, it will be seen, has to deal with that class of organism imperfectly understood by scientific men; for the nature of ferments is still a puzzle to the learned. We know that cold arrests them, and that boiling heat completely destroys the germs. If we always had perfect milk, or knew precisely the progress of ferments, the cheese manufacturer would be able to conduct his operations in such a manner as to secure desirable results. But this cannot be known, and hence the constant study must be to keep this low order of organism in abeyance; for so sure as it is once allowed to measure arms with the cheese-maker, he is lost, and it will be impossible for him to regain his position, and produce a fine product. You will understand then how dangerous it is to introduce such an active ferment as rennet in the milk that is already inoculated with another class of ferments, especially at high temperatures, when these germs spring into GIANTS with fearful rapidity. It will be safer, then, to set the milk at a temperature no higher than 78° to 82°. After coagulation is perfected, and the gang of steel knives has divided the mass, it should be left a sufficient length of time for the whey to form, then the horizontal gang of steel knives may be used, dividing the mass into cubical blocks. This will finish what is understood by the term "BREAKING," and it should always be accomplished before any additional heat is employed.

We use heat in the subsequent operations not for the purpose of "cooking the curd," but in order more readily to expel the whey and develop a chemical change for breaking down the caseine, so that it may be in a condition to be easily transformed into a mellow, flaky, and delicious morsel that melts under the tongue, leaving a clean nutty new milk taste in the mouth. Now with plenty of time and under favorable circumstances this can be satisfactorily accomplished without additional heat, as in the Stilton and Cheshire processes. But we cannot spare the time nor labor, and so we use heat, and if we employ it properly we get the most desirable results. If you watch the artizan tempering steel to make it tough, elastic, and of the true stuff, you will see that he proceeds leisurely with the heated metal, cooling it by degrees, touching with a little water, and watching every change until it assumes the right color, when he plunges it into the water to check any further change, and lets it cool off slowly. So in cheese-making the work must not be hurried—the heat must be slow and gradual, giving the curds time to do their own work—

the cheese-maker meanwhile watching all the conditions, and standing ready at any time to hold in check the curds when the proper changes are developed and perfected. The heat should never be higher than an 100°, and, perhaps, no higher than 96° to 98° will give the best results. It is always best to draw the whey early at the first sign of any perceptible acidity, since you can not tell what taints you have to contend with. Then the curds may be left exposed to the atmosphere until the proper degree of acidity is reached. Much cheese is spoiled in flavor by being put in the press too warm, as a large bulk of warm cheese promotes undue ferment and decomposition. Curd never should be salted or put to press above a temperature of 65°. I need not go into all the details of cheese-making, as these were stated in my address to you last year; but I will say, in the treatment of floating curds, the principles to be observed in checking fermentation should be observed, and such curds should be passed through a curd mill, as by this means the particles are broken up, allowing the free egress of gases. Cheese is often spoiled by over-salting, as the curing process is checked and held back so that the transformation never becomes perfect. The curing room should be kept at a temperature of about 70°, and in order to secure uniformity the walls should be filled with some non-conducting material like straw or tan-bark. Then there should be two or three divisions with air chambers in the ceiling above, and ventilators for conducting off moisture and gases arising from the cheese during its process of curing. Every curing room should be provided with the means of heating—hot water pipes running around the ceiling are best; for at no time should the temperature fall so low as to check fermentation while the cheeses are young. If the curing process is often checked at this early stage, there will always be a tendency to imperfection both in texture and flavor.

Professor Gamgee, whom I met at Amherst College on the occasion of the meeting of the Massachusetts State Board of Agriculture, expressed strong convictions that his meat-preserving process can be applied for preserving the flavor and arresting the decay of cheese. If so, it will be one of the greatest improvements of the age for American dairying. I had hoped that this matter might be tested before the meeting of the Utica Convention. I visited the English shippers and exporters in New York City and made all the arrangements for tests; but, unfortunately, Prof. Gamgee was called to Washington, and experiments were not made. But I am assured by the Professor that the requisite tests will soon be perfected. The process consists in having an air-tight chamber, where the cheese are to be placed. The air is exhausted to some extent with the air pump, and carbonic oxide and sulphurous acid gases admitted in certain proportions. Subjecting the cheese to this process destroys the germs of putrefaction and decay, and the cheese will remain unchanged for a great length of time under any influences of climate or temperature. The cost is a mere trifle, about one-eighth of a cent per pound.

In the application of this process the cheese is to be first cured to a condition suitable to the markets. Then if it can be held at that point for a great length of time, it will be seen that no losses will be sustained by dealers on account of flavor or quality. And hence we have a kind of goods like gold, which will pass in any of the markets of the world.

CANADIAN DAIRYMEN'S ASSOCIATION.

Transactions at the Second Annual Meeting of the CANADIAN DAIRYMEN'S ASSOCIATION, held at the Town Hall, Ingersoll, on Wednesday and Thursday, February 3 and 4, 1869.

At half-past eleven on Wednesday morning, the Convention was called to order by the President, C. E. CHADWICK, Esq.

COMMITTEE ON ORDER OF BUSINESS.

On motion of GEORGE HAMILTON, Perth, the Chair was empowered to appoint a committee of five to present a programme on the order of business for the Convention. The chair named Messrs. G. HAMILTON, T. H. WILMOT, G. GALLOWAY, J. RAYMER and W. WILKINSON.

COMMITTEE ON NOMINATIONS.

On motion, the following committee of five, on Nomination of Officers for the ensuing year, was appointed by the chair. Messrs. JAS. HARRIS, B. HOPKINS, H. FARRINGTON, H. LOSEE and D. PHELAN.

COMMITTEE ON MEMBERSHIP.

On motion, the chair appointed Messrs. E. CASSWELL, JAS. BRADY, A. O'CONNOR, ROBT. MCDONALD, D. WHITE, D. PHELAN, DAVID ELLIOTT and G. J. SHRAPNELL, a committee to receive Memberships during the sessions of the Convention.

COMMITTEE ON FINANCE.

On motion, the following gentlemen were appointed by the chair a committee on Finance. Messrs. R. C. JANES, E. V. BODWELL and G. MOORE.

The PRESIDENT stated that he regretted to announce the very meagre support the Association had received from dairymen the past year, and the consequence was the Executive had not been able to publish the report of the proceedings of the Annual Convention for the want of funds. It certainly is not creditable that an organization established specially to promote the dairy interests of the country, should have its effectiveness impaired—in fact, its very existence endangered for the lack of that support and assistance which the large and respectable class of dairymen who assemble

here are so well able to give. To improve the position of the Association in this respect, the Executive have concluded, after due consideration, to recommend a scale of fees to be charged, not only to members of the Association, but to all who attend the meetings of the convention.

T. H. WILMOT, Milton—Do I understand that it is intended to charge an admittance fee at the door, which shall entitle the party paying it to membership?

The PRESIDENT—The intention is to charge an admission fee of twenty-five cents at the door, which will admit the party paying it to the sessions of that day; and to charge a fee of one dollar, which will entitle those who pay it to membership and all its privileges.

Mr. HAMILTON—I find by the Secretary's books, that there are only about seventy-six members now belonging to the Association, and I am a good deal surprised to find the very indifferent support the Association has received from certain large and important dairy sections where one would most naturally look to find it most generously accorded, and I think it time that some plan is adopted to make all who attend these meetings contribute to the objects of the Association.

The PRESIDENT—The subject is of vital importance, and, I trust, will receive the careful consideration of the Convention.

JAMES HARRIS, Ingersoll—We cannot estimate too highly the importance of sustaining liberally this Association. It has accomplished much in directing the attention of foreign dealers to Canadian cheese, and we are largely indebted to it for the reputation our cheese has acquired in the old country.

P. R. DALY, Belleville—I think I could guarantee a membership of at least a hundred members, were the Annual Convention to be held at Belleville. There would have been a larger attendance from the Eastern section of the Province, had it been known that the Railways would convey members at a reduced fare.

The PRESIDENT—Every effort was made to complete the arrangements with the Railways in time to announce definitely the rate of fare to members, but the negotiations were still pending when notices of the Annual Convention were sent to the papers, and the Executive could only state in these notices that it was expected that a reduced fare for members would be obtained.

T. H. WILMOT—Is it recommended that twenty-five cents should admit for the day, or for each time of entering only?

The PRESIDENT—For each day.

K. GRAHAM, Belleville—It seems strange that in a country like this there should be such a lack of support in maintaining the objects of the Association, and it appears to me that the officers could not

have given proper attention to the interests confided to them, or we should not have had to complain of the low state of our funds.

The PRESIDENT--I have always thought that those directly interested should be looked to for support, and do not feel called upon to solicit it from those not directly concerned in the efforts that are being made to promote the dairy interests of not a section merely, but of the whole country.

JAMES NOXON—I have listened with a good deal of interest to the remarks that have been made in reference to the financial position of the Association, and while I regret that it has been permitted to languish for the want of that reasonable support we had a right to expect from the dairymen of the country, yet I think it neither fair nor just to attribute illiberality to one section more than another. You are aware that at our last Annual Convention we availed ourselves of a provision in the constitution, to appoint a large number of Vice-Presidents selected from various parts of the Province, with a view to enlarge the influence, and diffuse more generally over the country an interest in the objects of the Association. While personally opposed to these appointments as of no practical value, I was silenced by the argument that the gentlemen so appointed would interest themselves in their respective localities to obtain additional members, by which our funds would be largely increased, and the Executive enabled not only to publish a report of the transactions of the Association since its organization, but to set in motion other functions to promote the large and important interests it represents. Need I say that in these expectations, thus unduly excited, we have been entirely disappointed. Therefore, I hold that it is not to the illiberality of one section more than another that we have to look for causes that in my judgment have their origin in a defect of the constitution itself. To that system heretofore pursued, of allowing all who may choose to attend these Conventions, and partake of their benefits with the option of becoming members, I attribute the cause of the financial difficulties which beset us, and we shall be only able to overcome them when we require all who attend here to contribute to the support of the Association.

JAMES HARRIS—There is no doubt that the correct principle is to charge a fee to all who enter the room. If we do this we shall have no further complaint of lack of support.

K. GRAHAM—In justice to the Eastern part of the Province, it would only be right that members should be allowed to vote by proxy, as it is only in this way that members in remote sections could have a fair share of influence in these Conventions. In this way, too, a larger number of members could be obtained in the East, for you can scarcely expect a man to become a member of the Association in my section of the country unless you can hold out

some direct advantage to be obtained. If allowed to vote by proxy, we could hope to change the place of meeting to Belleville, or at some point farther East.

The PRESIDENT—The Constitution makes no provision for voting by proxy.

On motion, an adjournment was taken to half-past one o'clock, P. M.

AFTERNOON SESSION.

The Convention re-assembled at half-past one, the President, Mr. CHADWICK, in the chair.

The committee on the order of business made the following report:—

1st, President's address; 2nd, Reports of Committees; 3rd, Amendments to Constitution, if any; 4th, Decision of place for holding next Annual Meeting. Your committee would further recommend the following subjects for discussion:—

1st. Best method of cooking milk before cheese is made therefrom.

2nd. Has the system of making cheese once a day been successfully practised the past year, and can its general adoption be recommended?

3rd. What new features and improvements have suggested themselves the past season?

4th. A quarter of an hour for reception of models and information respecting new inventions.

5th. Questions—Drawn.

Your committee would also recommend the propriety of making arrangements with some paper for the publication of reliable market reports of the price of cheese from Montreal, Toronto, Ingersoll and per cable.

On motion of W. F. CLARKE, the report was received and adopted.

ADDRESS OF THE PRESIDENT.

LADIES AND GENTLEMEN,—The important interests which this Association represents has brought us together again for consultation and a comparing of notes upon the operations of the past year, as well as the election of officers and other routine business, in accordance with the constitution of our organization. I do not intend to occupy much of your time in any remarks I may have to offer, as there are doubtless many here whose large practical experience in the daily working of dairy matters will make them authority on the various details connected with the development of this great agricultural interest, and whose views it is desirable should be fully ventilated on this occasion.

The advantages of united action for the improvement of the dairy products, as well as securing for them their just value in the markets of the world, must be apparent to every one who has given the subject the

least consideration; and should the influence which this Association is capable of exercising be properly appreciated by those in whose behalf it has been organized, much good may be effected. The keen competition with which we have to contend, as well as the fastidious taste of the consumer, in the market to which we must look for the sale of our surplus supply, dictates wise action and unceasing efforts on the part of dairymen in perfecting the character of the article manufactured.

The establishment of cheese factories has given great impetus to dairy operations, and in those sections of our country that are naturally adapted for the prosecution of this speciality in farming, a mine of wealth is about to be opened up that will, in its essential results, compare favorably with the gold fields of California or Australia. To ensure success in this enterprise, neither labor, expense, or pains must be spared in improving the quality of the cheese, and this can be brought about by an interchange of ideas in the process of manufacture, on occasions like the present.

At our last Annual Meeting a resolution was passed to publish in pamphlet form the proceedings of this Association, which I regret to have to state we have been unable to accomplish, from the want of proper encouragement in the way of contributions to the funds of the Association from those to whom we had a right to look for support for the accomplishment of so desirable an object. The unanimous manner in which the resolution passed was an acknowledgment of the value of the proposed report, but the material response to it has led us to conclude that you were willing that the responsibility of it should fall upon your President and Secretary.

The publication, in detail, of the proceedings of these Conventions, embodying, as it would, the practice and experience of the old dairymen of the country, together with a statistical report from each factory in operation within the influence of this organization, would be a most valuable document, and its accomplishment is worthy the serious consideration of every member of the Association, as it would afford reliable data upon which operations for the future might be based. The dairymen, in fact all classes of farmers, should, as a matter of principle, as well as interest, meet together in bodies to exchange ideas upon their every-day occupation, and learn organized unity of action and oneness of purpose. In this way shall the dairymen of our country become known as a body and their influence felt.

The organization of the factory system of cheese-making is revolutionizing old customs, and heretofore fixed ideas, and is teaching this important lesson that has proved so successful in its application to other manufacturing enterprises, that by a consolidation of interests the dairymen of the present day can wield an influence that could never have been obtained through individual exertions. The system is a progressive one, and the experience of the age teaches us that it is difficult to retrace. Many of the operations of the husbandman have in like manner given way to this progressive spirit. We cannot return to these old systems again, because we cannot afford it. Associated capital is substituting the untiring arm of the machine for that of human muscle. It remains for us now

to open our minds for the reception of these great truths, and testing their value when a promise of success is at all reasonable.

The business of cheese-making since the introduction of the factory system among our dairymen has rapidly assumed very large proportions, and the amount of capital already invested in it is no inconsiderable sum. Yet I look for a very large increase in the future.

Our next serious consideration is the quality of the article manufactured. I do not see why we cannot compete with the dairymen of either the States or Britain in manufacturing cheaply—in fact I think we have a decided advantage in this respect over our American cousins ; and as we have with them to enter into competition with the markets of Britain, our aim must be to bring the greatest amount of knowledge and skill into the manufacturing process. Let us endeavor to rival them in this respect, but let that rivalry be of that pure and honourable description that will exhibit an earnest desire on the part of every dairyman to co-operate without jealousy or envy in promoting and developing this most important interest. Much may be learned from both of us, and the most efficacious way of disseminating knowledge will be by promoting and encouraging assemblies like the present.

