Seventh annual meeting of the Wisconsin Cheese Makers' Association held in the Assembly Chamber, State capitol Building, Madison, Wisconsin, Wednesday, Thursday, and Friday, Feb. 1, 2, 3, 1899. 1899

Wisconsin Cheese Makers' Association
Madison, WI: Democrat Printing Co., State Printer, 1899

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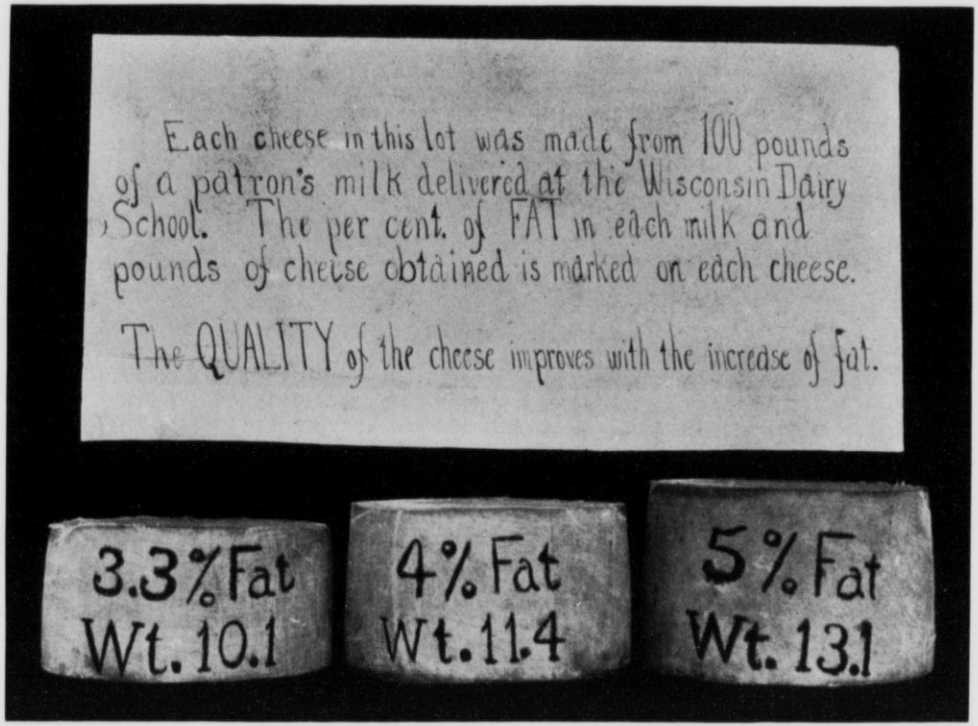

The cheese shown here were made by Prof. Decker to demonstrate the value of fat in the milk for cheese. The weights given were as taken from the press and the cheese were made soft for a local market, so that these figures are somewhat higher than for cured cheese for the ordinary market. The point to be noticed is that rich milk makes more cheese than poor milk.

SEVENTH ANNUAL MEETING

OF THE

WISCONSIN

CHEESE MAKERS' ASSOCIATION

HELD IN THE

Assembly Chamber, State Capitol Building, Madison, Wisconsin, Wednesday, Thursday and Friday, Feb. 1, 2, 3, 1899.

REPORT OF THE PROCEEDINGS, ANNUAL ADDRESS OF THE PRESIDENT, AND INTERESTING ESSAYS AND DISCUSSIONS RELATING TO THE CHEESE INTERESTS.

COMPILED BY

U. S. BAER, Secretary.

MISS JENNIE NELSON, Stenographic Reporter.

MADISON

DEMOCRAT PRINTING COMPANY, STATE PRINTER.

1899.

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LETTER OF TRANSMITTAL.

OFFICE OF THE SECRETARY,
Wisconsin Cheese Makers' Association,
MADISON, WIS., 1899.

To His Excellency, EDWARD SCOFIELD,
Governor of the State of Wisconsin.

I have the honor to submit the seventh annual report of the Wisconsin Cheese Makers' Association, showing the receipts and disbursements the past year, also containing the papers, addresses and discussions had at the annual convention held at Madison, February 1–3, 1899.

Respectfully submitted,

U. S. BAER,
Secretary.

OFFICERS, 1899.

President:—

J. A. CARSWELL..... Lone Rock, Wis.

Vice President:—

E. L. ADERHOLD..... Neenah, Wis.

Directors:—

Three Years—J. K. POWELL..... New Lisbon, Wis.
Two Years—J. W. DECKER..... Madison, Wis.
One Year—THOS. JOHNSON..... Boaz, Wis.

Treasurer:—

H. E. AUSTIN..... Homer, Wis.

Secretary:—

U. S. BAER..... Madison, Wis.

ARTICLES OF INCORPORATION

OF THE

WISCONSIN CHEESE MAKERS' ASSOCIATION.

(Adopted February 2, 1899.)

ARTICLE I.

The undersigned have associated and do hereby associate themselves together for the purpose of forming a corporation under Chapter 86 of the Wisconsin Statutes of 1898 and the acts amendatory thereof and supplementary thereto, the business, purpose, and object of which corporation shall be the education of its members for better work in the art of making cheese, the care and management of factories, the sale of their products and the weeding out of incompetency in the business of cheese-making; the further object of the corporation is to demand a thorough revision and rigid enforcement of such laws as will protect the manufacture of honest dairy products against undue competition from deceitful and dangerous imitations; and to unite the rank and file of its members in instituting a regular crusade against the unjust practice of pooling milk at cheese factories by weight, without regard to the butter-fat which it contains.

ARTICLE II.

This corporation shall be known as the "WISCONSIN CHEESE MAKERS' ASSOCIATION," and its principal office and location at Madison, Wisconsin.

ARTICLE III.

The association shall be a corporation without capital stock. Any person who is a practical cheese-maker, and such other persons as are directly or indirectly interested in the manufacture and sale of unadulterated cheese may become members of this corporation by paying one dollar annually in advance and signing the roll of membership.

ARTICLE IV.

SECTION 1. The general officers of said association shall consist of a president, vice president, secretary and treasurer, and the board of directors shall consist of three members of the association.

SECTION 2. The term of the officers of the association shall be one year, or until their successors are elected at the next annual meeting following their election, and until such successors qualify. At the first meeting of the members of the association there shall be elected a director for the term of one year, a director for the term of two years, and a director for the term of three years, and thereafter there shall be elected at each annual meeting a director for the term of three years, and each director shall hold his office until his successor is elected and qualifies. The election of officers and directors shall be by ballot, except in case of a single nominee when election by acclamation may be substituted. A majority of all the votes cast shall decide an election.