Canadians I have always considered apt scholars, ready to utilize and adapt to their own individual benefit the various improvements suggested by the wisdom and progressive spirit of the age. Their adoption and development of this great dairy interest to its present extent in the short period of time that has elapsed since the first cheese factory was started in our midst, goes far with me to confirm the opinion I have entertained. The danger, heretofore, has been that its development would be too rapid, and that cheese factories would spring up in our midst, to use an old adage, "too thick to thrive." This is an evil that experience will soon cure, as it will be found that to make the business profitable sufficient territory must be allowed to each factory, as the greater the number of cows, and the more milk that can be collected at any one given point, the cheaper the cheese can be manufactured.

A factory, to be successful, must be skilfully and intelligently managed. By this means every dairyman in its locality, contributing to its support, enjoys the benefit, and his interests are advanced accordingly. If the most skilful cheese-makers and the best conveniences for making and curing are adopted, and the whole business claims the undivided attention of the manufacturer, knowing that each patron is watching his proceedings with a critical eye, progress and improvement will be certain.

"The factory system," to quote the views of one of the leading members of the American Dairymen's Association, "requiring a large amount of capital, and the attention of the most intelligent and skilful men in the dairy community, in connection with these Associations, are the first steps in the right direction; not only for the development of the largest quantity and best quality of cheese; not only for the most remunerative prices for the article produced; not only for encouraging a useful spirit of emulation to increase the quality and quantity of milk, by taking better care of the farm and cows which produce the milk; not only for the culti-

vation of those social and executive qualities which the dairymen so much need; not only for obtaining, as a body, that influence, in a national point of view, which so justly belongs to them, but, also, are steps in the right direction for relieving the family of the dairyman from a great amount of drudgery and hard labor." Continuing the same authority he adds, "It is a well-established fact, that the old system of family cheese-making has done more to injure the health of our wives and daughters than any other cause. Let us then," he says, "hail with joy that system, that enterprise which relieves and benefits our families, and makes the home circle more useful and more pleasant. The dairyman's home claims his first attention. There we draw our first inspirations of right and wrong, there the first and most lasting impressions are made upon the mind. There should be kindly authority, domestic bonds, sweet charities, serene repose. There, in the home circle, at the paternal hearth-stone, by relieving home of unnecessary cares and drudgery, and making home what it should be, strength will learn to respect the rights of the weak. Then we shall purge the minds of our youth of their prejudice against agriculture, and they will behold in our homesteads so many favored, hallowed spots, where all nature's forces work together for good to man. Then they will appreciate the true dignity of agriculture, become attached to the soil, and yield a devotion to our noble calling. Then that which appears irksome and a drudgery in farm life and the home circle, will be surrounded and adorned by mental illuminations as well as practical experimental knowledge. Then improvement will be copied and labor-saving innovations upon the time-honored customs will produce no unintelligent prejudices or suspicions. Then, our wives and daughters, relieved from undue drudgery, will have a better opportunity to adorn and beautify our homes, and make that favored spot still more profitable, still more useful, still more beautiful, and nurture and raise up citizens who are the secure pillars of our national safety, who are a tower of strength in the hour of her peril."

These are not the crude sentiments of an Utopian philosopher, but the ideas and experience of an intelligent, practical dairyman, who, having brought knowledge and skill into requisition, feels the benefit he has derived therefrom, and occupies a proud position among his brother dairymen.

The past year, notwithstanding its drawbacks, has, upon the whole, been profitable to the dairyman, and the foreign demand for cheese has kept up a brisk trade in our market at very fair remunerative prices. I have no data within my reach upon which to base any correct calculation as to the quantity manufactured in Canada during the season. It must be much below what it otherwise would have been, owing to the excessive drought, yet I think dairymen are much better satisfied with the past year's operations than with the preceding one. Sales have also been effected much earlier and at more regular intervals during the manufacturing season. And, while speaking of this, the idea has suggested itself to my mind as to how the establishment of a Cheese Market, at regular intervals, either weekly or otherwise, similar to that held at Little Falls, in the State of New York, would succeed. I commend the idea to your

consideration, believing that it might be made profitable and convenient t the buyer and seller.

It is desirable that cheese should be put upon the market as early as it will bear, whenever the market affords a good profit margin. Great mistakes are often made by dairymen laying too tenacious a hold of the cheese, and refusing to sell only at prices beyond the reach of buyers. Competition among buyers has now reached that point that no great advantage can be taken over any intelligent dairyman who consults the public press as to the state and condition of the market. I would scarcely dare, with my limited knowledge of the manufacture of cheese, and within hearing of the greatest American authority on cheese matters, to offer any suggestions as to the manufacturing process; this comes more directly within the province of you practical dairymen.

I shall only allude to one point in this connection, and that is the necessity of cleanliness and punctuality on the part of the patrons of the cheese factory. You cannot expect from the manufacturer pure, high-flavored cheese from imperfect milk. This is a moral impossibility. Cleanliness is a virtue absolutely necessary for the production of fine-flavored cheese, and as this important starting point begins with you, discharge your duty faithfully and honestly towards the manufacturer, and then you may with propriety demand from him an article that will command the highest price in the market.

Our success as dairymen depends now entirely upon the quality of the cheese they manufacture. Canadian cheese is now entering quite freely into the English market, where it must compete with the best made English and American cheese. No second class article will pay to send there. Intelligence and skill of the highest character must be brought into requisition. Canadian talent is quite equal to the emergency, and your success will be based upon the manner and extent to which this talent is used.

I am happy to announce to you that we have again secured the services of that most practical and talented American dairyman, X. A. Willard, Esq., to deliver the annual address to the Association. I need not say that I am sure you will commend this action on our part, and I feel that this part of the duty of the Association could not be entrusted to better hands.

Your Treasurer will submit a statement of the finances of the organization. I should feel better satisfied was he able to show a better balance, but as the Association is now clear of liabilities and in good working order, I hope the dairymen as a body will feel it to be both their duty and privilege to contribute their individual mite, as by so doing, it may be returned to them a hundred fold through the knowledge that might be disseminated thereby touching the dairy interest. This is an age of progress, requiring men to think, and reason, and act. To keep pace with the age, the country needs a large class of enterprising, public spirited and educated farmers, whose influence may be used to effect a change in that too popular idea that the occupation of a person engaged in one of the liberal professions is more honorable than that of the husbandman.

I will conclude my remarks in support of these ideas by quoting an extract from an agricultural address delivered at one of the agricultural societies in the State of New York: "With you, therefore, is left the work of making farming so worthy of the esteem of men that your sons will be willing to take it up; for, after all that can be said in praise of an agricultural life, the practical question still remains to every father, how shall I start my son in life so as to make him contented in his calling and make him prosperous? The answer is very plain. Educate him as, and to be, a farmer. Do not delude yourself with the idea that you can put him through a mere method of routine, or that any young man in this age is content to be a sort of machine. A machine is only fit for an intelligent being to work withal, and that he may not be played upon, educate him for the highest mastery of everything connected with or incident to his vocation, and when you set him down for life upon his farm, seek to impress him with the belief that you have given him a profession worth more to him in physical value for health and true enjoyment of existence than any other on the earth. And when you have done this—when you have assisted, as we are all striving, in different parts of the State, to bring farming up to the acknowledged dignity of a professional life, you will have achieved not only a great and good result for yourself and children, but have showered untold blessings upon a posterity that you may not know of, and upon your country, whose prosperity and welfare mainly depend upon the exalted enthusiasm and indomitable spirit of her farmers."

I must apologise for detaining you so long, and return you my sincere thanks for the high honor you have conferred upon me by appointing me to the position of President of this important Association since its organization. I trust you will criticize my shortcomings with charity, and I have now simply to add that I hold office only till my successor is appointed.

Report of committee on nominations read, and on motion of C. G. Cody, Mount Elgin, was referred back for amendment.

The PRESIDENT—Next in order of business is amendments to the Constitution, if any.

On motion of P. R. DALY, Belleville, the Chair was authorized to appoint a committee to make a digest of the Constitution of the Association, and the following committee of five was appointed for this purpose: Messrs. Moore, Daly, Bodwell, Noxon and Graham.

The place for holding next annual meeting being next in order, Mr. WILMOT moved that the subject be referred to a committee, to be appointed by the Chair, for their report.

The PRESIDENT—As the subject is one that requires some consideration, I shall defer the appointment at present, but shall give it my attention before the adjournment this evening.

H. FARRINGTON—That is a matter that rests in the hands of the executive committee, according to a provision in the Constitution,

and the Convention is not competent to entertain the subject without having first amended the Constitution.

The PRESIDENT,—The gentleman is quite correct, and it will be necessary to defer the matter until the committee on Constitution have brought in their report.

The best method of cooling milk before making cheese was then taken up as the next subject in order.

Mr. H. FARRINGTON being called on, took the platform, and said: I am proud to be called on by so intelligent an assemblage for information on so important a subject; and while so many methods of cooling milk are practical, I will not presume to say that my method is the best. I have just returned from the Utica convention, which was one of the largest and most important of any ever held by the American Dairymen's Association, and the subject of cooling milk occupied a large share of their attention. It is a subject of growing importance among dairymen, and while a great deal of light was shed on it, yet there seemed to be no decided preference given to the many ingenious methods devised for this purpose. I have given a good deal of attention to the matter, and of the various devices examined, some were of doubtful utility, and others were too expensive and incomplete. Our usual method has been to apply cold water to the bottom of the vat, but the cold thus applied will stay at the bottom, and the milk must be agitated. Even then the plan is not so effective as to meet the requirements of the business, and, I am satisfied, to be successful. The cooling process should be performed before the milk is sent to the factory. At Syracuse they were using a simple can, with a pipe running through it, in which cold water was passing, and it is said to answer a good purpose. But I would recommend, after a careful consideration of the matter, that a pail of ice be suspended in the top of the can by a cord and pulley, so that the pail can be raised out of the way in emptying milk into the can. This plan is simple and inexpensive, as the pail could be used for other purposes, and can be easily practised by every patron of a factory. The quantity of ice required for a 15 cow dairy would be about three tons a year.

Mr. J. H. RAYMER, Cedar Grove—I am confident we must cool our milk down to 70° before we can make good cheese. I was induced by the suggestions thrown out last year to make an apparatus for cooling milk, a model of which I hold in my hand. It is simply a shallow tin pan, made about 2½ feet wide and 8 or 10 feet long, which is placed in a wooden sink with strips fastened on the bottom for the pan to rest on, and to admit of a circulation of water under it. These strips are placed in such a position that the water as it enters one end of the sink is made to pass in a zig-zag course along under the pan as it passes to the other end, where it

finds its way out. Under the centre of the pan, and connected to it, is a tin pipe running the whole length of it, and through the end of the sink, with a faucet at the end to regulate the flow of milk from the pan. I have found this contrivance to answer an excellent purpose in my factory, and would recommend it as an inexpensive and effective method of cooling milk. I have taken no patent for it, and any who wish are welcome to use it.

W. F. CLARKE, Guelph—Are we to understand from Mr. Farrington that he considers ice essentially necessary.

Mr. FARRINGTON, after giving a humorous illustration of his meaning, said—Without ice milk could not be cooled to a lower temperature than the surrounding atmosphere. I have no faith whatever in any kind of machinery that acts on the pan principle in cooling milk, nor am I a strong believer in the utility of the much talked-of deodorization of milk. In fact it is a debateable question in my mind if milk really contains odors. By using ice much more can be accomplished in cooling milk, and with less trouble than with water, as one pail of ice is equal to six of water for the purpose. Besides, ice is a luxury that no farmer can afford to do without. Every farmer should provide himself with an ice-house, and the simplest and cheapest are the best.

MARTIN COLLETT, Toronto—I believe I can safely say that, from much experience in the business, I have been able to make a cheese the like of which is not to be found in the dominion. My process is in direct antagonism with the theory and practice of all other dairymen. I do not believe in cooling the milk at all, but make it up warm as it is drawn from the cow. My attention was first directed to this method by observing the English dairymaids take the milk warm from the cow and immediately set it for cheese-making. And from my investigation of the subject, I would recommend calling in the assistance of chemistry in the manufacture of cheese. I have an antiseptic which I use to prevent the decomposition of milk, and by using it, milk can be kept twenty-four hours longer than without it. I act upon the theory that prevention is better than cure, and by taking timely means to prevent decomposition, have no need to seek an escape from the effects of tainted milk. My cheese are made without presses, and the like of them is not to be found in any dairy in the country; they weigh from *two to two-and-a-half ounces each.* There is a gentleman present who has used my compound, and I shall be glad to have him state his experience with it.

J. W. COHOE, Brownsville—I have used the chemical compound referred to, and believe that milk can be kept twenty-four hours longer by its use. I am not prepared to say how it might affect

the cheese, as my experiments were not sufficiently extended to satisfy myself on this point.

H. FARRINGTON—This is an entirely new agency as applied to cheese-making, and it is well worth careful experiment and investigation. If it can be successfully employed to prevent the decomposition of milk, it will be a great boon to manufacturers. I should like to see a few cheese made by its use, and sent home to be reported on as to flavor and quality as compared with other cheese made at the same time, and at the same factory, that it might be ascertained if it can be safely used.

Mr. COLLETT—The mixture is perfectly harmless, and is a preparation from bi-sulphate of soda; I use it largely in the preservation of meat without salt, and have also tried it in curing rennets, and find it an excellent preservative. The rennets I have in my hand are cured by this process without the use of salt, and you will find by examining them that they are perfectly sweet.

ANSON GARNER, Drummondville, said—Before I commenced cheese-making, I thought one of the first essentials to be an ice-house, and I proceeded to construct one in the most simple manner. Mine is sunk three feet below the ground, with the merest shed over it. A proper drain to carry off the leakage from the ice is absolutely necessary.

H. LOSEE—I have an ice-house erected with slabs on the surface of the ground, and find it to answer all the purposes required. I laid slabs in the bottom and covered them with four or five inches of dust, put in the ice and filled in the sides with twelve inches of saw-dust, and covered with the same thickness. I had not the slightest difficulty in keeping ice.

Fifteen minutes were taken to exhibit and discuss any new inventions that any parties might be desirous of bringing before the Convention.

The first introduced was the chemical preparation for preserving milk, and its active principle was explained.

Mr. CUNNINGHAM, of the Toronto *Globe*, in the absence of the patentee, explained the working of a milk-cooler and ventilator, which appeared to combine the principle of cooling with ice and also by means of a fan to ventilate and deodorize the milk as it passed down a series of inclined planes from the machine. The apparatus had never been submitted to practical test, and the object of the patentee—who is not able to manufacture and introduce it to the public—in sending it to the Convention was to induce some one to take hold of the invention and introduce it into practical use.

The CHAIRMAN announced as the next question in order:—

Has the system of making cheese once a day been successfully

practised the past year, and can its general adoption be recommended?

Mr. H. LOSEE, of Norwich, on being called on, said—I do not claim any great experience as a cheese-maker, as this is my second year in the business. The first year I engaged in the business I resolved to spare no trouble or expense to secure a superior quality of cheese, and while I believe I was to a considerable extent successful, I had fully made up my mind by the close of the season that unless a good quality of cheese could be obtained by making once a day, to give up the business altogether. This year I determined to give the system of making once a day a thorough trial, and the result has been entirely satisfactory. In my judgment it is the correct system for all our factories to adopt. The principal requisites in making once a day are a proper attention to cooling, and milk brought sweet to the factory. In August last I commenced the use of Alguire's Agitator, and by its use, and a proper distribution of the milk in the vats, I had no difficulty in keeping it sweet in the hottest weather. All the worry and exhaustion of night-work was avoided, and I believe better results were obtained. I have two 600 gallon vats, and in each of them I put a part, say 3000 lbs., of the milk I received in the evening. During the night a stream of water, about half an inch in diameter, was left running under the vats, and as it passed away from them worked the Agitator, which kept the milk in slow and gentle circulation. The motion kept the cream from rising, and in the morning I invariably found the milk sweet. When the milk came in the morning, I added the morning's to the night's milk in the vats, filling one vat first, and commenced to work it off before the last of the milk had reached the factory. In this way one vat was kept out of the way of the other, and we were able to get the last of the curd in press about four o'clock in the afternoon. I had sometimes found it necessary to put a piece of ice in the milk over night in the hottest weather, and I am satisfied it was made more effective by the Agitator, as by its operation all the milk was brought in contact with the ice. Our manufacturing room is well ventilated. All the windows are left open during the night, and we have a plentiful supply of water, which is pumped into a reservoir or tank by a force pump and engine. Of course making once a day involves a larger capacity of vats, but I believe the advantages to be gained abundantly compensate the extra expense in this respect. My curing-house is also well ventilated, and I believe the system I have adopted of ventilating from the ground floor, through openings left for the purpose, and corresponding ones through the floors above, with a couple of good ventilators in the roof, is as good, if not the best, that can be devised. It matters not how still or close the atmosphere; I have always found a strong current of air pass-

ing upward through the openings, carrying with it the moisture and impurities always to be found around a curing-house. I believe the hot air principle the best for heating the curing-rooms when required, and I always endeavor to keep the temperature uniform, and as nearly as possible to 70 degrees.

H. FARRINGTON—It is the universal practice in New York to make cheese only once a day, and were factories here supplied with proper facilities, such as a plentiful supply of water and sufficient vat room to spread the milk out over night to cool and ventilate it, I have no doubt it could be as successfully practised in Canadian factories. But, until factories are supplied properly for this purpose, it would be very unsafe to attempt it. In fact, the milk is not always brought to the factory sufficiently sweet to admit of its being kept over night even with all the appliances we are acquainted with for the purpose.

E. CASSWELL, Ingersoll—No doubt great benefit would accrue to the factorymen were they to provide proper appliances to dispense with making cheese twice a day. I have invariably found that where cheese is made only once a day it is more uniform in quality, and I believe were the system generally adopted, a higher standard would be secured for our cheese. I have visited nearly all the factories in company with gentlemen largely engaged in the trade, and they have time and again complained that we were injuring the general character of our cheese by this troublesome and expensive system of making twice a day. The use of an Agitator I consider to be essential in making once a day, as without it a large portion of the cream from the night's milk would be lost, and its absence would be easily detected in the inferior quality of the article made. Our hot and dry summers impart a hot, dry and husky texture to our cheese, and in this respect the English dairies possess an important advantage over us, and one that we shall always find it difficult to overcome. The last season in England, however, was more like our own, hot and dry, and their cheese was correspondingly hot, dry and husky. I would strongly urge upon the Convention to recommend the system of making once a day.

ANSON GARNER, Drummondville, said—I have made it a practice to receive milk only once a day at my factory, and have had no difficulty with sour milk except in one instance. My patrons, generally speaking, have good cellars, and the milk is kept over night in pans set upon the cellar bottom. Some of the milk is brought a distance of six miles. As incredible as it may appear to many gentlemen present, such has been my experience in receiving milk only once a day at my factory.

H. LOSEE—I entirely disapprove of the plan practised by the gentleman who has just taken his seat, as I do not believe that

milk can be as well cooled, ventilated and cared for by the patrons as it can be at the factory. Besides, the cream that rises over night must be lost to the cheese, while with the use of the agitator at the factory it could be prevented from rising and retained in the milk.

P. R. DALY, Belleville—The patrons of the factory with which I am connected keep their Sunday nights' milk by putting a small piece of ice in the can. This milk is made up separately, and the cheese made from it is kept by itself. The difference was always pointed out to dealers when purchasing, but they had invariably taken it at the same price as the other cheese, and I presume from this that it must have been just as good.

On motion by Mr. FARRINGTON, the question was laid on the table.

The Chairman named Messrs. K. GRAHAM, G. HAMILTON, J. HARRIS, T. H. WILMOT and H. FARRINGTON to recommend a place for holding the next Annual Meeting.

On motion, the Convention adjourned to 7.30 P. M.

EVENING SESSION.

The President, C. E. CHADWICK, Esq., in the chair.

The report of the committee to prepare a digest of the Constitution was read.

On motion of E. V. BODWELL, M.P., the report was adopted.

Mr. X. A. WILLARD, M. A., was then introduced by the President, and delivered his address.

A vote of thanks was moved by Mr. BODWELL, seconded by W. F. CLARKE, and supported by Mr. WELD.

On motion of Mr. FARRINGTON a vote of thanks was tendered the ladies for their presence.

Convention adjourned to meet at 9 o'clock A. M.

THURSDAY MORNING, 4th February, 1869.

Convention met pursuant to adjournment.

The President, C. E. CHADWICK, Esq., in the chair.

Report of the committee on order of business read, and on motion adopted.

Report of committee on finance read, and on motion of E. V. BODWELL, adopted.

The CHAIRMAN announced "Amendments to the Constitution, if any," as next in order.

Mr. P. R. DALY moved, seconded by Mr. K. GRAHAM, That article 5 of the Constitution be amended by striking out all after the word "year," and inserting the following in lieu thereof: "And in such place as shall be decided upon by the members of the Association at the Annual Meeting; and that members shall be allowed to vote either in person or by proxy."

Mr. DALY—In moving this resolution, I may state the object I have in doing so is to entitle parties at a distance who may not find it convenient to attend the Annual Convention to a share of influence in the decision of such questions as may come before it. I should like to see the usefulness of this Association more widely extended than it is at present, and this I believe can be accomplished by changing the place of meeting, and divesting it of its local character. As the Constitution now reads, we have but little hope of being able to make a change in the place of meeting; and the amendment I propose is for the purpose of strengthening representatives from a distance, who would be able to arm themselves with the proxies of dairymen in their respective sections, and by coming thus prepared might be able to bring about such a change as would be not only advantageous to the Association itself, but of greater benefit to the dairy interest of the country.

H. FARRINGTON—I heartily endorse all that has been said by the last speaker as to the desirability of making the Association more extended in its operations and more serviceable to the dairy interests of the whole country; and I am ready, as I presume the dairymen of this section are, to support any measure calculated to secure it.

T. H. WILMOT—There certainly can be no objection to take the authority to decide the place of meeting from the Executive, and restore it again to the Convention; and I cordially concur in so much of the proposed amendment. The last clause, however, I most decidedly object to, as I believe much injury would be inflicted upon the Association by the recognition of the principle of voting by proxy, as its tendency would be to induce parties to stay at home and invest others with their votes, in the expectation that by some turn of fortune the next meeting would be held nearer to their own doors. I will therefore move in amendment, that all the words after the word "meeting" in the motion now before the meeting, be struck out.

C. G. CODY, Mt. Elgin—There is no disposition on the part of members in this part of the Province to show any illiberality towards other sections. The principle of voting by proxy I believe to be a just one, and might be adopted with advantage. For my part, I am not sure if the Association would not be more prosperous by occasionally changing the place for holding its Annual Meeting, and will support the original resolution.

K. GRAHAM, M.P.P., Belleville—No doubt it will be admitted that we come here to use our best endeavors to promote the dairy interests of every section of the country, and we all believe that to be successful we must not know nor favor one section more than another. I have regretted to observe in the Legislature of the Pro-

vince a growing animosity between the Eastern and Western sections. But in cheese matters we must know neither point of the compass, striving only to realize that we are one in interest, and that it will require our united efforts to produce a quality of cheese that will secure for Canadian manufacturers in England a reputation second to none; nor should we ever rest or allow ourselves to be divided by minor considerations until this has been achieved. I would not advocate holding the Annual Convention further East than Toronto. If such a change were made, it would improve the Association financially, and be most acceptable to dairymen in the Eastern part of the Province.

E. V. BODWELL, M. P.—The system of voting by proxy, if introduced into the working of this Association, would be found to have a most pernicious effect on its future usefulness. Instead of our annual gatherings being comprised of the principal dairymen from all sections of the country, we should see them represented instead by a few of the more prominent among them, prepared with proxies and ready to engage in a contest to secure a place for the Annual Meeting more favorable to the parties they may for the time represent. Such contentions could not be otherwise than hurtful, as they would inevitably destroy the harmony so essential among dairymen in carrying out the objects of the Association.

Mr. FARRINGTON was pleased to see the interest manifested to improve the financial position of the Association, as it was claimed that the change which it is proposed to make would do this, but he would put it to members whether in pursuing a measure of doubtful success there is not danger that matters of more vital importance might be sacrificed.

D. PHELAN could see nothing in the organization and objects of the Association that would justify the adoption of the principle of voting by proxy. This could not be compared with certain incorporated companies, where large pecuniary interests were involved, and therefore the arguments in favor of the motion, based on the comparison, lost their force.

The vote was then taken and the amendment carried.

On motion of Mr. HAMILTON the President and Secretary were appointed to make arrangements with the proprietors of some paper or papers to publish reliable reports of the cheese market in Montreal, Toronto, and Ingersoll, and also the cable reports.

On motion of Mr. WILMOT, the discussion of question No. 3 was deferred.

The report of the committee on place of holding the next annual meeting was read.

Mr. HARRIS, as one of the committee, could not coincide with the report, as he could not bring himself to believe that it would

be wisdom on the part of the Association to change the place for holding its annual meeting. By far the larger proportion of members are resident in this vicinity, and were Toronto selected as the place of meeting, it would almost certainly result in a falling off in the number of members as well as in the general attendance of dairymen.

Mr. GRAHAM, M. P. P., had no doubt that were the next annual meeting held at Belleville instead of Tronto, as recommended by the committee, there would be a larger attendance, as well as membership, than we have yet been able to obtain.

Mr. NOXON admitted that much could be said in favor of change of place, but as the dairymen of this section had been the first to move in securing the organization of the Association, and had devoted a good deal of time in giving it efficiency and promoting its objects, they were not prepared to favor its removal to a distant part of the country before it had acquired greater strength and stability. These annual conventions may be regarded as the dairymen's college; and while it is desirable they should be largely attended by representatives from all parts of the country, it is no less important to their success and usefulness that they should be located in the midst of an active, well-developed and progressive dairy region.

On a vote being taken the report was not adopted.

On motion of Mr. JAS. HARRIS, Ingersoll was selected as the place for holding the next annual meeting of the Association.

On motion, the Convention adjourned until 2 p. m.

AFTERNOON SESSION.

President CHADWICK in the Chair.

Question No. 3—"What new features and improvements have suggested themselves the past season ?"—was announced as next in order, which, after some discussion, took the form of the following questions and answers:

What is the cause of floating curds ?

Mr. FARRINGTON—Tainted and impure milk.

Is liquid better than ball annatto ?

Mr. FARRINGTON—No better, while it is much dearer; and in answer to a question, would also say that cheese made once a day is preferable when the practice can be safely pursued.

Does colored or white cheese bring the highest price in England ?

X. A. WILLARD—London market requires colored, and brings the highest price. Manchester demands pale cheese, and will have no other at full rates.

Mr. HASKETT had no hesitation in saying that he could get ten

buyers in Liverpool for colored cheese where one was to be had for pale.

Mr. GRAHAM, M. P. P., would advise coloring for first-class cheese, but second quality would sell better pale.

X A. WILLARD—Cheddar, which brings the highest price in London, is a pale color, and Chesire is highly colored.

G. MOORE—Make a good article, that does not require color to conceal defects, and we will be all right.

Mr. FARRINGTON—At the Utica Convention coloring had been voted a nuisance.

Mr. WILLARD had received a letter from England complaining that some American cheese had been colored with red lead. He had given considerable attention to the quality of annatto, and out of fifty samples he had had analyzed nearly all were more or less adulterated. It was a most reprehensible practice, and dairymen should look carefully as to the quality of annatto used. When in England, he had from enquiry been induced to recommend Nicol's liquid annatto, but on further enquiry found their secret for making is just that possessed by you all, the use of potash for cutting.

Mr. CASSWELL read extracts from Mr. Webb's address to the Utica Convention, which, while recommending that efforts should be made to educate the consumers to not use colored cheese, admitted that with the present taste it is necessary to color cheese in order to obtain the highest prices.

What is the best kind of salt for cheese-making?

G. HAMILTON had used both Goderich and ground Liverpool salt, and after one season's trial had become convinced that the Goderich salt was in every respect equal to the other, and last year used it altogether with the best results. Could safely recommend it.

Has whey been utilized by feeding it to cows?

Mr. FARRINGTON—When it is not too sour it can be fed to cows with advantage.

Mr. WILLARD, in reply to a question, stated that American dairymen always use Onondaga salt, which had been proved by tests to be better than Liverpool salt for both butter and cheese-making. Canada salt had also, by chemical analysis, been proved a very pure and excellent salt.

Report of the committee on nomination of officers presented the following names:—

President—C. E. CHADWICK.
1st Vice-President—K. GRAHAM, M. P. P.
2nd Vice-President—GEORGE HAMILTON, Esq.
Secretary and Treasurer—JAMES NOXON, Esq.

On motion, the report was adopted.

The President, Mr. CHADWICK, expressed a desire that he had felt to be relieved from longer occupying the position he had held since the organization of the Association, and hoped that he would have been permitted to retire. He fully appreciated the honor conferred by his re-election, but would have preferred to see the position filled by another.

On motion, a vote of thanks was passed to J. S. Gurnutt, Esq., editor of the *Chronicle*, for the full and complete report of the proceedings of the Association, and also to the President and Secretary for the able manner in which they discharged the duties appertaining to their offices.

On motion of Mr. CODY, the Convention now adjourned *sine die*.

[The Convention was more largely attended than any former one, and was characterized by an earnest interest in the important questions brought under consideration. A vast amount of information was imparted to those present, and the opportunity afforded by these Annual Meetings for an interchange of views amongst dairymen as to the system and practice of cheese-making is not the least of their practical benefits.]

THE FOLLOWING

ADDRESSES, &c.,

ARE TAKEN FROM THE

FOURTH ANNUAL REPORT

OF THE

AMERICAN DAIRYMEN'S ASSOCIATION,

FOR THE YEAR 1868.

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ANNUAL ADDRESS,

DELIVERED BEFORE THE AMERICAN DAIRYMEN'S ASSOCIATION, 1869, BY

PROFESSOR JOHN GAMGEE,

President of Albert Veterinary College, London, Great Britain.

DISEASES OF CATTLE AND THE INFLUENCE OF THOSE DISEASES ON MILK.

Mr. President and Gentlemen:—

History reveals a truth which is at once deterring and encouraging to men engaged in the arts of peace. In times not yet remote, and even at the present day, the qualities recognized as supreme, as best calculated to secure glory, wealth, and the honor of being ennobled by Sovereigns, have been of valor and skill in devising instruments of destruction. According to the views of many, the preservation of peace is best guaranteed by arming to the teeth, and encouraging the manufacture of monster cannons, iron-clads, infernal machines, torpedoes, shells, chilled shot and so forth. It is true that a learned or influential divine may attain the front rank amongst peers, that distinguished lawyers acquire great wealth and the title of nobility after years of toil which may well be characterized as arduous, but scarcely as growing out of pure philanthropy.