ARTICLE V.

SECTION 1. The principal duties of the president shall be to preside at all meetings of the Board of Directors and of the members of the association during his term of office. He shall appoint special committees and sign all orders drawn on the treasurer. He shall appoint a committee on resolutions and a program committee. He shall also provide for suitable medals at the expense of the association.

SECTION 2. The vice president shall assume the duties of the president in the latter's absence.

SECTION 3. The principal duties of the secretary of this association shall be to keep a complete and accurate record of the proceedings of the Board of Directors and of the association and to attend all meetings, keep a correct account of the finances received, pay all moneys into the hands of the treasurer and receive his receipt therefor, and to countersign all orders for money drawn upon the treasurer. He shall keep a record book and suitable blanks for his office. He shall make a full and complete report at each annual meeting of the correct state of the finances and standing of the association. He shall also procure certificates of membership, and every person joining the association shall receive one signed by the president and countersigned by the secretary.

SECTION 4. The principal duties of the treasurer shall be to faithfully care for all moneys entrusted to his keeping, paying out the same only on receipt of an order signed by the president and countersigned by the secretary. He shall file with the secretary of the association all bonds required by the articles of incorporation or the by-laws. He shall make at the annual meeting a detailed statement of the finances of the corporation. He must keep a regular book account, and his

books shall be open for inspection at any time by any member of the association.

SECTION 5. The Board of Directors shall be the Executive committee and shall audit the accounts of the secretary and treasurer, and present a report of the same at the annual meeting; Executive committee shall procure a place to hold the meeting and make arrangements for Reception committees, hotel rates, halls, and all necessary preliminary arrangements for each and every meeting.

SECTION 6. The committee on programs shall make all arrangements for the proper working of the conventions, assigning all subjects, arranging for speakers, and make the division of time allowed to the discussion of each topic, to determine upon the time for the election of officers, conducting business meetings, and any other matters that may properly come under this division.

SECTION 7. The committee on Resolutions shall draw up such resolutions as the exigencies of the time may require and which shall express the sense of the association.

SECTION 8. The said officers shall perform such additional or different duties as shall from time to time be imposed or required by the members of the corporation in annual meeting, or by the Board of Directors, or as may be prescribed from time to time by the by-laws, and any of the duties and powers of the officers may be performed or exercised by such other officers or officer, or such person or committee as the corporation or Board of Directors may authorize.

ARTICLE VI.

The treasurer of this corporation shall give a bond in the sum of one thousand dollars with two sureties, for the faithful performance of his duties.

ARTICLE VII.

These articles may be altered or amended at any regular session of an annual meeting of the members, provided the proposed alterations or amendments shall have been read before the association at least twenty-four hours previously, and provided also that such alterations or amendments shall receive a two-thirds vote of the members present.

ARTICLE VIII.

The first meeting of this association for the election of officers and directors shall be held on the 3rd day of February, 1899, and such corporation shall hold a meeting of its members annually during each calendar year at such time as may be determined by the Board of Directors.

LIST OF MEMBERS, 1899.

Austin, H. E. ..... Homer, Wis.
Alves, H. C. ..... Johnsonville, Wis.
Austin, H. W. ..... Rockbridge, Wis.
Adams, H. C. ..... Madison, Wis.
Aderhold, E. L. ..... Neenah, Wis.
Aune, J. G. ..... Baldwin, Wis.
Austin, E. E. ..... Boscobel, Wis.

Biddulph, J. R. ..... Providence, Ill.
Boelter, H. A. ..... Berlin, Wis.
Berg, Julius ..... Algoma, Wis.
Baer, U. S. ..... Madison, Wis.
Bachman, J. F. ..... Bonduel, Wis.
Bolchen, Thomas ..... Mt. Ida, Wis.
Bracy, E. L. ..... Elgin, Ill.
Bales, R. R. ..... Madison, Wis.
Bender, F. J. ..... Boaz, Wis.
Buchen, E. F. ..... Adell, Wis.
Beckwith, Chauncy ..... Dixon, Wis.
Busse, H. W. ..... Forestville, Wis.

Carswell, J. A. ..... Lone Rock, Wis.
Cross, J. W. ..... Mauston, Wis.
Clarson, Jack ..... Rockbridge, Wis.
Carman, G. ..... Sheboygan, Wis.
Carswell, Fred ..... Lone Rock, Wis.
Chadwick, W. W. ..... Monroe, Wis.
Crandall, John ..... Dodgeville, Wis.
Cretton, H. J. ..... Mishicot, Wis.
Cornish, Curtis & Green ..... Ft. Atkinson, Wis.
Cranston, D. M. ..... Sabin, Wis.
Cunningham, J. G. ..... Rockbridge, Wis.

Drischel, Geo. W. ..... Cambridge City, Ind.
Decker, Jno. W. ..... Madison, Wis.
Decker, A. J. ..... Fond du Lac, Wis.
Dickson, W. C. ..... Madison, Wis.
Dassow, R. P. ..... Sheboygan Falls, Wis.
Davis, J. M. ..... Milwaukee, Wis.

Erbstoerzer, Edward ..... Howard, Wis.

Frankenhoff, Will ..... Fennimore, Wis.
Flemming, Chas ..... Highland, Wis.
Fredrick, W. E. ..... Madison, Wis.
Fulmer, F. B. ..... Ettrick, Wis.

Ganschow, H. F. ..... Bonduel, Wis.
Green, R. C. ..... Albion, Wis.
Goodall, L. K. ..... Sumner, Iowa.
Gilbert, J. B. ..... Sterling, Ill.

Hollock, A. ..... Yuba, Wis.
Huffman, H. ..... Rockbridge, Wis.
Haney, T. J. ..... Dixon, Wis.
Hamm, W. P. ..... Kohlsville, Wis.
Huebner, W. F. ..... Waterloo, Wis.
Hensler, Nic ..... Bakerville, Wis.
Haushalter, John ..... Muscoda, Wis.
Hollister, George ..... New Lisbon, Wis.
Hagenhofer, Joseph ..... Fenwood, Wis.

Jenson, N. C. ..... New Lisbon, Wis.
Johnson, Thomas ..... Boaz, Wis.

Kapelka, J. A. ..... Richland Center, W
Kielsmeier, O. A. ..... Hika, Wis.
Klotz, J. L. ..... Plymouth, Wis.
Kelty, Jno. ..... Boscobel, Wis.
Kliner, Frank ..... Algoma, Wis.
Kellner, Henry ..... Cazenovia, Wis.
Kasper, P. H. ..... Nicholson, Wis.
Knoke, O. E. ..... New London, Wis.
Kielsmeire, E. H. ..... Timothy, Wis.
Kachel, F. A. ..... Whitewater, Wis.

Larson, Fred ..... Chicago, Ill.
Loehrke, A. E. ..... Lomira, Wis.
Lindeman, G. H. ..... Denmark, Wis.

Marshall, Walter ..... Yuba, Wis.
Moore, Chas. B. ..... Balmoral, Wis.
Monrad, J. H. ..... Winnetka, Ill.
Mason, Peter ..... Sandusky, Wis.
Merwin, F J. ..... Boscobel, Wis.
Morse, G. W. ..... Juneau, Wis.
Morrison, G. W. ..... Fennimore, Wis.
Mayer, R. A. ..... Kohlsville, Wis.
Moldenhauer, H. R. ..... Lebanon, Wis.

Nisbet, Will ..... Hub City, Wis.
Nisbet, Hugh..... ..... Woodstock, Wis.
Novak, J. C. ..... Castle Rock, Wis.
Noyse, H. J. ..... Muscoda, Wis.

Pickard, Chas. ..... Ithaca, Wis.
Powell, J. K. ..... New Lisbon, Wis.
Pomranke, F. W. ..... Chilton, Wis.
Pauli, E. ..... Monroe, Wis.
Pheatt, H. D. ..... Milwaukee, Wis.

Quade, H. W. ..... Watertown, Wis.

Robinson, Geo. R. ..... Jacksonport, Wis.
Rothenbach, Jacob ..... Ackerville, Wis.
Remington, Frank ..... Boscobel, Wis.
Ruetten, Peter ..... Ithaca, Wis.
Radel, Ben ..... Spring Green, Wis.
Rusche, O. A. ..... Reedsville, Wis.

Stanek, A. ..... Yuba, Wis.
Schoenman, Adolph ..... Plain, Wis.
Sawyer, L. ..... Neptune, Wis.
Sanborn, G. W. ..... Lone Rock, Wis.
Steinhart, Ottow ..... Castle Rock, Wis.
Schauf, Albert ..... Neptune, Wis.
Spooner, W. H. ..... Aunton, Wis.
Simpson, W. B. ..... Milwaukee, Wis.
Scott, Z. D. ..... Milwaukee, Wis.

Tripp, F. A. ..... Chicago, Ill.
Tisdal, J. D. ..... Bird's Creek, Wis.

Viergutz, F. A. ..... Marion, Wis.

Werth, A. C. ..... Neenah, Wis.
Winton, W. W. ..... Chicago, Ill.
Winsor, G. B. ..... Mauston, Wis.
Ward, J. E. ..... Sandusky, Wis.
Waddell, F. O. ..... Richland Center, Wis.
Waterstreet, Wm. ..... Madison, Wis.
Walker, Frank ..... Dixon, Wis.

Zietler, A. H. ..... Johnson Creek, Wis.
Zwicky, Wm. ..... Van Dyne, Wis.

SEVENTH ANNUAL CONVENTION

OF THE

WISCONSIN CHEESE MAKERS' ASSOCIATION

HELD IN THE

ASSEMBLY CHAMBER, STATE CAPITOL BUILDING,

MADISON, WISCONSIN,

Wednesday, Thursday and Friday, February 1, 2 and 3, 1899.

PROGRAM.

OPENING SESSION.

Wednesday Afternoon, 2:00 *P. M.*

Opening Address.....Prof. John W. Decker, Madison, Wis.
Cheese Instructor in Wisconsin Dairy School.
Reply.....Adolph Schoenman, Plain, Wis.
General Greetings .....
President's Annual Address.....J. A. Carswell, Lone Rock, Wis.
Appointment of Committees .....

EVENING SESSION.

Wednesday, 7:30 *P. M.*

Music ..... Selected
Stereopticon Views Showing the Growth and Development of the Swiss, Brick and Limburger Industry in Wisconsin.....Prof. John W. Decker, Madison, Wis.
Cheese Instructor in Wisconsin Dairy School.
"Outlook of the Cheese Industry of Wisconsin,".....
.....W. W. Chadwick, Madison, Wis.
Assistant Dairy and Food Commissioner.
Report of Secretary.....U. S. Baer, Madison, Wis.
Report of Treasurer.....H. E. Austin, Homer, Wis.

MORNING SESSION.

Thursday, 9:00 *A. M.*

Music ..... Selected
"How Can Wisconsin Produce Better Cheese,".....
.....J. K. Powell, New Lisbon, Wis.
"The Qualifications Necessary to be an Up-to-Date Cheese Maker" .....Peter Mason, Oslo, Wis.
"Care of Delivery Cans and Cheese Factory Apparatus,"
.....Chas. B. Moore, Apex, Wis.
"Educating the Patron to Care for Milk for Cheese Purposes," .....Eddie Schwingel, Avoca, Wis.
"The Ripening of Milk in Relation to Flavor in Cheese Making," .....Wm. Waterstreet, Madison, Wis.
"Cutting and Cooking of the Curd and Drawing off the Whey," .....R. C. Dassow, Sheboygan Falls, Wis.
"The Handling of the Curd, from Dipping to Hooping,"
.....August Blank, Sheboygan Falls, Wis.
Music, ... Selected

AFTERNOON SESSION.

Thursday, 2:00 *P. M.*

Music, ... Selected
"Management of Factories and Marketing the Cheese from a Proprietor's Standpoint,".....Chauncy Beckwith, Dixon, Wis.
"The Common Interests of Cheese Maker and Patron,"
.....George McKerrow, Madison, Wis.
Superintendent Wisconsin Farmers' Institute
Address.....Prof. T. L. Haecker, St. Anthony Park, Minn.
Instructor in Dairy Husbandry, Minnesota Dairy School
Awarding of Medals and Prizes.....
Cutting of the prize Cheese.....
Discussion—"What is a Good Cheese".....
Music, ... Selected

EVENING SESSION.

Thursday, 7:30 *P. M.*

Music, ... Selected
Address by.....J. H. Monrad,
Representing the Dairy Division, U. S. Department of Agriculture.
Address by.....R. A. Pearson,
Assistant Chief of Dairy Division, Washington, D. C.
Lecture: "The Modern Improved Methods of Cheese Making, or the Science and Art of Cheese Making,".....
.....Hon. D. M. MacPherson,
Ex-Member of Provincial Parliament,
Lancaster, Ont., Dominion of Canada
Music, ... Selected

FINAL SESSION.

Friday, 9:00 *A. M.*

Music, ... Selected

Election of officers and business meetings of the Association, and of the Wisconsin Auxiliary of the National Dairy Union. .....