In this free country an effort is made to despise titles, and yet my travels indicate that Honorables, Generals, and Colonels by courtesy, are relatively about as numerous as members of the Legion of Honor in France, and there is a sneaking regard for distinction, which, emanating from a solid substratum of human vanity and praiseworthy emulation, must in the future acquire a bolder and more distinct form.

By all means let us have good works, even at the risk of pandering to some human folly; and above all things, let us hope that a dukedom, a baronetcy, or precedence over hereditary peers dating back to the middle ages, may occasionally be assigned where such distinctions are prized, to those whose every effort has been directed to making mankind in general happier, healthier and richer than heretofore.

It is true we look to Cæsar as Cæsar, and should laugh at a prefix should an insane biographer avoid tautology by occasionally calling him His Imperial Majesty. It is likewise true that Harvey, Jenner, Stephenson, Washington, Franklin, Faraday and a host of others, could scarcely have lived longer in the minds of men had they hidden their patronymic

under the tinsel of aristocratic titles. But, gentlemen, it is a law of nature that the strong shall master the weak, that the great shall be great, and held up as examples to others who may be induced to strive in a like manner; and all I desire is, that in the old world and in the new, the public and the rulers of the people should learn that in accordance with the spirit of the age there should be a new classification of the list of public benefactors.

For some inscrutable reason, in by-gone generations a monarch, a pontiff, a general, each and all have found that to them belonged the true title of greatness—of pre-eminence—in their respective countries; but the world should reverence the man or the body of men whose aim is to prevent sickness and to cure it, to feed God's people and make men truly better, wiser and more peaceable than they were before.

These remarks, gentlemen, will show you how much I feel honored in being selected to deliver the Annual Address at this meeting of the American Dairymen's Association—started it may be, as all great things are started, by prudent men in their attempts to make an honest livelihood and be useful members of society, it aims at developing the resources of a country, at economizing one of the most precious of all articles of diet, and at the prevention of much waste, which is the cause not only of money loss, but of actual human suffering. You are engaged in a great and good work, suited to the spirit of the age, and I am not saying too much should I assert that this Association is a successful pioneer, calculated by its example, no less than by its labors, to encourage people in the path of social improvement.

I esteem it a privilege to have an opportunity of directing attention, this evening, to the great advantages you are likely to derive from encouraging the acquisition and diffusion of knowledge concerning the diseases of lower animals. It is to be regretted that in this great country, with all the inducements offered for the progress of agriculture, no encouragement has been given to the establishment of Veterinary Colleges, or even a single Institution devoted to the study of diseases of animals. Dr. John Busteed, of New York, has attempted and accomplished much, and if the Legislature of this State can appreciate the labors of a far-seeing enthusiast in this essential branch of human learning, thirty or forty thousand dollars may yet secure for the State of New York the honor of precedence in creating an American Veterinary Profession. Dr. Busteed is allied with good men, and they have demonstrated their disinterestedness in undertaking what has as yet proved a thankless task.

Veterinary Colleges were founded over one hundred years ago in Europe, with the main object of enlightening people as to the nature and prevention of Cattle Plagues. France took the lead, and her reward now is a striking contrast with other countries in the losses sustained by the rinderpest during the past three years. In England, until the days of Youatt, the subject of cattle disease was ignored. Steam power and free trade sentiments virtually converted the British Isles into a part of the European continent, so far as the cattle trade was concerned; and whereas for long the ocean had protected the herds and flocks on our evergreen

pastures, the hand of time brought facilities of communication with distant lands which have cost us millions upon millions sterling in matchless sheep and cattle. The great benefits of free trade have thus in part been neutralized in our country for want of veterinary knowledge at a time when such knowledge could easily have controlled the disasters which followed.

No better illustration can be had of the limitless character of injury inflicted by a cause which, if recognized at the proper time, would have been most easy of control. Not only did the United Kingdoms of Great Britain and Ireland suffer as the result of Sir Robert Peel's reforms, but Holland, which had been exporting her cattle southwards, became a main route to the British markets, and her provinces were soon devastated by the foot and mouth disease, contagious pleuro-pneumonia, and small pox in sheep. And then both Holland and England began to contribute to cattle plague dissemination. America was one of the first to suffer, and she suffers still. Australia, rising in wealth and influence, has been crippled by the lung plague, and the Cape of Good Hope, with its Dutch and British settlements, has been impoverished by the same disease. I need not refer to minor outbreaks in Sweden, Norway, Schleswig Holstein and elsewhere, the direct result of the British free trade movement of eight and twenty years since, for without these I can easily calculate a loss to agriculture, an irrecoverable loss to Britain, of at least fifty million pounds sterling, and to the British Colonies and America combined of at least a similar sum. These figures are not purely theoretical. I published statistics as an official report to my Government in 1862, proving that in six years we had lost not less than twelve millions sterling from pleuro-pneumonia amongst cattle, and that rate of loss has been kept up since 1842, some years more and some years less. But this does not include the enormous losses incurred by the curable foot and mouth disease, which although rarely fatal, so impoverished stock and destroyed the milk-producing faculties of dairy cows that the farmers of England have lost in cash as much, if not more, by this disease than by the other.

And again, I have not made any allowance for the losses by small pox in sheep, and the terrible ravages of the cattle plague which visited us in 1865. You therefore see that I should be nearer the mark if I said that England had probably lost one hundred millions sterling during the past twenty-eight years. The farmers of America should not wait to learn this lesson by heart. It so happens that whilst the New York College of Veterinary Surgeons is pining for means in New York, the farmers, I am sorry to say, are feeling the impoverishing effects of cattle disease in many parts of the United States, and it appears to me that, in this intelligent country, all that is required is the free publication of facts on all these subjects. It is fortunate that at the head of the Agricultural Department at Washington there is a true son of the soil, who appreciates the vast importance of all these questions, and had he the means at his disposal I do not believe American farmers would remain long ignorant of the diseases prevailing in America, and the best means to be adopted for their prevention and cure. So little provision has, however, been made here

for the consideration of this important question, that Gen. Capron had to ask me last summer, when the Texan fever prevailed, to work for him, trusting to Congress paying me, and my report, written last September, is still in manuscript for want of funds. Now I do not blame Americans or this government for this. This is a wide country, and you have not had the experience in cattle disease which roused the Europeans in the 18th century. Nevertheless, the losses sustained here have been and are enormous, in all probability exceeding one hundred million dollars in gold every year, and the excitement of the panic of 1868, produced by the American cattle plague, may result in good, and may lead to rational efforts. Let me advise you not to copy England in this respect, but rather to look to France, Prussia, Austria, and other continental nations that recognize it as duty to provide, even from the public purse, for the education of a profession whose special province it is to prevent poverty and famine, for these are the inevitable results if cattle plagues be permitted to disseminate at pleasure.

This country has as yet been visited by only one of the great contagious cattle plagues of the East which have travelled the Old World in the course of civilization, and as history repeats itself, may in a similar manner travel through the New.

The foot and mouth disease, vesicular murrain, or epizootic aphtha, has long been the forerunner of these pestilences, characterized by longer periods of incubation. The width of the Atlantic alone has saved you. But the rapid sixty day voyages of bygone times have been reduced in length to ten and fifteen days, and who is there bold enough to say that the same distance will not soon be traversed with great regularity within a week. It may be somewhat improbable for some time to come, but it is one of the probabilities of the future.

The great need of American Agriculture is the improvement of its breeds. The materials to a large extent have been imported, but closer relations with Europe will result in the more common transportation of European stock. Any domestic animal is liable to the foot and mouth disease. Nay more, game, especially deer, hares, rabbits and even the feathered tribe, domestic or wild, may and do carry the poison of this loathsome malady long distances. For readiness of propagation it has thus no equal amongst the plagues of animals, and taking all circumstances into consideration, it is rather remarkable that it has not found its way here already. Without doubt the reason for this is to be found in the rapidity with which the disease manifests itself and runs through its various stages. The first cattle that brought the malady into the London market lost their hoofs and had to be slaughtered in Smithfield. The animals they came in contact with carried the disease into remote parts of our islands within a week, and from that day to this similar accidents are of constant recurrence.

The poison of this disease is found in vesicles within the mouth, and is discharged with the gallons of saliva secreted daily under the irritation produced by the eruption on the tongue, palate, cheeks and lips. It is also formed in vesicles on the teats and finds its way into the milk, and

thus it kills young pigs, calves, and even children that get milk fresh or undiluted. The skin around and between the hoofs blisters, ulcerates, and discharges virus to poison the grasses, roads, stables, and all else the cattle tramp upon. Cattle famish with their excoriated mouths; cows lose their udders from garget, and the lameness incident to the disease of the feet not only deteriorates the stock but is often a very troublesome complication demanding skilful veterinary aid.

If you go into a market visited by this disease, the feverish and panting cattle stand with hollow flank, or lie obstinately to relieve their painful feet. If you enter a dairy you find the cows lying, breathing hard, frothing at the mouth, smacking their lips, and giving the greatest amount of trouble to all, from the dairyman to the milkmaid, who knows not how to handle the blistered and bleeding teats, and is in perpetual danger of kicks and contagion.

Words fail to convey to you my ideas and those entertained especially by dairy farmers in England and elsewhere, regarding the troublesome and dangerous character of this, the curable plague of cattle.

CURABLE! It is well to emphasize this word, because people unacquainted with bovine pestilences, and quacks born to rob the farmer of his money, are always calling out for or dispensing cures. In Pennsylvania they are "curing" abortion and the hog plague. Thus it is that both are likely to be preserved for future generations, and it behoves every one endowed with a germ of common sense to inveigh against the practice of curing epizootic diseases. It has been my object in England for many years to advocate the practice of exterminating contagious maladies, and but for the short-sightedness of the farmers, and a host of penny-a-liners ever ready to damage a good cause by their ignorance, I should have succeeded long since in ensuring protection even to you by ridding the British Isles of every epizootic. That great work required simple means. Although it may not be necessary to add one word to what I have said in demonstration of the importance of preventing the spread hither of epizootic aphtha, which is never absent from Europe, you may be interested in hearing something of the disease induced in man by drinking the milk of sick cows, or being inoculated through the skin.

The milk of cows affected with epizootic aphtha is probably harmless unless mingled with the virus as it flows from the vesicles on the teats. This accounts for a difference in results of experiments. When the teats are affected and the udder congested, the milk is strongly albuminous and curdles on boiling. Professor Hertwig, of Berlin, found thirty years ago that the warm milk induced disease in man. He drank a quart of it daily. On the second day he had slight fever, dry and hot mouth, and itching of the extremeties. These symptoms lasted five days, and then the mucous membrane of the mouth and tongue began to swell, and vesicles formed about the lips, cheeks and tongue. The hands blistered, and the blisters scabbed over in about ten days. But these are not the only results in young people, and especially children. They are affected as the young pigs and calves are that die. Vomiting, diarrhœa, and the excoriations of the mouth and fauces end in death. In large cities the direct relation

between cause and effect cannot easily be proved, but there are not wanting facts to show that epizootic aphtha may become epidemic, and in this form may very materially aggravate infantile mortality. A brief review of the past may satisfy you that I am not exaggerating the importance of this question. Nearly two centuries since, according to Valentini, severe aphtha prevailed in man as well as amongst the cattle in Hesse. Early in the 18th century Steurlin described a malignant catarrhal fever, with or without delirium, occurring amongst young people, as the epizootic aphtha then raging amongst cattle in Franconia. Human beings and cattle were simultaneously afflicted with this malady and gangrenous angina in Europe in 1763 and 1764. Sagar, in 1764, describes the malady in domestic animals and in man. In 1827, is mentioned a form of inflammatory rheumatic fever with aphthous eruptions of the mouth, or a vesicular skin disease with abscesses and ulcers on the lower limbs, occurring amongst young people in Bohemia, at the same time that the foot and mouth disease occurred amongst cattle. And vomiting and diarrhœa prevailed amongst children in Wurtemburg at the same time, and were attributed by Kolb to drinking the milk of cows affected with this malady. Numerous other observations have been made on the European continent, and people of all ages have been inffected with the disease, either by drinking the milk, placing knives or bits of wood in their mouth, after they had been in contact with the mouths of sick cattle, or the discharge from vesicles dropping on to wounds on the hands, or on eruptions of the skin of the arms. Chronic ulcers and thickening of the skin have not been uncommon.

Soon after vesicular murrain was introduced into England, Professor Sewell, of the London Veterinary College, prepared a report for the Royal Agricultural Society of England, in which he alluded to an observation of the disease in man. Mr. Holmes, a veterinary surgeon at Thirsk, in Yorkshire, reported having heard of a few individuals who evinced symptoms something similar to what animals in the epidemic showed, from partaking of the milk; "and I know others," he added, "that partook of the same with impunity." Mr. Karkeek, an able veterinarian at Truro, in Cornwall, writing in the VETERINARIAN in 1841, said he had seen a plain and palpable instance of the disease in the human subject. He had heard of two others, but the one he saw was very distinct. "It was that of a young farmer who exhibited every symptom which characterizes the disease. There were the vesicles on the alae of the nose, at the point and on the sides; and the point and dorsum of the tongue, and on the gums of the upper and lower jaw. There was the constant flow of saliva, the inability to eat or drink anything either hard, or very hot or very cold. This patient, (for I attended him as well as the cattle), is an intimate and particular friend, and I had many opportunities of witnessing the progress of the complaint. He informed me that he was first taken ill with what he called a shivering fit, about the hour of bed-time. For some hours after, although warmly covered up, the cold fit continued. By the morning this had left him, and was succeeded by the hot fit. There was a great degree of constitutional disturbance; he had a difficulty of deglutition, his bowels were costive, his nose constantly itching, his tongue and

palate dry, and the pulse ranging from 70 to 100, accompanied by great prostration of strength. During the night which succeeded, he could get no sleep, the itching of the nose was increased, and sometimes he had sharp and violent pains in the head and face. The next morning there was a discharge of an offensive matter from his nostrils, and for the first time he observed the vesicles on his gums and tongue. On the next day the discharge had assumed a semi-purulent appearance. He afterwards took some mild aperient medicine, and in about a week or ten days was nearly recovered. I have every reason to believe that the disease was communicated to him from having injured one of his fingers in giving a drench to a cow. The wound had a very unhealthy appearance for some time previous to his being attacked as I have described."

I need not detain you with the history of other cases, although I might relate many which have been brought to my notice in England and Scotland of late years. The point I have to insist on is, that epizootic aphtha is the one plague of cattle and other warm blooded animals which is communicable to man, and that the poisoned milk of affected cows is probably the cause of many deaths amongst children—deaths which medical men have not learned to trace to their proper cause. I have no facts to indicate whether cheese or butter would retain the virus for any length of time, but in all probability they would; and a trustworthy observer assured me some years since that a pudding made with milk from a sick cow, though boiled, produced the disease in a family of five grown persons. This is remarkable, and would need further observations in corroboration.

I trust these remarks concerning a disease which is not yet in America, may not be deemed out of place. It is necessary you should know of dangers ahead, and your only safety is in incessant vigilance and fulness of knowledge.