"The Construction of Curing Rooms from a Practical Standpoint," .....Prof. F. H. King, Physicist, Wisconsin Experiment Station.

"An Ideal Cheese Factory,".....P. H. Kasper, Nicholson, Wis.

"Our Method of Paying for Milk by the Babcock Test,"...

.....James Briggs, Mineral Point, Wis.

Report of Committees.....

Music, ... Selected

NOTE.—After the reading of each paper all persons present are kindly requested to ask questions and discuss thoroughly the articles as read.

The music will be furnished by the Glee Club of the Wisconsin Dairy School.

J. W. Cross of Mauston, Wis., will have charge of the cheese and dairy exhibit, and will assist exhibitors in arranging their displays.

SPECIAL PREMIUM LIST.

EXPORT CLASS.

FLATS. CHEDDARS.

The Association offers a handsome gold medal artistically engraved, and of beautiful design, to the exhibitor whose cheese scores the highest number of points.

The Association will give a solid silver medal, suitably engraved, to the exhibitor securing the second highest score on cheese.

To all exhibitors that shall score 90 points or above the Association will give bronze medals, properly engraved.

Every exhibitor whose cheese scores 85 points or above, will receive a diploma, signed by the judges and verified by the president and secretary, setting forth the score of his cheese, the highest score, the lowest score, and the average score of all cheese exhibited at this meeting.

Hoard's Dairyman, Fort Atkinson, Wis., offers one dozen subscriptions to Hoard's Dairyman, to be awarded as follows: To each of the twelve exhibitors securing the twelve highest scores (regardless of class of exhibit or style of cheese), one year's subscription to this valuable dairy paper.

Mr. Adolph Schoenman, author and publisher of Schoenman's Dividend Calculator and Schoenman's Hand Book on Milk Testing, offers the following special premiums for cheese scoring highest, not drawing any other regular or special premiums:

First Premium—One Butter Fat and Dividend Calculator; value, $2.

Second Premium—One Butter Fat and Dividend Calculator; value, $2.

Third Premium—One Hand Book on Milk Testing; value, 75 cents.

Fourth Premium—One Hand Book on Milk Testing; value, 75 cents.

Fifth Premium—One Hand Book on Milk Testing; value, 75 cents.

Creamery Package Manufacturing Co., Chicago, Ill., offers the following premiums for cheese exhibit:

First Premium—Five hundred 14½x8 Excelsior Bandages.
One pail Royal Swiss Cheese Grease.
Five gallons of Hansen's Rennet Extract.

Second Premium—Two hundred and fifty 14½x8 Excelsior Bandages.
One pail Royal Swiss Cheese Grease.
Three gallons of Hansen's Rennet Extract.

Third Premium—Two hundred and fifty 14½x8 Excelsior Bandages.
One "Little Detective" Milk Tester.

Genesee Salt Company will give five barrels of cheese salt, valued at $10, to the cheesemaker whose cheese scores highest, salted with Genesee cheese salt.

F. B. Fargo & Company offer as a special premium for the cheese scoring the highest number of points, one Wisconsin Curd Test; valued at $12. Lake Mills, Wis. St. Paul, Minn.

The New York Produce Review and American Creamery will be sent for one year to every cheese maker whose cheese wins a premium. 173–175 Chambers St., New York City.

DOMESTIC CLASS.

DAISIES, FAVORITES, SPECIALS, PICNICS, STOVE PIPES, YOUNG AMERICAS.

The Association offers a cash premium of $10 to the cheese maker securing the highest score on cheese, made in any of the above shapes, especially designed for the domestic trade.

Those wishing to contest for this premium will also be entitled to enter a cheese, in flat or cheddar shapes, in competition for the medals and special premiums offered in the Export Class.

SPECIAL CLASS.

DRUM AND BLOCK SWISS.

A. J. Decker & Co., dealers in creamery and cheese factory supplies, offer as a special premium, one of their improved Wisconsin Curd Tests, complete, for the best Drum Swiss cheese; also one gallon of Eilerson's Danish Extract of Rennet, "imported from Copenhagen by A. J. Decker," for the best block Swiss cheese.

CHEESE EXHIBIT.

RULES.

1. Every exhibitor must be a member of the Association. One dollar secures a membership and the annual report.

2. Cheese made at any time in flat or cheddar shapes, full cream, unbored, properly vouched for in writing by the owner, maker and one disinterested party.

3. Scale of points for judging cheese:

Flavor	45.
Texture	30.
Color	15.
Make-up	10.

4. The tag upon the box shall contain the name and address of the exhibitor, a duplicate of which shall be pinned on the cheese inside the box. This will prevent mistakes should the outside tag be destroyed in transit.

5. Cheese may be shipped by express (charges must be prepaid), to the Secretary. Entry blanks will be furnished by the Secretary.

6. All cheese must be in the city the day before the convention.

7. Exhibitors will be limited to one package only, in each class.

8. Makers exhibiting cheese, and not attending the meeting in person, will in no instance be awarded a medal.

9. Manufacturers, dealers and inventors of dairy goods are invited to make an exhibit. No award or premium will be given.

10. Upon receipt of cheese at exhibition hall all tags, cards and markings will be removed by the superintendent, and will be substituted by entry cards of the Association designating number of entry.

TRANSACTIONS

WITH

ACCOMPANYING PAPERS AND DISCUSSIONS

OF THE

Wisconsin Cheese Makers' Association

The seventh annual convention of the Wisconsin Cheese Makers' Association was called to order by President J. A. Carswell in the Assembly Chamber at Madison, Wisconsin, at 2 o'clock p. m., February 1st, 1899.

Hon. Chas. E. Whelan, mayor of the city of Madison, was introduced to the convention, and made the following address of welcome:

Mr. Chairman and Gentlemen of the Convention: This is a surprise to me so far as making any remarks are concerned, but at the same time you know those of us who live in the most beautiful city that God has planted upon his footstool are always glad to welcome the inhabitants of other cities and other districts to come to us and enjoy with us a part of the hospitality we are always willing to extend to the stranger, and to you, who come here representing a great industry—an industry which reaches out into all parts of the world and makes the name of Wisconsin one to be proud of—I say, you who represent that kind of an industry are entitled to congratulation, and there is no class of persons I would extend the hospitality of this city to with more pleasure than to you.

It has been said that the foundation stones of our republic rest upon those who have control of the great tracts of agricultural lands; it has been said that he who provides any avenue by which agricultural pursuits are encouraged, by which those men who form the foundation of this republic, and whose independence of thought and action are so well known,—that those men are entitled to consideration. Now, my friends, I believe this to be true. Agriculture or dairying—the two go hand in hand—form the basis, as has been said, of the advancement commercially of this great country of ours. The other handmaiden which goes to bring these results is intelligence and education. Now, take the links and bind the two, the agricultural and dairying interests of this great country with the intelligence and the education of those engaged therein, and the energy and the push and the power and the accomplishments made by that union are simply not to be computed. I congratulate you as representing this great industry. I presume that while you are here you will discuss ways and means of bettering your condition and that industry which you represent. You will discuss, and you will have come to the proper place to discuss, for here we are almost under the shadow of that magnificent institution which in the state of Wisconsin has attempted to form the connecting link between the men upon the farm or in the dairy and the educational advantages to be given him. Standing here we cannot help but remember that here was given to the cheese making industry of the world the triumph and invention which has meant so much to you, and which has placed such an advantage in your hands. We cannot fail to remember that over in that institution was invented that machine which is now in use in every cheese factory and dairy and creamery in the state of Wisconsin—the Babcock tester. I remember looking as a newspaper man upon the first Babcock machine, and I wondered at the ingenuity, the patience and the untiring industry that were combined in the man that invented it; but I was struck more, my friends, with

the generosity of the man who, because he was a public servant at the time he invented it, said that the invention belonged to the world, and gave it to you without one price nor without one particle of royalty. And I say to you that when you find a man of that kind interested in dairying, men like my good friend here, Mr. Decker, and those who are around behind here, interested in dairying, using their intelligence, using every effort God has given them to better your condition and better the condition of this state, I say the time is coming when Wisconsin will take even a higher rank than it has had in the dairying industry of the world. We send our cheese to the Chicago market, we send our cheese to the New York market, and I took great delight in eating a piece of good, solid Wisconsin cheese in Liverpool; and I say to you that when we teach those people on the other side of the water what it means to engage in the industry of making cheese or butter, when we carry over the good news to them, they will be sending more and more of their men over to the Wisconsin institution and over into your factories to study practical dairying. Why, we will never throw it up. We will not be in the condition of the man I saw as I was going over to Scotland. It was on one of those flat, stubby-nosed mail-boats, and it seems the fellow was liable to sea-sickness. He was a Scotchman and had a friend with him. They sat up on deck against a cable and soon began to get the motion of the boat. I knew it was dangerous to attempt that, and went down and sat with my back against a coil of rope. There was a choppy sea. Finally one of the Scotchmen said to the other, "Sandy, me stomach feels bad; let's go and get a drink;" so they went down to the bar and got a drink and returned. They were talking back and forth, and pretty soon the Scotchman again remarked, "Sandy, me stomach feels bad again, and we will go down and get a drink." They repeated this operation several times, the man getting sicker all the time. I noticed his color, he was getting white around the gills and his nose was blue, which is gen-

erally a pretty good sign. They sat there and were talking, and I heard the Scotchman remark, "Sandy, I feel just—as though I was going to throw up." Sandy said, "Why don't you throw up then?" "What!" replied the Scotchman, "throw up that whisky which has cost me four shillings?" (Laughter.)

Now, you see, we are getting into that position, and we don't propose to throw up any of the things that have cost us so much. We have put money into the institution over on the hill, put there for them by the legislature and tax-payers, and I want to say to you there has not been a dollar expended in the University of Wisconsin that is not today returning fourfold therefor, and in no other such industry or department has there been such a return as in the Dairy department of the University of Wisconsin. And so as I look out before me and see this vast amount of industry, I say to you who know the advantages to be derived from intimate association with that institution and what it is to you by reason of it, you will be very well satisfied with it. And before England, Germany and France, and all the states of this Union, I say to you, you are going to take a front rank. They will move along, but Wisconsin will always be in the lead. They will not be in the condition of a young man who was put on a train between here and Milwaukee to learn to be a brakeman. He was put in charge of an older man who was to teach him the name of the stations. He said to the young man: "When we come to a station I will go in the rear of the car and you go to the head of the car, and when I call off the station you repeat it after me, and in that way you will be able to learn the route without any trouble." They started out and when they got to Cottage Grove the old man went to the rear of the car and the new man went to the head of the car. The old man called out, "Cottage Grove," and the new man repeated after him, "Cottage Grove." They reached Deerfield and the old man took his position in the rear of the car and called out, "Deerfield," and the new man in the front of the car repeated after him, "Deerfield," and so on through

London and Lake Mills. When they reached Jefferson Junction the old man again took up his position in the rear of the car and the new man in the front of the car, and the old man called out: "Jefferson Junction; change cars for Milton Junction, Janesville, Beloit, Watertown, Fond du Lac, Oshkosh, Appleton, Fort Howard and Green Bay," opened the door and passed on into the next car. Well, the new man tried to drop in along the line, but he couldn't make it go—it wasn't in his line—and so when the old man got through and passed on into the next car he called out: "Same ting at dis end." (Laughter.)

So after you have exchanged your ideas here and have listened with a great deal of interest to all that is being told you, that you will have learned practically all there is to be learned in dairying. And it seems to me when I look into your faces here and when I look at Mr. Decker that I am swamped entirely. I say to you that England can come to you, Germany can come to you, and the United States with all her wealth and resources and moneyed men, and with her intelligence and capacity will come to you—all these things combined—and all that will be necessary for you to say is, "Same ting at dis end," and you have accomplished all. You have taught them and are teaching them without any trouble. You are now sending out and reaching out into the furthermost corners of the world. You are building up a great name for the state of Wisconsin, and especially Madison, which is crowned upon her hills with so magnificent an institution, and I say to you: "Go place your manufactures out into the world, and teach them that honesty in dairying has come to Wisconsin and the men engaged in it are honest men."

I welcome you again. Remain with us and have as good a time as possible, and if you get into the police station, notify me immediately. (Applause and laughter.)

OPENING ADDRESS.

Prof. John W. Decker, Madison, Wis.

Mr. Chairman, Ladies and Gentlemen: I think after the mayor has given us such a grand "kick-off" that we can keep the ball rolling during the rest of the convention, and I think that if any of you happen to get into the police station you will certainly want such good company as the mayor can give you. (Laughter.)

This is our seventh annual convention. I see before me a great many familiar faces that I have seen in conventions before and in the factories as I go up and down the state inspecting the work of our students and studying problems as we have to meet them. It was six years ago that this association was organized. It was then known as the Northwestern Factory Cheese Makers' Association. The reason it was organized was that some of our cheese makers had been to some other conventions where butter was put pretty well to the foreground and the cheese part of the convention was crowded into a session or part of a session, and they felt like the boy that had been eating a little bit of some nice chicken pie—that it was a pretty good thing and he would like some more of it.