But let me turn now to a malady which is in the United States, that is the very opposite to epizootic aphtha in point of incubation, duration and result, and concerning which I have just furnished a very brief report to the Commissioner of Agriculture. I allude to the contagious pleuro-pneumonia, or as I prefer to call it, the lung plague. It is without exception the most insidious of all diseases, and none but the careful student of history can make out whence it comes and whither it goes. On its first manifestation in different parts of Europe, it has usually been regarded as a common inflammation of the respiratory organs, of non-contagious character, and it has been only after years of research and observation that the leading veterinarians of the world have learned that it is never developed except as the result of communication from sick or convalescent to healthy cattle. The events of the past thirty years concerning the development of this disease in England, America, Africa and the Australian Colonies, has tended to dispel many doubts; but the weapon that was used against me in England, even by Professor Simmonds, when I sought legislation to check the traffic in diseased cattle, was that the disease might be due to that mythical principle, atmospheric influence. The people of Massachusetts can tell you the truth in this respect, but they too were unaware that the malady which they successfully cleared out of their

State, had been and has been all along in the Long Island dairies, and has spread thence to New York, New Jersey, Pennsylvania, Maryland, the District of Columbia and Virgina. I learned yesterday of the disease having been witnessed at Armenia, in New York State, amongst cattle from Ohio. It is as bad as ever now in some counties in four distinct States, and if some decided and effectual effort be not made to extinguish it, it will surely and disastrously assail the stock of Western and Southern graziers, and as it has done in Australia, will inflict an irreparable injury on the whole country. Rinderpest moves on more rapidly than pleuro-pneumonia, and kills so fast that it is like an army moving to invade a land. It is visible, and the full measure of the danger incurred is appreciated by the people it is destined to victimize. The lung plague is the assassin that stabs in the back. It is masked, stealthy in movement, and strikes only to kill, but to kill by slow poison. You may have heard of the distant but certain death of a man that accidentally inhales binoxode of nitrogen. No symptoms appear for weeks, and then ulceration of the air passages, which is inevitably fatal. So it is with lung plague. An ox rubs its nose against an apparently healthy animal of its kind on a road or in a market. Thirty, forty, and even sixty days elapse, during which the ox may have been transported ten or fifteen thousand miles, say from London to Australia, as that has been done, and then it is ready to contaminate and kill all the cattle that come within the range of its deadly influence.

How can such a disease exist anywhere on this continent without a tolerable certainty that, sooner or later, it will spread like the thistle and noxious weeds in general, wherever circumstances at all favor the transportation of cattle. You would all have been in arms already, as the people of Massachusetts were, had the West not been a breeding and purely exporting region, and had the extreme South not been the cheapest point whence to drive cattle to the North. The movement to and fro in stock is increasing, and especially the movement of cows, and it is certain that the creation of immense dairy districts on the still unreclaimed prairies of the West will create a demand for different stock than that produced anywhere but in the Eastern states, and Europe will continue to be levied for improved breeds, and the lung plague once roaming in the broad plains of Illinois, Iowa, and other growing states, will establish stations for its future development which few will have the courage to attack. It is easy to stamp a disease out of a farm, a county or state, but this continent is wide, and your only salvation is to strike now; learn all that is to be learned of the whereabouts of the disease, and never cease so long as a single case of lung disease can be traced on American soil. Posterity will not thank you. They will only know what the lung plague is if you neglect your duty; but there is a good measure of patriotism in the land, and if you will learn from England's misfortunes, from the blunders of those who have spoken of notes of warning as emanating from alarmists, and if you will act as Massachusetts did, you will soon save to this country infinitely more than the national debt amounts to.

The members of this Association will be interested in knowing that in

this, as in other countries, the lung plague always finds most frequent opportunities of introduction on dairy farms, and in the sheds of town dairymen than elsewhere. You are the first people to suffer and to suffer most severely, so that it is your direct interest to stimulate inquiry and energetic action. Congress should be moved, and funds provided for the working of a national commission which should labor to ensure the co-operation of the several States at present implicated, and should continue its work until there is nothing really left for it to do.

The lung plague not only harasses the dairy farmer and checks the supplies of milk, but it largely contributes to encourage the traffic in diseased animals and diseased animal produce. The flesh of cattle dying of this disease is innutritious if not absolutely poisonous, and in all probability favors the development of boils and carbuncles, on those who partake of it. The milk is much diminished in quantity, has an acid reaction, is thick and curdled. When the cream is removed, the milk is thin and blue. Analyses of the milk have shown that it contains about seventy-five parts of water, ten of butter, ten of casein and insoluble salts, and part of one per cent. of sugar and soluble salts, to the one hundred parts. This analysis does not, however, indicate the properties which undoubtedly render it improper food for infants and children, whose main article of sustenance should always be of the purest and healthiest description.

The field of inquiry into the nature and prevention of cattle disease is not limited to contagious plagues of the kind I have spoken of. There is a vast amount of work to be done in the study of indigenous American maladies. We know little or nothing of the characteristics of the principal diseases destroying your stock, and reliable information can only be acquired by skilful observers, at great cost, and engaged in careful research for a considerable period of time. On arriving in America one of the first questions asked me was, "what is the common cause of abortion in cows?" I told Professor Dalton, as I had explained to others, that the essential element in the production of wide-spread accidents of this description in Europe was ergotism, and that a botanist should be employed to collect evidence as to the extent of this disease in plants. I believe this advice has been acted on, but I know not with what result, and since I have been specially requested to say something on this scourge of dairy farms, it may be somewhat interesting for you to know under what circumstances the premature birth of animals in general, but especially of calves, has been witnessed in the old world. The disease has, indeed, been epidemic as well as epizootic at one and the same time, and especially in ancient times, when a pastoral people, living in the greatest simplicity amongst their herds, were liable to be affected by influences which proved deleterious amongst their animals. As far back as 278 years before Christ, we are told that abortion was both epidemic and epizootic in Rome and its vicinity. Few, however, are the records of similar outbreaks until the beginning of last century. In 1720 wet was followed by an abundance of smut, rust, and probably ergot in the fields. We are told by Koliser that grains and grasses were diseased, and as a result cows failed to bear their young to the full period. The year 1721 is also described as remark-

able for mild weather at first, a damp spring, summer and autumn. Vegetation grew diseased, and the domestic animals in general experienced the greatest suffering from abortion and difficult labor.

There is one malady which is a sure indication of damp seasons and unhealthy pastures. It is the rot of cattle and sheep—a form of weakness and emaciation, with tendency to dropsy, due to the ravages of the fluke or distoma hepaticum. Vast numbers of sheep died of this disease in France in 1761, intermittent fever was rife amongst human beings, and the mortality of unborn calves was great.

Swine as well as cows suffered severely from abortion in Germany in 1777, and we have distinct evidence of rust and ergot having prevailed to a great extent at the same time.

A long and cold winter, followed by the rapid growth of plants in a humid soil, caused the production of fodder in July, 1784, which led to mares as well as cows expelling their young long before maturity.

Toggia, one of the oldest and best writers on the diseases of cattle, describes a wide-spread outbreak of this description in Piedmont, which occurred in November, 1792, and he remarks that it is extremely difficult to prevent such accidents amongst cows in wet countries where the dews in autumn are abundant and cold; and that cows removed from a dry to a wet country are very liable to become subject to the disease.

In 1831 forage was very bad in Westphalia, and ergotism common there and in other parts of Europe. This did not fail in the development of premature labor amongst cows. Precisely similar observations were made in 1839, in France, Bavaria, and Lithuania.

In England my attention has been often directed to this question, and although there have been isolated outbreaks on farms, which could be traced to other causes than the presence of ergot in the grasses, as a rule this was the active agent in the production of the disease. Professor Tanner, of Birmingham, contributed an article in 1858, on ergotism as a cause of abortion, to the Edinburgh Veterinary Review, and he remarked that he had been led by experience and extended observation to regard the connection between the two conditions as close and almost constant.

Now, although in speaking of ergot it is usually supposed that allusion is made to ergot of rye, there are many plants liable to be attacked by the parasite. The parasite of the rye is a fungus described as an elegant sphæria, and called by Fries, cordyliceps purpurea. There are different species of cordyliceps, and the list of grasses and other plants affected with ergot is quite extensive. I am not in a position to give you a complete one, and indeed this subject demands earnest and prolonged investigation, which I trust the remarks I have to make may prove.

Ergot is common on rye, on maize, and is sometimes seen on barley, wheat and oats. In addition to these we have it on Triticum Repens, Tr. Junceum, Elymus Arenarius, E. Maritimus, E. Europaeus, Lolium Perenne, L. Temulentum, Alopecurus Pratensis, A. Geniculatus, Phleum Pratense, Phalaris Aquatica, Ph. Canariensis, Paspalum Setaceum, Panicum Miliaceum, Holcus Lanatus, H. Avenaceus, H. Spicatus, Agrostis Stolonifera, Arundo Arenaria, A. Cinnoides, Phragmities Communis, Aira Cœrulea,

A. Cristata, A. Cæspitosa, Arrhenaterum Elatius, Sesleria Cœrulea, Poa Fluitaus, Molinia Cœrulea, Festuca Duriuscula, F. Hordeiformis, Dactylis Glomerata, Bromus Secalinus, B. Mollis, Scirpus Palustris, Heilocharis, Palustris.

A knowledge of the nature of plants thus infected proves that they are apt to grow on low lands, in valleys, on ill-drained or marshy soils, and always best during moist seasons. If history in Europe teaches us anything, it is in such localities and during such seasons that the females of domestic animals are incapable of regular gestation. Now I know that one of your most common grasses, poa pratensis, is often ergotized, that in times past, and perhaps still in some localities, it has produced gangrene in cattle, and that it often constitutes a main element in the hay which has been cut and housed on old pastures late enough in the season to ensure such a state of inflorescence as to favor the development of ergot.

It is not my desire to convey to you that ergotism is the only cause of the troubles that have afflicted many dairy farmers in New York State and Pennsylvania, but I am convinced it is the main one, and every effort should be made to disseminate a knowledge amongst farmers, of the nature, varieties and development of this kind of fungus.

It has been stated with justice that ergot often fails in producing its specific effect in animals. Fortunately this is so; whilst nature has provided for the preservation of all that is alive, it has also supplied the means whereby the balance of power between the animal, vegetable and mineral kingdoms may be sustained, even though that should entail the destruction of the more highly organized or richly endowed of human beings.

In England, grasses on which cattle have grazed in summer, will in a humid climate become ergotized, but according to Professor Tanner, it is not produced before the end of July, or early in August. When grasses are cut early and followed by an abundant growth, so as to ensure an early autumn mowing, ergotism prevails. After September, ergot rarely develops injuriously. The more northern parts are more severely affected with ergotism than central or southern Europe, and I suppose this applies pretty much to this continent.

Ergot differs greatly in strength according to its conditions and the period of its growth. When first sprouting it is harmless, and it is specially poisonous when attaining maturity. Should it then ferment, its power is completely lost, and the same effect is produced by prolonged exposure to a high temperature, such as that of boiling water. This acounts for contradictory observations regarding the action of ergot.

When ergot is not the cause of premature birth in animals, we find, especially in the case of cows, that accideuts operate, and when they have suffered once they are extremely liable to suffer repeatedly. There is no doubt also that some cows are apt to become excited and made to expel their young by being placed with other cows liable to the same condition. I need not, however, enter into details with which most or all of you are conversant. I have simply to state that it is my opinion that in Europe, and probably here, the most frequent cause of abortion is ergotism. The

means of prevention consist in excluding animals that are known to be liable to the disease, draining lands, ploughing deep, turning up of old pastures the grasses in which are affected with ergotism, and sowing other grasses thickly. I expect you will reap great good from investigations which are being pursued at present, and I think Professor Dalton's first report is admirable in showing that many circumstances supposed to influence the development of the disease, do not operate prejudicially on cattle. By this process of elimination, we often learn the truth, and if you will persevere in encouraging proper inquiry, your reward will be freedom from this and other diseases.

It would be well for America if the example of this State in appropriating money for the investigation of such a disease were widely followed. You need good veterinarians, and such an association as this should encourage the emigration from England or other countries of some of the best men, to bring to bear a full knowledge of veterinary science on all questions in which such knowledge can benefit agriculture. The prevention of disease implies, in many instances, good farming; and although farmers cannot individually control the spread of a contagious plague, you will find there are few diseases which cannot be prevented by proper precautions at home. Did time permit, I could readily prove to you that where British agriculture is most advanced, there diseases of animals are most rare. Here it is supposed that cattle diseases are becoming more common. It is true that the lung fever and the Texas plague have naturally swelled the mortality lists lately, but indigenous affections recede as a rule just in proportion as drainage, effectual sacrification of soils, the intelligent use of artificial manures and the proper management of domestic animals are appreciated and practised. This alone, I trust, is sufficient to direct attention to the proper cultivation of the veterinary art; and in conclusion, I have only to repeat that with the means at your disposal now, not a day should be lost in urging on the Government the great importance of ridding America of the lung plague. This is too serious a matter to be delayed; and if members of Congress and others should suppose that a malignant disease ought to have stimulated people already in the good work, whereas, unfortunately, few have heard of the disease, let them apply to the farmers of Westchester, Pennsylvania, or secure trustworthy reports from the Long Island Dairymen, and then remember that a single case of lung plague unearthed is worse in its ulterior effects on this continent than all other cattle diseases put together.

COOLING MILK BEFORE CHEESE IS MADE THEREFROM,

AND CAUSE OF THE EARLY DECAY OF AMERICAN CHEESE.

ADDRESS OF MR. L. B. ARNOLD, OF TOMPKINS.

Mr. President and Ladies and Gentlemen:—The history of the production of cheese in the United States, is a history of progress and development. From small begianings it has steadily increased till it has assumed a magnitude of immense proportions. The low price of land has so kept down the cost of cheese as to make it a cheap luxury, and from its cheapness there has arisen a large demand for home consumption. Formerly it was all consumed within our own borders. So lately as 1850, out of an annual production of 110 millions of pounds, 100 millions were consumed by our own people. But lately a demand has sprung up abroad for our goods, which with the introduction of the factory system, has expanded its production beyond all precedent. We are now manufacturing the enormous quantity of over 200 millions of pounds annually. It is evident that such a vast amount could not find a market at home at remunerating prices. Over one-fourth of this amount is now consumed by other nations; and it is on this export demand that we are now dependent for living rates.

It behoves us to study the requirements of that demand, and to adapt our cheese to its necessities. But it is notorious that we are not fully satisfying the requisitions of our foreign market. The best English cheese outsells the best American cheese by about one pound sterling per hundred weight.

While some of our goods sent abroad would be accounted good in any market, much that appears excellent when it leaves the factory loses its excellence before it reaches its destination. We are not realizing for our products what we ought; and we are without mercy in a crowded market, from the perishable nature of our goods.

The early decay of American cheese, which has become an acknowledged fact, is, I have no doubt, the result of a variety of causes. Among these causes may be named, bad and excessive rennet, light salting, light scalding, new or uncooled milk, diseased milk, putting the curd in the press while too warm, curing too rapidly, &c. Each of these, doubtless, has its bearing upon the general result, but to no one of them do I believe the early decay of American cheese wholly belongs. Recently the opinion has been gaining ground that the use of new milk, or milk that has not been cooled, is the main cause of a too early maturity. All milk must be warm when curded; but new or uncooled milk is supposed to differ from that which has been cooled, in two important particulars, viz: in containing a peculiar heat, called *animal heat*, and a peculiar odor, called *animal odor;* the two in some way so blended together, that the removal or retention of one, carries with it the removal or retention of the other.