So the cheese makers here formed an association in which the subjects discussed were to be entirely cheese. In fact, I remember President Powell would shut down on us when we began to discuss along butter lines.

The association has grown and we have had good conventions in the past. It has grown to be quite a boy, and we are now looking for larger things.

The preparations for this convention have been carried on mostly by our secretary, Mr. Baer, and we owe a great deal to him for the wise manner in which he has managed the preparations, especially the way he has managed the financial end of it.

We have the annual report published by the association this year for the first time. It cost $165.00 to publish it, and through the good management of Mr. Baer it has been paid for. We want our reports published so that the members can look over the discussions as they have taken part in them here —can look them over in their factories and think over them at their leisure. We also want to carry the discussions to farmers that do not come here. These are the leading men from all over the state here who carry on these discussions.

Our first convention was published through a newspaper, and our first report of the association was published through the good work of Mr. Baer.

We also have a number of distinguished dairymen from other states with us, or will have. Mr. Monrad is here with us as he has always been in the past—one of the familiar faces I see before me. We will have with us also Mr. R. A. Pearson, Assistant Chief of the Dairy Division, U. S. Department of Agriculture, Hon. D. M. MacPherson from Ontario, and Prof. T. L. Haecker of the University of Minnesota, and I can assure you that with all these preparations we ought to have a good convention, and we owe a great deal to Mr. Baer, to our president and some other officers for making these preparations for us, and making such a good foundation for a convention. Now, all that remains for us to do is to get all we can out of the convention. Only see to it that you take part earnestly in the discussions and ask lots of questions. We are all on a par here, and need not think somebody else will criticise us for using certain wording. We are all equal here and want the convention to go with a roll from the time the mayor started it off until the last day.

I might say here that we need state aid to help prosecute the work the association has undertaken. We need to publish a report, and the state should publish a report of this association the same as it publishes the Dairymen's Association and the Horticultural Society and the rest of such societies. We have

demonstrated that we are a strong, live society, when we can produce such good discussions as are brought forward here, and the state ought to take hold of them, and print them and carry them to the people all over the state.

We also need money to bring out better exhibits. We have some pretty good premiums offered. We have offered in the past medals for the best cheese, and these medals are sought after because they are something worth having, something that shows skill in making a good product that will score the highest at this convention. So these medals are sought after. But the funds that come in from membership alone are not enough to get the kind of premiums we want to offer.

This association has been working along the cheddar line almost entirely. There is the Limburger, Swiss and Brick industry that is well within the boundaries of this state. In fact the manufacture of these kinds of cheese leads in Wisconsin. We make, perhaps, somewhere from forty to fifty million pounds of cheddar, and probably fifteen million or more of the other kinds I have named in Wisconsin, and we want to bring out these cheese makers to these conventions, let them take part in the discussions, and get the benefit of what comes to us. We have not been able to get them much, and one problem has been to offer such premiums as will induce them to come, but we have not had the money. That is another reason why we need state aid.

Then, again, it costs money to get good men from abroad, like Robinson, MacPherson and other men. We want the best we can get for our cheese makers and it costs money to do this, and that is another reason we need state aid, and our representatives that have been sent here by the people are willing to give us the money that we need if we can show them that we really do need it. They are not sent here simply to give money to people who think they ought to have an appropriation; but they are ready to give us an appropriation for any proper work that we can use it for.

Cheese has been booming this past year. The price of cheese is now eleven cents and butter eighteen and a half cents, Elgin quotation. At that rate butter would have to bring about twenty-eight or nine cents to be equal to cheese. You see the great advantage cheeese has over butter at the present time. It is because the cheese makers are pretty well cleaned out and there is a good demand for cheese. I fear, however, that these prices will not keep up during the summer for the reason that butter is low, and a good many creameries will turn over to making cheese. The reason butter is low is that the oleo men are coloring oleo in the semblance of butter, so it looks like butter, although this is prohibited in Wisconsin. In other states they do not have this law, and they can sell it for a little less than butter. What we want is legislation all over the country that will make oleo go for what it is worth. We have no objection to people eating oleo and buying oleo, but the trouble is that it is colored and looks like butter, and the consumer thinks he is getting butter. The result is lower prices for butter, and the creameries are going into making cheese, and that will put more cheese on the market and will lower the price of cheese. So it comes back on us, and we should insist on national legislation to cover this point. There is a tax of two cents per pound on oleo, and as it is produced out of hog fat, beef fat, and from cotton-seed oils that are cheaper and not so costly as butter fat, and being colored, they can sell it for butter; and it is proper that the tax should be raised from two to ten cents a pound for oleo colored like butter, so it would make it unprofitable to carry on this business. It is a fraud and we should insist that the fraud be stamped out.

Now, as I have said before, we are here to get what we can out of this convention, and we can only get it by asking questions and taking part heartily in the discussions. (Applause.)

REPLY.

Adolph Schoenman, Plain, Wis.

Ladies and Gentlemen of the Wisconsin Cheese Makers' Convention: I don't see why our secretary put me on for a speech. He knows my speech-making qualities well enough, and I think he is in favor of short speeches and long discussions, and I am glad of it. However, I simply rise to thank the mayor for his hearty welcome, but I think by the looks of the crowd he knew that we were going to take the city anyway, and he might as well welcome us.

I have often noticed that when our congressmen or even governors have a speech to make, it often appears on paper and is delivered from paper, and I think no one will think very serious of me if I follow the example of congressman and governor.

Mr. Decker has given you some things about oleo, and my paper will give you some things about filled cheese.

"The object of this association is the weeding out of incompetency in the business of cheese making and the education of ourselves for better work in the art of making cheese, the care and management of factories, and the sale of their products. The further object of the association is to demand a thorough revision and rigid enforcement of such laws as will protect the manufacturer of honest dairy products against undue competition from deceitful and dangerous imitations; to unite the rank and file of its members in instituting a regular crusade against the unjust practice of pooling milk at cheese factories by weight, without regard to the butter-fat which it contains."

My imagination goes back to the winter of 1893 when the cheese makers of Wisconsin became thoroughly convinced that to be a minor part of the National Butter and Cheese Makers' Association would be a suicidal act, as far as the cheese mak-

ers were concerned; consequently after several attempts in company with out butter-making friends, we concluded to go it alone; and early in the winter of 1893, while in company with a few of the faithful ones, I was requested to draw up a constitution and by-laws for a Northwestern Cheese Makers' Association. A call was issued to the "boys," and in March, 1893, our initial convention of the first organization of cheese makers was consummated triumphantly under the name of "The Northwestern Cheese Makers' Association." Later the name was changed to "The Wisconsin Cheese Makers' Association," and I venture the assertion that the signs of the times warrant me in saying that this, The Wisconsin Cheese Makers' Association, with its plucky young officers, with Excelsior as their motto, with a set determination will raise The Wisconsin Cheese Makers' Association step by step onward and upward until it shall become one of the most powerful associations in the state; that it will be practically impossible for our state legislature to ignore us when making up their biennial state appropriations.