In answering the invitation to assist in opening the discussion on the topic before the convention, I propose to confine myself to the consideration of these particulars, and leave to those more familiar with them, the other causes of decay.

And first, Animal Heat. What is it? Is it any different from any other heat? In the opinion of many intelligent dairymen, and of some agricultural writers and editors even, there *is* something peculiar in the warmth of newly drawn milk, that is very efficient and controlling in the production of bad results; and that, as before stated, it is intimately and necessarily associated with the odor that accompanies such milk; and this opinion is strengthened and confirmed by observing that when the natural warmth is removed, the aforesaid odor disappears with it. The inference is then very natural that animal heat is the prime instigator of all the injuries that are supposed to follow the use of new milk; and that its removal implies also the removal of the odor, and is all that is necessary to prepare milk for the hands of the cheese-maker.

In opposition to all this we were last year assured by Professor Brewer, that animal heat does not differ from any other heat; that all heat is essentially the same; and all chemists whose authority is worth consulting tell us the same thing. In the face of these conflicting opinions I have preferred not to follow either implicitly, but to determine for myself, first, whether the heat and odor are inseparably connected; and secondly, if they exist independently of each other, what is the capacity of each for evil. By abstracting the heat rapidly by an application of ice and cold water, I easily succeeded in removing the heat and leaving the odor in the milk. It is true, that in experiments for this purpose, the odor was not so apparent to the olfactory nerves as to the organs of taste. The animal *odor* became an animal *flavor*. But upon warming the milk again, the odor revived. Then, by the use of a filter of pulverized charcoal, I succeeded perfectly in removing every trace of animal odor from milk when first drawn, and leaving the animal heat in the milk. These experiments fully satisfied me that there is no necessary connection between the two, and furnished satisfactory evidence that the former does not differ from heat derived from other sources. Instead of using the phrase "animal heat," we may as well drop the term "animal," and inquire what effect heat has upon newly drawn milk. But the effects of heat upon milk are so well known, that I need not waste many words, nor the precious time of this convention, in answering this query. Everybody knows that heat hastens the development of acidity and the decomposition of milk, and the higher the temperature the greater the effect. This is true until we approach 170 degrees. But above that temperature those effects are, for a while, retarded. I will not stop to explain why the results are different above and below the degree named. It might interest the curious, but it is not necessary to the discussion of the subject under consideration, so I will let it pass, as we have been admonished to be brief.

Now, what of the odor that accompanies new milk? What *is* it? Whence is it derived? Is it something that necessarily constitutes a part of the milk? Or is it something that like milk is formed out of the elements of the blood? No; it is not either. It is, I apprehend, derived from the waste material of the cow's body.

Animal bodies are constantly undergoing change. A steady supply and waste are necessary to existence. Food is digested and carried to

every part of the system, and so vitalized as to become a part of the living structure, and when it has served the purposes of life it is cast out as waste and dead matter. Physiologists have demonstrated that a large portion of this waste is cast out in the form of gases. No part of the structure is impervious to the passage of these gases so necessary everywhere to be got rid of. All parts of the body are made open to their escape. All the liquid secretions of the body absorb them; they are cast out in the breath; and very abundantly through the pores of the skin. It is this gaseous waste, absorbed by the milk in the udder, and which escapes when drawn, that we recognize as the animal odor in milk. This is the material which we are carrying, shut up with the milk in cans, to our factories to be worked into cheese with which to supply our customers at home and abroad. This is the agent to which, I believe, may be ascribed, nearly, if not *all* the evil consequences that arise from using new milk.

Let us now study the nature of this odor and trace its results. Being derived from the changing elements of the cow's body, it must be similar in composition to the gases arising from other decomposing matter, and like it, infectious. It is in *fact* infectious. Confined in warm milk it soon induces taint. There can hardly be a cheese-maker in any of our factories, that has not seen instances of this kind to his regret. They are of frequent occurrence, and are the direct effect of the gases in the milk, and not of the natural warmth, as many suppose; for if the gases are removed, and the milk is kept warm, and in other respects treated the same, it will not *taint* but will become *sour*. Milk with the odor out, has, in my experience, invariably *soured* instead of *tainting*.

The quantity of gas in milk is probably not very large, but it is efficient in action. At previous meetings of this Association, it has been repeatedly said, (and all observing cheese-makers know it,) that milk curded before it has had time to cool, makes the cheese strong and unpleasant in flavor, porous in texture, and much inclined to huff. I have never had the privilege of inspecting cheese in foreign markets, and not very extensively in our own, but I am told by those who have, that this style of cheese is liable to premature decay. This is true to the extent of my observations, and it is equally true that, other circumstances being equal, where the most efficient means have been employed to remove the disturbing element, the cheese has been the least liable to huff, and of the cleanest flavor, and least affected by time.

But there are those present who have had better opportunities for observations of this kind, and I appeal to them to enlighteen us on this point. But I have hardly a doubt that they will corroborate my own observations, nor have I any doubt that the mind of the dairying public is setting in the right direction when it ascribes to some agency in new milk, a leading cause of the early decay in American cheese.

Having shown whence that agency in milk is derived, what it is, and pointed out its tendency to induce change and decomposition in both milk and cheese, I shall probably be expected in the next place to suggest some efficient means of getting it out of the milk, or of neutralizing its

effects. But I prefer not to respond to that expectation now. I propose to study a little further the peculiarities of this disturbing agent. I have said it was gas in the milk. Being in that form, it is like other gases, subject to certain laws, one of which is expansion and contraction from a variation in the temperature. Though all gases do not expand and contract just alike, yet they all expand with heat and contract with cold. The gas in new milk follows this law. By an increase in temperature its elasticity is rapidly increased, and by a decrease in temperature its elasticity as rapidly diminishes. This fact is very suggestive of the treatment milk should receive. At 90 deg. its elasticity pushes it slowly through a body of milk, and when it reaches the surface, by the law of the general diffusion of gases, it is taken up by the atmosphere and conducted away. It is hardly necessary to remark that its exit would be facilitated by stirring. If the temperature be raised to 10 or 20 degrees above blood heat, its elasticity will be so very much increased, that but little stirring will be required to cause its escape. But drop the temperature below blood heat, and it diminishes in elasticity as the temperature falls, till it has not power to escape; or, what is more probable, is condensed into a liquid; for it will remain in the milk for a long time if kept sufficiently cool. Because the "cowey" smell has died away when the milk is down to 70 deg. or below, it has usually been supposed that the odor, or *cause* of the odor, was wholly removed. But it is by no means necessarily so; for unless the cooling has been very slow, or the milk has been spread so thin as to make the exit of the gases easy, the cause of the odor, the condensed gases, will be there and be readily detected by the taste; and at 50 or 60 degrees it will remain there till the milk sours. The "cowey" flavor is most effectually preserved when milk is cooled in a close vessel, shut out from the air, and the heat absorbed away by an application of ice or cold water. For reasons before stated it is unphilosophical to cool milk in this way, and yet it has its merits. It is better to have the gases all in, than to have the milk either tainted or sour.

The gas in milk varies both in quantity and relative effect. For instance, it is in the smallest amount when the cow is in good health and quiet. It is more abundant when actively exercised, as when sharply driven to the yard by dogs. It needs but a little hurrying, especially in the morning, to make the effect apparent in cheese. It is different in health and disease; and very abundant and very infectious in cases of fever. There is more in a state of debility than in strength; and more when pinched with cold than when comfortably warm. The most marked effects that I have observed have been produced by the odor of milk from cows in a feverish state—a state that may generally be detected readily by smelling the milk. It becomes so infectious that a small quantity—the milk of a single cow even—will infect a whole vat full of good milk. In connection with the rennet, it becomes a ferment, inducing rapid changes in the milk and curd. New gases are evolved, which, becoming more elastic as the temperature is raised, swell out the lump of curd, giving them a soft spongy feel, till at length their bulk is so much increased that they float on the whey. A vigorous action is now going on in the

curd; the work of decomposition is fairly begun; the solid structure of the casein is broken down, making the cheese appear salvy and rich. At first it huffs badly from incipient decay; but after a little the development of acidity will check the huffing, and the cheese will behave better. This state of things may, to a considerable extent, be counteracted by means which, I have no doubt, will be fully described in the discussion on floating curds; but I do not believe that cheese from such milk can be long saved from decay.

But perhaps some one will say, "this is the result of diseased milk; it is not chargeable to animal odor; the milk itself is faulty." I once thought so too, but I have found since that I was mistaken. In the worst cases I have seen, the milk, for aught I can discover, is of itself, as good as any other. It may be somewhat altered in the proportion of its elements—perhaps it is—but it does not differ materially from other milk when new. I filtered a sample of feverish milk last summer in the forepart of August, when the weather was so very hot and dry, and floating curds were so very popular. The result was very striking. The filter was all ready and the milk turned in as soon as drawn, and though it stood at about 90 degrees when it issued from the filter, it was free from any offensive odor, and its flavor was delicious. It was in perfect contrast with its former condition, and also with the same kind of milk cooled by ice water to a much lower temperature. This charged the fault back upon animal odor. It was nothing else than animal odor in its worst forms, and in increased quantity, derived from the excessive waste of the living structure, occasioned by the depressing influence of the long continued hot weather, and the use of scanty and stagnant water.

There are other peculiarities about this odor in new milk, which it might be interesting to notice, but I have pursued the investigation as far as is necessary to the subject before the convention, and I will close with a few words in answer to the query that seemed to suggest itself in the earlier part of my remarks, viz: How shall we get rid of this odor, or neutralize its effects? I need not add many words for that purpose. The remedy is suggested by what I have already said. The first thing to be done is to give the gases from which the odors arise a chance to escape as soon as possible after the milk is drawn, for the reason, firstly, that they are then most elastic and escape most easily; and in the second place, to keep them from imparting an influence to the milk by their presence; and then the milk cooled to prevent souring. The reason for doing this at the dairy is that it is generally a little too late when the milk gets to the factory. There is a variety of ways for deodorizing and cooling milk, as the devices on exhibition for that purpose indicate. But whatever means are employed, a thorough exposure to the air should be involved in the process. It is the air that takes up and carries away the odor. It can be imparted to nothing else.

It is this gas in the milk, rather than acidity, that we have to contend with in striving to lengthen out, so to speak, the life-time of our cheese. Acidity may affect flavor, but it does not hasten decay. It is the infectious gas or odor that does the destructive work in new milk, and it must

be got out to be avoided. It is not sufficient, especially in hot weather, to *conceal* it, as may be effectually done by cooling without a thorough atmospheric exposure; for if it is retained in the milk by condensing, it will be there to work its legitimate effect upon the first favorable circumstance for its development. There will be nothing gained to the keeping qualities of our cheese unless this point be regarded. You may get milk to the factory in apparently the finest condition, with the gas in, by keeping it cold, but when you come to scald your curd you will find that the heat will cause the condensed gas to resume its elasticity, and its escaping be evidenced by the "cowey" odor of your scalding curd; and the leaven which has thus been carried into the cheese will hasten its early decay, if it ever falls into circumstances that favor its development. This will be especially true when there is anything of a feverish or diseased condition about the milk, and will be the least seen when the cows are comfortable and quiet.

The next thing I would suggest is, that the cows be kept in perfect health and furnished with a supply of wholesome food and pure water, and be kept quiet. This will reduce the odor to its minimum both in quantity and effect. Warm milk when thus produced, though not in its best condition for making cheese for long keeping or of the finest flavor, will produce a good cheese and one that would not be very seriously objected to. But there is but very little milk thus produced. The artificial circumstances under which domestic animals are cared for, are seldom such that they do not in some way deviate from the requirements of perfect health. Dairymen ought to feel themselves constrained to keep their cows in perfect health from high moral considerations, as well as from motives of interest; they may be scattering the seeds of disease by a vitiated product, as well as injuring the financial value of their goods.

REMARKS OF DR. L. L. WIGHT, OF ONEIDA.

The vast interests clustering around the manufacture of cheese in America at the present period of time, demand that we aim to remove every possible barrier to the procurement of a most perfect article.

Long practice has given the experienced manufacturer such knowledge and skill as to enable him to procure rennets taken from calves of the proper age and condition, cured and preserved in the most scientific manner; to set the milk at the most favorable temperature, using the true quantity of rennet and coloring material; to raise the heat to the required point, using therefor the most judicious length of time; to cut and manipulate the curd neither too little nor too much; to retain the curd in the whey until it attains the proper acidity, and the hard, shotty feel readily detected only by the experienced, as distinguished from the soft doughy feel which will always make a porous and ill-flavored cheese; to salt and put to press at the best temperature; to use hoops which will not allow the curd to press up between the hoop and follower, or down between the hoop and press-board, perforated by small holes to admit of the free egress of the whey at all points, constructed so as to allow the cheese to

be easily removed; to press until the whey is all extracted from the curd; to preserve the just medium of humidity and temperature in the curing house, and to perform all such other skilful attentions as are requisite to secure a first quality of cheese.

But few factories have as yet been enabled—especially during the extremely warm weather—to obtain all the milk delivered at the factory in a clean, sweet, cool and perfect condition. The patrons, inexperienced as most of them are in the manufacture of cheese under the complex and unfavorable conditions of the factory system, cannot be expected to judge accurately of all the precautions necessary to the procurement and delivery of a perfect article of milk. Care must be taken that the cows do not have access to any foul weeds, seeds, or feed of any kind which may taint the milk. The utmost cleanliness in the process of milking, and in the protection of the milk, and in the cleansing of all pails, cans and other utensils used in the dairy (which pails, by-the-by, should always be of tin), is an essential pre-requisite for pure milk. The protection from rain at all times, and from the heat of the sun when being transported long distances, should not be disregarded. It may not be thought necessary to any of our American farmers that the success of our factories demands that they should rise in season in the morning to milk and get their milk to the factory by at least nine o'clock, A.M., and although industry is to be commended, yet it would seem that the farmer had worked late enough if he should get his milk to the factory by nine o'clock, P.M.

The great desideratum, however, in the present progress of the cheese factory system seems to be, to institute the cooling of the milk to 65 or 70 degrees, especially in the spring and in warm weather, both night and morning, before sending it to the factory.

The multiplied experience of the last few years satisfies us that, even if all the other requirements are assiduously complied with, and this neglected, the milk will not be perfect and cannot be transmuted into a first quality of cheese. Of course the quantity of milk accumulated together, the time elapsing before its delivery, and the temperature of the atmosphere by which it is surrounded, all tend to modify the condition of the milk when ready for use. A quantity of milk at 100 degrees temperature, and even over, surrounded by an atmosphere from 80 to 90 degrees, and remaining in this condition from one to three hours, will in my experience become so decomposed, not necessarily soured, as to forbid the making of cheese therefrom without some one or other of the following unpleasantnesses resulting.