When we think of the great magnitude and the large amount of money the cheese industry of Wisconsin represents, extending, as it does, to about fifty thousand farmers representing about five hundred thousand cows whose raw product is worked up by about one thousand six hundred and fifty cheese factories into a finished product of about sixty millions pounds of cheese, worth on the open market somewhere in the vicinity of six million dollars annually, it seems to me that if this great cheese industry makes a proper demand for a reasonable appropriation for the furthering of the good cause of the Wisconsin Cheese Makers' Association, which is now so active in working for the betterment of Wisconsin cheese, it could not be refused.

We are now six years old and have passed through the most damnable filled cheese era the world has ever known. We have fought it, and with the aid of our State Dairymen's Association and Wisconsin's most noble representative, S. A.

Cook of Neenah, and others, have successfully conquered it, and we are now entitled to an era of "good feeling and prosperity." Gentlemen, I feel that the spirit of progress has caught our boys, and the star of prosperity and business activity for the Wisconsin cheese industry is rising. I often come across such articles as the following on Wisconsin cheese. I quote from the pen of Hon. H. C. Adams:

"It is a matter of congratulation for the friends of the dairy interests in Wisconsin, that enough progress has been made in this state in recent years to bring our cheese product upon a par with the best cheese made by any state or country on this continent. The manufacture of filled cheese in this state from 1889 to 1895 thoroughly demoralized the cheese producing industry. The poisonous competition of a fraudulent counterfeit destroyed for a time the progressive spirit which had existed among Wisconsin cheese producers. The law of 1895 which prohibited the manufacture of filled cheese, reinforced by the national legislation which taxed and branded it, gave Wisconsin an opportunity to regain her former standing as a cheese producing state. There was an immediate revival of interest in this industry. The State Dairymen's Association began a work of systematic instruction, the Dairy school at the State University began sending out more and more trained cheese makers each year. The farmers' institutes kept up their work of practical education among Wisconsin farmers, teaching them how to breed cows, how to feed them, and how to get their product in the best shape for the factory; and Hoard's Dairyman continued to do what it always had done through trenchant editorials and the publication of correspondence from the best equipped dairy minds of the country. All these influences combined have given us some splendid practical results.

"In a recent interview with A. D. DeLand, of Sheboygan, who is a wholesale dealer in cheese, handling several million pounds annually, I was informed by him that at no time in the history of the state, had Wisconsin cheese graded so high in quality as during the year 1898; and that the demand for it far exceeded the supply; that the prices had increased twenty per cent. in the last two years; that very little was exported to Europe, largely because of the strong domestic demand; that there was practically no skim cheese made in Wisconsin today.

"The Wisconsin cheese maker is rapidly learning the fundamental lesson, which every producer must learn, to be successful, that a first-class article will always be in demand. He is

beginning to understand that it pays to educate his patrons by compelling them to bring him good milk; to keep a clean factory, and to keep his eyes wide open to the investigations which are being made by other cheese makers, and by the experiment stations, in the way of making and curing cheese.

"Canada has undoubtedly made splendid advances during recent years and captured the European market, while the United States was fooling with the filled cheese industry. The government of the Dominion has been wide-awake to the value of the cheese industry and has stimulated it tremendously by governmental aid, but Canada is not out of reach, and Wisconsin will certainly overtake and surpass her, if the present educational forces at work in this state grow in effectiveness during the coming years as they have recently."

It is my honest conviction that our cheese makers' association will become one of the most powerful associations in the state—powerful in calling the "boys" together once every twelve months to compare notes and exchange ideas; powerful in teaching to every cheese maker that is teachable within the borders of Wisconsin the true principles of fancy cheese making; powerful by instilling into the minds of our cheese makers that the laws which govern the making of a cheese which our domestic cheese trade so loudly calls for, should be diligently studied and then strictly followed, and our own people will be after our goods like a pack of hungry wolves; powerful by disseminating knowledge through our annual reports to the absent cheese maker, as well as those present, because that is where it is most needed. When our annual report finds its way to every home and every fireside of our cheese makers, then, and not until then, will the power of the work for good by this association be strongly felt.

While taking a course in one of the best business colleges in the land, one thing was constantly kept before me by my teachers, viz.: that in commercial business, woe be to the man or set of men that endeavor to violate some fundamental business principle, and adopt the method of making money by some shrewd, sharp drive, ignoring, as it were, true underlying business principles. I was taught that such methods may work

for a short while, but always ended disastrously to the parties practicing them. We can thus truthfully attribute the downfall of our English export cheese trade to this very cause. About a dozen years ago the Yankee "wooden nutmeg" notion struck many of our cheese manufacturers and cheese dealers. They said to themselves: "Why not skim out our valuable butter fat in the milk and replace it with cheap cotton-seed oil, soap grease, and rancid, stinking butter all mixed up and properly flavored? What a good joke it will be to sell this 'succotash' to our western and southern brethren and our English cousins abroad for Wisconsin Full Cream cheese. They will never know it." It worked like a charm. Nearly all manufacturers from central Wisconsin to southern Illinois were scrambling to be in the "swim" of this great money-making scheme. The creameries of Illinois especially were running night and day turning out those delicious "Wisconsin Full Creams," scattering them broadcast over the United States, and even had the "gall" to export them.

Gentlemen, one of the most precious of all business principles was here ruthlessly violated, a business principle which under ordinary circumstances is considered almost criminal, viz.: "selling goods under false pretenses."

All men that had studied business and business principles knew that such things could not long exist; that the crash must sooner or later come.

The crash came, and the splendid cheese reputation it took Wisconsin years and years of hard labor to build up vanished like a mist before the morning sun. We lost our splendid export trade that we used to enjoy, and our home trade was simply paralyzed. It seemed for a while as if the bottom had dropped out of everything. Then, in the midst of those blue times, came into existence the Wisconsin Cheese Makers' Association which, with the aid of our Dairymen's Association, was a powerful factor in getting through Congress the famous "Filled cheese bill" which silenced forever one of the most

damnable frauds ever perpetrated upon the honest cheese makers of Wisconsin.