There will be a foul, disagreeable, repulsive, smoking, choking, suffocating exhalation emanating from the can immediately on removing the cover. The chances are that on raising the heat to 90 degrees or thereabouts, the decomposition will have so far advanced that a formation of gas takes place in the curd, which thus becoming lighter than the whey, you are greeted with the disagreeable phenomenon of seeing your curd suddenly rise to the top of the whey, emitting a noisome effluvia, and presenting a soft, sticky and unwholesome appearance, defying any amount of skill and patience to again reduce it to a proper, consistent, wholesome,

laudable curd. Such curds may be restricted to their old place by over-salting, or they may be improved by the immediate application of the acid of sour whey, and also perhaps by a number of other processes, but the making a good cheese of them is an impossibility. On being removed from the hoop they will naturally increase their former dimensions by rising from one to three inches, as if to show you the "irrepressible conflict" always attendant upon the violation of nature's laws. Remove these things to the dry house and they will lean and sway and roll about to the infinite disgust of all decently behaved cheese in the neighborhood. You will next find them cracking about the edges, and the flies will find a splendid place to raise a multitudinous brood of those little jumpers. On boring such cheese they will be found exceedingly porous and much off in flavor, and you will be fortunate if you dispose of them at a discount of from one to three cents per pound less than cheese made on the same days and by the same method, but from milk carefully preserved. To ascertain the best kind of cooler for farmers to use is now a great desideratum. I find there are quite a number of patents for this purpose, but most of them are objectionable from their complexity and difficulty of cleaning thoroughly. What is needed is some simple invention by means of which the milk may shortly be reduced to 65 or 70 degrees of temperature, and be kept as low until delivered at the factory, and the implement used must be easily handled and readily cleaned.

I venture to affirm that with exercising proper care in preserving the milk clean and cool, with the skill which experience has already given American dairymen, there need be no complaints by either buyers or consumers, of cheese being either porous or possessed of that other fault which of late seems to take precedence of all others, the "off in flavor" that buyers complain so much about, and which seems to be the chief fault with cheese of American manufacture, and which in my opinion can be obviated by preserving the proper temperature of the milk and the dry house, and by that only.

REMARKS OF DR. AMOS WESTCOTT, OF ONONDAGA.

In responding to this unexpected call to speak upon this important topic, I am more than doubtful whether I shall be doing either this audience or myself justice. My experiments with milk have hitherto been confined to this article with the view of producing the best quality of butter from it, and with reference to this purpose, I have probably made as many experiments as any other single individual; and, believing that the same general rule as to its treatment will hold good with reference to producing from it a fine article of cheese, which shall have the property of retaining its good qualities for any length of time, I shall venture a few remarks upon the subject under discussion, viz: the importance and best method of cooling milk, and so far as we understand it, the rationale of the effect produced. It seems to be a foregone conclusion on the part of dairymen, perhaps universally, that milk, during hot weather at least, should be cooled as soon as possible after being drawn from the cow,

from its natural temperature, about 98 degrees, to that of 60 degrees, or not more than 65 degrees, and I will simply state that this conclusion fully accords with that which my own experiments dictated in reference to butter-making. So much for the fact or necessity of thus treating milk before hoping to secure the best results in either butter or cheese-making. But what changes in the milk are thus produced, or why it is thus better fitted to produce a perfect article of cheese, there seems to be some difference of opinion even among those best informed upon the general subject. It has been said by those who have preceded me that this good effect is secured "by driving off the animal heat and animal odor," and the question has been seriously raised as to whether animal heat was different from other heat, or whether there was something peculiarly deleterious imparted to the milk by this heat, because it was generated in and by the animal producing the milk. It strikes me, however, that this question is hardly worthy of serious consideration. There can be but one kind of heat in its effects, however it may be generated, if its application be made to any given substance under the same circumstances. The effect of cooling of course disposes of the animal heat of the milk. It likewise somehow disposes of the animal odor, upon the baleful effects of which there has been no little stress laid as the great agent of mischief in cheese-making.

Let us then carefully consider the "animal odor" question, and inquire how it becomes the scape-goat, bearing away the sins of the multitude when it is "driven off." Does this animal odor come off a vapor or gas which is sent off bearing with it effete matter, or, as has been said, "the waste material of the animal?" or is it simply the natural odor of the milk, harmless and inert in its qualities. The very method taken to dispose of it does much toward settling this question. What would be the method of driving off any gaseous substance contained or suspended in any fluid? Would it be by cooling that fluid? Clearly not. It is a universal law in regard to all the gases which are capable of being absorbed by fluids (and most of them are), that the lower the temperature of the fluid, the greater amount of gas they will absorb, and hence the cooling process is the last one in the world that would be adopted to drive off this animal odor, if it be a ponderable agent, and capable of evaporation. On the contrary, the cooling process is the very one we should adopt with an opposite end in view, and such is unquestionably the fact as regards cooling milk. If, therefore, there is latent mischief in the animal odor of the milk, and the cooling of this fluid can only tend to fix it, instead of driving it off, this treatment of milk must be the worst possible course which could be adopted. Hence, instead of recommending it, it should not only be discouraged, but abandoned. But actual and varied experience has decided that it is highly beneficial, and hence are we not driven to the conclusion that even animal odor is to a large extent simply a bug-bear, and its existence as a destructive agent a mere myth? I will simply add, under this head, that did I for one moment believe such to be the true theory, my process to get rid of this "bad odor" would be to raise the temperature of the milk as high as possible without actually altering

its qualities, and at the same time powerfully agitate it in the open air. Nor are we forced to any such conclusion for want of ample and far more rational ways to account for all of the phenomena this agent has been supposed to produce. The fact is, and one which covers the whole ground, that in very warm weather, (and this is the only time when this odor is supposed to do any mischief,) putrefactive fermentation commences the very instant the milk leaves the cow, and there are several authenticated cases where it commenced previous to milking. This process not only commences, but is suffered to go on, although perhaps it may be imperceptible to the senses, for hours before the play of chemical affinity is arrested by the peculiar treatment it receives in cheese-making. That some chemical change commences in the milk the moment it leaves the cow, is proven by the *gradual* rising of the cream to the surface. Cream is simply the butter globules mechanically suspended in the milk, and would be held there were there no change in it by temperature and exposure to the atmosphere. When such a change commences to release them, these globules, by their specific levity, commence to rise, and as this change progresses the rising process of cream continues, till the entire cream comes to the surface. Now, if we are to suppose that they come to the surface by reason of their comparative lightness only, then the cream should all rise at once, as would a cork when submerged in water. Now, be it remembered that all this change is going on while the milk is perfectly sweet, and gives no indication of its existence except the physical one above alluded to. Do not these facts render it possible, nay probable, that other changes, including incipient putrefaction, may commence and progress, and yet not be apparent or even detectable by the senses? Of this there can be no doubt, and it is to this that we may, with as little doubt, ascribe the early decay of the cheese which is made from such milk. The great opposing principle to vitality—to life itself—is chemical affinity, and whenever the former is lessened or destroyed, chemical affinity correspondingly asserts its sway, till the fairest form becomes a shapeless mass, or is converted into the most odious gases.

Next, as to the best means or method of cooling milk on the farm before it is transported to the factory. Every arrangement for this purpose should have, as cardinal points, cheapness and simplicity, combined with efficiency, going upon the supposition moreover, that, generally speaking, *water* will in the great majority of cases be employed as the cooling agent, in order to secure the greatest cooling effect of water in the least time and with the least amount. To secure to the fullest extent such a result, *the cooling medium must be applied to the upper surface* of the milk to be cooled. It is a well-established principle or law of heat, that fluids cannot be heated from the top. Any amount of heat applied to the top surface of a vessel of water would not affect its temperature to any perceptible depth. It is equally true that fluids cannot be cooled by applying the cooling medium wholly to the bottom surface. The cooling medium may be applied, as above indicated, in a very simple and easy way, by passing a stream of cold water through a buoy which rests upon the surface of the milk in the can in which it is to be transported, and which

will rise as the milk is from time to time poured into this can. This stream of water need not be constant, but the water from time to time poured in will serve to effect the object in a sufficiently short space of time.

Any one who has not tried this experiment will be astonished to see how small an amount of water, comparatively, and how short a time will be required to bring the temperature to the required standard—say from 98 to 60 degrees of heat. In an experiment which I carefully performed to test this question, I found that a can of milk which was changed from 95 to 60 degrees in 35 minutes, required more than three hours to effect the same change when left to stand in the same room, which was kept at the same temperature, about 60 degrees. The amount of water employed could not have exceeded the amount of milk thus cooled. This float should not cover the entire surface of the milk, as free access should be given to the air during the process. I give this as a reason for leaving such space, instead of saying that such space is left for the escape of noxious vapor, which I do not believe to exixt in the milk, unless putrefactive fermentation has commenced. If an explanation of this contact of air is demanded, I may be obliged, with only my present knowledge and observation upon this subject, to deal rather in generalities than to give a specific explanation. One thing is well settled, which bears strongly upon this solution. It is well known that if milk have the air fully exhausted from it, and it is thus kept, treated as is fruit in the process of canning, it will remain unchanged for almost any length of time, in its normal condition. The only reason why milk does not sour in the bag of the cow after it is fully finished and evolved by the secreting vessels is, that it does not contain air within its structure, and is kept wholly protected from the external atmosphere. I shall attempt no more specific explanation on this occasion to show the good offices of the air during the process described for cooling milk. After the milk is cooled, it is still to be transported to the cheese factory—it may be a half-dozen miles. To retain the temperature which we have thus gained, some provision is required. This may be easily accomplished by surrounding the can with a thick covering of cloth, and thoroughly wetting it. This serves a double purpose—it is a non-conductor of heat from without, and by the constant evaporation from the surface, cold is produced. This covering, hence, of itself, becomes an important cooling medium.

The milk cooler exhibited to this Association by L. T. Hawley, of Onondaga, and to which he has recently added and patented important improvements, seems to me to meet fully all of these indications.

REMARKS OF JOSEPH B. LYMAN, ESQ., AGRICULTURAL EDITOR OF THE N. Y. TRIBUNE.

You are right, gentlemen, in giving to the subject of the cooling of milk your special attention. The difficulties you complain of, huffy cheese, floating curds, and defects of flavor, are mostly due to the peculiarities of our climate. The English taste has been educated by the English climate.

They are insular; we are continental. There is no month in the summer during which the Englishman does not at times kindle a fire in his grate, and no winter month in which he cannot do some ploughing. This cool, moist condition of the air gives them a mellow, smooth-flavored cheese, and they require similar qualities of our dairies. But we have extremes of heat and cold to contend with that I need not describe. For this reason I do not believe the hill country of the South will ever send out a cheese acceptable to English palates. For the same reason it behoves the dairy farmer to study all the available means for cooling milk, and for softening the severity of our summer suns, especially when they fall on cheese houses. Last summer I served on a committee appointed by the American Institute to test a milk cooler and make some experiments with cooled milk. We went up to Warren Leland's farm, 25 miles north of the city. He milks 44 cows and uses their milk at the Metropolitan Hotel; he has found more difficulty and met with more annoyance and loss from sour milk in hot weather than from any other drawback in the dairy business. At one time he poured his milk from the third story into vessels on the ground. Then he built an expensive stone spring house, and sinks his cans in water at 53 degrees temperature as soon as they are filled at the stable. The cooler we tried was invented by a man in Illinois, and consisted of a common tub with about twenty feet of lead pipe coiled over the bottom, a funnel to pour the milk into the tube and a spigot to draw it off.

The day was very hot and close, thermometer standing in the barn at 87 degrees. The tub was filled half full of ice, and several pails of milk poured into the funnel as the milkers came from the stalls. A common pailful of milk runs through in less than five minutes. We held the bulb of the thermometer where the milk from the spigot poured over it, and the mercury at first fell to fifty degrees, then, when the ice somewhat melted, to 52, 55 degrees, and higher till more ice was added. We drew off two gallon glass jars of milk, filling one with cooled and the other with uncooled, and set them both on the parlor mantle in Mr. Leland's house. This was at five o'clock in the afternoon. The jars were undisturbed all night. At six the following morning the jar of cooled milk showed a stratum of cream about an inch thick. It was now churned, cream and milk together, and made the best of butter. The milk remaining after the butter was removed was not buttermilk, but as sweet, pleasant flavored milk as one ever drank. The uncooled milk had curdled with a thin film of rather badly flavored cream on its surface. The cooled milk gave off no bad odor at all. The other jar emitted the peculiar rank smell of warm milk in very hot weather. The cows were grazing on a cool, sweet pasture all day, and none of them were sick or in any respect feverish. The time was the last of June. These experiments and others, not unlike them, conducted by Mr. Leland and the owner of the milk cooler, brought us to certain conclusions with regard to milk in hot, moist weather.

I. Two months in the year, on an average, this climate is too hot and sultry for dairy business unless special pains in cooling the milk are taken.

II. Reducing the milk to between 50 and 60 degrees as soon as it comes from the cows, purges it of the objectionable odor and flavor, and that odor and flavor does not return, although the milk may stand for many hours in a temperature above 80 degrees.

III. The contact with air obtained by letting a stream of cooled milk fall a few inches from a spigot into a can is enough.

IV. After the milk is thus cooled, the cream rises well, and will, when churned, make excellent butter in dog days.

V. There are many ways of getting the milk in contact with a co ld surface. The best milk cooler need not be costly. Any farmer with good mechanical gumption can fix some contrivance by which he can reduce his milk down to 60 degrees, or thereabout, in the hottest weather.

The conclusion to which I am led is that in our climate, especially as we supply an English market and must suit it in order to get good prices, the dairy farmer should have one of three things in order to make good cheese all summer. 1st, a spring of cold water with some contrivance for cooling milk by contact with a cool surface made so by the water; or 2nd, a well stored ice house; or 3rd, a deep cellar, so cool and yet so dry and sweet smelling that he can keep his milk there at a temperature of about 60 degrees. Moreover, our climate requires cooler cheese rooms than we have. The walls should be of stone, and they should be shaded so that the make of July and August may not ripen so fast, and take on that twang which many consumers in this country do not object to, but which spoils it for the English mouth.

REMARKS OF EX-PRESIDENT PETERS.

Ex-President T. C. Peters, of the State Agricultural Society, said that in "swinging round the circle of life," he had made some observations on cheese and butter-making, and on cooling processes. He spoke favorably of cooling milk by the aid of well water. He did not consider ice of great importance, and preferred to get along without it, both in making cheese and butter. He approved the ideas uttered by Dr. Wescott. Milk cooled to the temperature of the atmosphere is enough. Under ordinary circumstances, where milk is to stand, as in a spring house or in a dairy room, it will not do to cool milk below the temperature of the room where it is to stand. If below the temperature when reaction takes place, the milk becomes sour much sooner than when cooled to the temperature of the surrounding atmosphere. There is no finer dairy region on the continent than Central New York.

Mr. Peters said he happened to be on the committee which visited some of the dairy establishments around Philadelphia; he saw and tasted good butter. The reason why butter made in that region had such good reputation was because there was comparatively little real good butter went into their market. The prejudice for particular names made butter sell higher. He had seen quite as good—even better—butter in nearly every county in this State. A neat dairy-woman, and cows fed on old white clover pastures—not too dry or too wet and spongy—would be sure to produce butter of the highest quality.

As a general remark, Mr. PETERS said that dairy-making would ultimately transfer much of its importance to the South. Especially would it be the case when Yankees transferred themselves there.

REMARKS OF MR. G. W. DAVIS, OF HERKIMER.

One important point is in the handling of milk at the farm in the heat of summer. At the last year's Convention a gentleman from Canajoharie, (Mr. Burnap) presented an apparatus admirably adapted to do this work, when honestly and faithfully applied. But there arose, and justly too, an objection to its use, because it offered great facilities for watering or diluting the milk. To my mind, this tampering with the milk is one of the weakest points in our whole factory system. Not that I have any cause individually to complain of my patrons, but others have had, and may have again, hence the necessity of our adopting the best possible mode to discourage any one from trying the experiment. In the Herkimer County Central Factory, we have a clause in our By-Laws making the Lactometer evidence under the following conditions, viz: when any milk will not stand the test when compared with milk known to be pure, the President is authorized to appoint a committee of three, whose duty it is to observe the milk in its passage from the cow of the delinquent to the factory; when if it is found to stand at par, the party in question is deemed guilty of having diluted his milk the previous day, in the ratio as it is found to vary from the average standard. This By-Law has worked to our entire satisfaction; and I should be glad to have this, or its equivalent, enacted into a State law, as it certainly works no injury to any, but on the contrary, great good to all.

REMARKS OF MR. A. BARTLETT.

Mr. A. BARTLETT, of Ohio, said he was in hopes the last speaker had slandered the dairymen of the State of New York. He had hoped the farmers of the Empire State were certainly as honest as those of the Buckeye State. He thought the putrefactive fermentation of the albumen of the milk was the greatest difficulty in the way of the manufacture of good cheese. Cooling the milk as soon as drawn from the cow will remove the danger of this fermentation, and when this danger is removed, the problem is pretty well solved. He had always had the greatest amount of trouble from the evening's milk. Where whey is taken home in the milk cans, impure milk is almost sure to come to the factory. He had refused to be associated with any factory where this was practised. He had found that trouble arose when cows inhaled bad odors. Several questions were asked, which Mr. BARTLETT answed to the apparent satisfaction of the questioners and the Convention. He soaked his rennets in whey. Tainted milk, in order to be used at all, must be soured.

THE CHEESE MARKET OF 1868.

ADDRESS OF JOHN M. WEBB, ESQ., OF NEW YORK.

Mr. President and Gentlemen: During my recent absence in England, I received a letter from your excellent Secretary, asking me, in very flattering terms, to prepare a short paper for this meeting of your Association. I was pleased to receive that invitation, partly as a proof that the few observations which I had the honor of submitting to you at your last year's gathering had met your acceptance, but mainly because I took it as a clear indication that you do not sympathise with the harsh remarks then made about that body of merchants of which I am in some sort the representative, namely, the shippers of cheese from New York to the English markets. Believe me, we shippers are *not* the enemies of the farmers in general, and of the dairy in particular, that we have been represented to be. On the contrary, many of us have done good service in your cause. For years we have labored hard, with no thanks, and but scanty profits for our pains, to introduce your improved production of American cheese to a better class of trade, and to obtain for it that recognition on the part of the consuming public of Great Britain which its intrinsic excellence deserves. I repeat, some of us New York shippers, and our friends in England, have expended much trouble and labor to this end. It is true that our interest was concerned in the matter as well as yours, but it is not just, and it certainly is not pleasant, to find ourselves denounced and misrepresented by those who, having borne comparatively little part in the heat and burden of the day, come into the field at a later hour, and claim nearly all the merit of that healthy and promising position which the product of your cheese factories now occupies. I pass from personal topics, and have now to offer to your notice a few observations as to the present position and future prospects of American cheese in the English markets.

The season just closing has been unprecedented in character, and in marked contrast to the ones immediately preceding it. Last year, at this time, we had to report to you a dull and declining market, with full stocks of cheese on both sides the Atlantic; this year, stocks are everywhere light, and the market wears a firm and healthy aspect. Last year one of your most prominent speakers expressed his fears that you were on the high road to over-production, and consequently ruinously low prices; to-day, in looking back on the closing season, you must confess that prices have at least been *fairly* sustained, and you know better than I can tell you whether your cheese-houses are encumbered to any extent with surplus or unsaleable stock. A brief review of the current season will enable us to account for this changed position of affairs. Last season wound up badly, with heavy stocks left over, both of American and English cheese. Holders of the latter, with a keen recollection of their disastrous experience of the previous year, were determined to clear out before the hot weather should set in. Dealers in American had no option but to drop their prices in correspondence to the decline in English cheese, and hence

it was that some rather heavy purchases made in New York during the months of February and March resulted in a smart loss to the over-sanguine shippers. The trade in England, occupied in the disposal of these heavy stocks of old cheese, were much less eager than usual for early shipments of the make from this side of the Atlantic. In a certain sense this was well, for your fodder cheese last Spring was not only short in quantity, but for the most part very poor in quality. It was not till we were fairly working on the grass cheese that we had any active English demand. From that time out we had a flowing trade, which continued until the English dealer and English consumer alike began to get a surfeit of that strong-flavored, loosely-made, bad-keeping quality, which was the universal characteristic of your July make of cheese. This inferior quality was doubtless largely owing to the intensely hot weather then prevailing; but whatever the cause, your very serious attention should be directed to the discovery of a remedy, for not one single dairy, as far as my personal experience and pretty full inquiries extended—not one single dairy stood the test of that most trying month. Even those dairies of which I spoke last year—dairies that for a series of years have been always and uniformly excellent—did not hold their own last July, but proved, in the matter of flavor and keeping-qualities, to be no better than the great majority of your State factories. Thus, about the beginning of September, the markets of London and Liverpool were full of badly-made, strong-flavored cheese, of which both dealers and consumers were heartily sick, and there was a general outcry for some rich, closely-made, clean-flavored cheese at any price. Let us now see in what position was the English farmer for supplying this demand.

Up to the middle of June the season in England was most favorable for dairying, and the make of cheese there was, perhaps, the largest ever known. Then came a drought, unprecedented for severity of duration. Under its blighting influence the make of cheese had fallen to one-half of an average by the middle of July. When, toward the latter part of August, the longed-for rain did at length come to the rescue, the pastures recovered with unexpected rapidity, and from the middle of September to November 1, there was a fair, but not an average make of cheese of good quality, which will probably be brought to market about February or March next. Some very sharp frosts closed up cheese-making by November 11. To recapitulate. Up to the middle of June we had a very large make in England; by the middle of July it had shrunk to one-half an average; by the middle of September it had recovered, and to the 1st of November was fair in quantity and good in quality. The decrease in the make was, however, by no means the only consequence of the unexampled heat and dryness. Not only was the quantity short, but the quality was worse than had been seen for many years, and added to this was the unfortunate circumstance, that very much of the early make, which I have described as being both abundant and good, was spoiled on the farmers' shelves by the excessive heat. Hence a clean-flavored dairy of English cheese was very hard to find—in fact, really choice quality was never so scarce—and of course for his diminished make, inferior

though it might be, the farmer naturally expected an increased price. You will thus see that the English makers were in no position to satisfy that demand for fine mild-flavored cheese which was so eager and so general. We had no resource but to see what the American dairymen could do for us, and I am happy to say that we did not turn to them in vain. Your August and September make of cheese proved to be of unusually fine quality. I am only repeating the opinion of those best qualified by experience and observation to judge on this point, when I tell you that never, since the factory system was inaugurated, has there been so large a selection of fine and almost faultless American cheese as was presented in your August and September make. Not only did most of the standard favorites regain their character and resume the position they had lost in July, but the general quality of the make in all parts of the State was vastly improved; dairies of hitherto only second-class reputation turned out cheese that in point of style, solidity and flavor, was second to none. When this fine quality which I have been describing first reached the English market, its superiority was at once recognized, and considerably enhanced prices were conceded for it, but the keenness of the first demand once satisfied, the dealers strenuously resisted any further immediate advance. The result has been a quiet, but firm and gradually rising market ever since. While acknowledging the quality of the American to be equal to the best, and better than the bulk of the English cheese this season, it is with great reluctance that our English buyers pay anything like a full value for the former. It is, however, a great point gained that they admit the superiority of the American make, and that its recognition is being surely, even if slowly, forced upon the consumers of Great Britain. With little or no cheese left back in the country, and with a greatly reduced and rapidly diminishing stock in New York city, the season of 1868–69 promises to wind up with a complete exhaustion of stocks both here and in England. Hence the prospect for the new season is highly encouraging, and your energies should be bent not only in the direction of increased production, but to keeping up that production to the very highest standard of quality. In this way only can you maintain the healthy position you have gained for your factories. A great orator has said that "the price of liberty is eternal vigilance." In these days of competition and advancement, no less a price must be paid by those who would excel, or even keep their place in ranks of business, whether mercantile or manufacturing.

I have but little to tell you of other cheese-making countries. The quality of the Canadian cheese in the early part of the season was very disappointing. There was a great deal too much harsh, dry, and overscalded cheese, and where a dairy showed quality it was too frequently accompanied by a most objectionable flavor. But in August and September our Canadian neighbours, like yourselves, made some really fine cheese. The proportion of this sort was not so large, perhaps, as in your State, but the improvement was very marked, and the cheese, being nicely colored, is rapidly growing in favor with English consumers.

Perhaps no country in Europe suffered more from the effects of last

Summer's drought than did Holland, but at the same time no country recovered so quickly from those effects. Of course the make of Dutch cheese is short, but less so than could have been expected. The increasing demand from France has done nearly as much as the short make to stimulate prices in Holland to an extreme pitch; added to which, the quality, like that of the production of other cheese-making countries this season, was very much below an average. Scotland suffered far less from the drought than did either England or Holland. There was a fair, though by no means a full, make of cheese in that country. The consumption has been mainly on their own make, almost to the entire exclusion of the American article from the Scottish market. The shipments from New York to Glasgow, and the purchases in Liverpool for that city, have been unusually small. From Sweden no progress is reported in their cheese-making experiment. Their product, while showing much quality, and a beautiful style of curd, is characterized by a rank, strong flavor. But so important is this new branch of industry in the opinion of the Swedish Government, that they have sent a deputation to visit the cheese-making districts in England, and study the methods there in use, with the view of remedying, if possible, this great defect of flavor.

The competition for the favor of the English cheese consumer virtually lies between the products of the English farmer and that of your factories. In this connection I have a word or two to say on the subject of color. It is often asked, cannot we do away with the system of coloring, which adds nothing to the flavor or keeping qualities of the cheese—is even in some instances a positive drawback to both, and, above all, is a source of considerable trouble and expense to the manufacturer? It has even been said that if none of you colored your dairies the English public must perforce consume your white cheese! This would be a very cogent argument if you had exclusive command of the English market; but in your present active competition with the English farmer, the carrying out of any such policy would place you at an almost fatal disadvantage. During my recent visit to the old country I made particular inquiry into this question of color, and found that the area of consumption of dead white cheese was a comparatively limited one. I found less general disposition to insist on a very high color, but *some* color is indispensable for all, except one or two districts. The experience of my London friends is that their customers make less objection to a light shade of color than formerly, but they express their deliberate opinion that any attempt to force uncolored American on that market would at once drive the consumption on to the colored English cheese, and reinstate it in the position from which you are so rapidly displacing it. Is the end to be gained worth this hazard? That the supply of *un*colored cheese may very easily be overdone, has been conclusively proved quite recently on the Liverpool market, where, within the last three months, I have seen white dairies of otherwise faultless character entirely neglected, while colored were in eager demand at a premium of from 3-4c. to 1c. per lb. The color that finds acceptance with the *largest* number of English buyers seems to be a bright straw color. In telling you all this I have no personal end to gain

that in any way runs counter to your interests. The more saleable your cheese in the English market, the better for us all. It is no light matter to educate the taste of English consumers in the matter of any article of food. This difficulty we have experienced to the full during our endeavours to secure for American cheese that recognition to which its intrinsic excellence so fully entitles it. Those endeavours were materially aided by the alacrity with which you adapted your manufacture to English usage in the matter of shape, size, and, not least, of color. By thus conforming to English prepossessions (prejudices, if you choose to call them so), you have insured a larger demand and much better prices for your cheese; and strong as is your hold on that market, believe me, you are not yet sufficiently masters of the position to dictate or run counter to the requirements of your largest and best customers. It may be well here to call your attention to the extraordinary rapidity with which the color has faded out of this season's cheese. The annatto is not altogether at fault, as the same deterioration of color has been observed in dairies using various kinds of annatto. The cheese colored by the liquid imported from England, has perhaps stood better than any other, but still have not retained their color as in ordinary seasons. Not being a practical cheese-maker, I cannot say which of the different reasons that have been suggested to account for this is the true one, but it is a point well worth your very serious consideration. Another matter to which I must advert is that in some factories there has been placed in the centre of the cheese a quantity of stale curd, apparently left over from the previous day's make. The most vigilant inspection frequently fails to detect it previous to shipment, but of course it is revealed whenever the cheeses are cut up on the counter of the retailer. This practice cannot be too strongly condemned; not only is it slovenly, not only is it a fraud on the buyer of the cheese, but it is fatal to the character of the dairy. Sooner or later it must come to light, and then, you may be sure, a very black mark is made against such a factory by those who have anything to do with the buying, shipping, or selling of it. A little care and judgment in filling your hoops would put a stop to all such complaints in future. If necessary, it would be better to make a few very small, rather than spoil several full-sized cheeses. Complaints have also been made of some dairies, otherwise fair, presenting a mottled appearance, as if the curd from different vats had been carelessly mixed together.

Shortly after the Factory system was fairly started in this State, I ventured to predict that its manifest advantages would enable you in course of time to produce an article fully equal to the very finest English cheese; but some of my English friends were scarcely inclined to be as sanguine as I was in this matter. While from the first there have been a *few* factory dairies, and occasional drafts of others, that have come very nearly, if not quite, up to the highest English standard, it was not till the August and September make of the present season was reached that we were able to show the English dealers any *considerable* quantity of American cheese, that in point of quality, make and flavor, could not be beaten by any country in the world. During my visit to London last October, I went through a carefully selected stock of over 10,000 boxes of

New York State cheese, with one of the largest and most experienced cheese-factors in the South of England. The inspection was close and critical. When it was concluded I asked two questions. The first was: "How do these cheeses compare with the English make of the *current* season?" Said this most competent authority: "The season has been so unfavorable that I don't think I could get returns of equal quality in all the South of England." I then asked: "How does the stock we have been looking through compare with the best English cheese of an *average* season?" The reply was: "They are just as good, and I did not think it possible to get together so many fine American cheeses." This is high praise, and the character and position of the speaker adds very much to the value of his testimony. I regret to have in any way to qualify it, but I am here to tell the whole truth. Indeed the only claim I have on your attention is that, without fear or favor, I endeavor to represent things to you as they really are. Much of this cheese that we examined in the month of October has been disposed of, and given great satisfaction to the consumers. Several of the dairies, those apparently most likely to keep well, have been held over, and I regret to say that the latest advices from London report many of them to have faded in color, and become strong or rank in flavor. The result of the closing season, then, as regards quality, would seem to be, that during two or three months you have made a larger quantity of finer quality than you ever made before, but also *that the cheese lacks keeping qualities.* Still, you have made a great step in advance, which should stimulate you to zealous and intelligent efforts in the same direction. I can honestly compliment and heartily congratulate you on the position you have gained, but much yet remains to be accomplished. Your endeavor must be to make superfine cheese, not only in one or two months, but from the beginning to the end of the season, and so to make it that it will retain its good qualities for a reasonable length of time. This is no easy task, especially in a climate of such extreme and sudden changes; but from what you have accomplished in the past I am very sanguine of the improvement you will make in the future. The problem thus presented for your solution is undoubtedly one of *great* difficulty, but it has been well said that "difficulty is only the measure of resistance to be overcome by superior force." In this age and in this country, superior force is only another name for superior intelligence.