One more point and I am done. I am now a strong advocate of getting our Wisconsin makers to work as a unit in pushing our "Wisconsin Full Creams" to the front for a fancy domestic trade cheese, by catering to the wants of our own people here in the west and south. If our dairy school, our association, and our Dairymen's association, and our makers all unite to make a "long pull and a strong pull" in advocating the idea that above all things this state was cut out to produce the cheese for the cheese eaters at our own doors.

How many makers of this association ever pondered over the foolish idea of transporting New York cheese thousands of miles west from the Atlantic seaboard for our grocers in the west, and, at the same time, Wisconsin transporting her cheese thousands of miles east to the Atlantic seaboard for export? Have we, as intelligent cheese makers, not business ability enough to see the point of all this useless money spent in cheese transportation? Why not have our New York brethren supply the export demands, and *we* cater to the wants and nurse our domestic trade in all its phases?

I will give you the figures to show what can be done in the line of catering to the wants of our own people that consume cheese.

General average price for season at Utica, New York, cheese board 7.42c
General average price for season at Lone Rock and Muscoda, cheese board 7.89c
General average price for season, received for special size Fancy Domestic Trade cheese at Clover Hill, Plain, Wis. 8.40c

In conclusion let me urge all that we have once more met together for the good of our profession. It is said that our butter-making friends look to their annual convention for a regular "pow-wow." We cheese makers are noted for business, and let us keep up our reputation.

In behalf of the Wisconsin Cheese Makers' Association, I again thank the good people of Madison for welcoming us right royally to their splendid city, and through the hospitality of Professors Decker and Henry, Secretary Baer and others, we have now taken possession of the city of Madison and its capitol, and shall not surrender it until the evening of February 3d, 1899.

The President: Gentlemen, we have with us here the pioneer cheese maker of Wisconsin, the Hon. Stephen Faville, and the "boys" would like to hear a word from him.

Mr. Faville spoke as follows:

Boys (that is what John—Mr. Carswell—calls you and that is what you are): I have not a discouraging word to say in this matter of cheese making. I want to say first before I forget it, that I like the ring of that paper just read. It sounds good to me. It sounds as if the convention was to do better things than it has done in the past. We are capable of it—no doubt about that. I want to say a word in corroboration of what he says about market prices of cheese in Wisconsin and in the east. Parliment & Espert told me a year ago that they were buying cheese from the east. "Why," said I, "because it is better?" "No," was the reply, "because it is cheaper, and we can bring it from the east and sell it." I understood lately, within the last few weeks, that they are doing the same thing now, and stocking the Chicago market with eastern cheese.

There is another thing I noticed in the paper, and that is in regard to home trade. Those of you who have ever heard me talk on that subject know that is a fad of mine. I am very fond of good cheese, and I am sorry to say that in the past few years it has been difficult to get, in the markets here in Madison, cheese I like. It was not good, for some reason or

other. I don't know what is the matter. But it is difficult to get any cheese, such as the market demands.

And I want to corroborate what he said in his paper that if you will cater to the home market in this city, all the other little cities around in Wisconsin will buy every pound of cheese we make. We will save freight to other cities. Do that; remember that thing. That suggestion pleased me very much in regard to the home trade. You go into the market here and into the groceries and you will find they are selling New York cheese. They call it so, anyway; some is pretty fair and some is not. If they cannot make better cheese in New York than we get in this market, I wish they wouldn't send it here. We can make better cheese than that and ought to do it.

I am glad to see you here, glad your eyes are wide open, and ready for business. If any man utters things that you don't like, pitch into him, even if it is John Decker; if he says anything you don't like, let him have it. (Laughter.) John doesn't know it all. He is learning. He is giving up a good many things he advocated two years ago. We are all learning.

I am not going to take up your time in talking. I am glad to see you here and intend to listen to what is going on, and I shall be ready to pitch in if you say anything that is not right. (Applause.)

Mr. Decker: I want to say Amen again to what Mr. Faville has just said, and to bring in my testimony as to what I have learned here personally in these discussions. There is nobody that learns more and watches these discussions closer than the workers in the experiment station over on the hill. A good many of our experiments that have brought us knowledge and carried us ahead in the last years have been inspired by the discussions that have taken place here, and some of the experiments in the curing of cheese, by which we have learned what effect temperature has on the curing of cheese, were brought about by things said by Mr. Faville, and I will give him credit here.

The President: We would like a word from Mr. Adams, who is here,—our Dairy and Food Commissioner.

Mr. H. C. Adams: I am like Mr. Faville. I came here to listen, not to talk. It would be very presumptuous in me to undertake to instruct students in the Dairy school and the practical cheese makers of this convention about their business. I am like Mr. Decker—I don't know it all—but unlike him in that I know very little about the technicalities of the business. But I am exceedingly glad to be here in the presence of the Cheese Makers' Convention, and as a resident of Madison and one interested in the dairying business, I extend to you cordial greeting. I want to congratulate you upon living in Wisconsin, which has one of the best dairy schools in the Union; that you live in a state that has as good laws relating to the manufacture and sale of dairy products as there are upon the books of any of the states; I want to congratulate you upon living in a state where the legislature looks with favor upon the agricultural interests, and does not hesitate to stand by and protect us by proper legislation; I want to congratulate you upon living in a state where the people had the wisdom to build up a great dairy school, one of the best in the Union; I want to congratulate you upon living in a state where the people are wise enough to send bright boys to that school to learn the science and art of the dairying business.

We are living in different days than those of twenty years ago. Men move faster and think faster than in the '60's, when all a farmer had to do was to sow his fields in the spring, fuss around until summer and reap them, and then sell his wheat in the fall for sixty cents a bushel. Competition is sharper than it was then, and the American farmer today, if he is successful, has got to become a thorough business man, educated in his profession, whether he is educated in the general arts and sciences or not.

You have many practical questions that you can consider in this convention in reference to the details of your business; in

reference to the production of milk and in reference to the handling of it in the factory.

I want to say this: that the inspectors in my department have been over this state a good deal, and during the last year we have noticed a marked improvement in the character of cheese factories in cleanliness and methods of proceeding.

A short time ago I was in Sheboygan, which is the center of the cheese industry in this state, and I had a talk with Mr. DeLand about the cheese industry in Wisconsin. He told me that in all his experience he never had so good a quality of cheese as in 1898, and he said that the demand was so strong that they were unable to supply over three-fourths of the demand made for Wisconsin cheese. We are making better cheese than ever before. We are doing it in a more scientific way. We are reaching more of our domestic markets. I am informed that three-fourths of the cheese produced in this state is sent to the southern states. It is taking the place of the filled cheese, the manufacture of which has been crushed out in the main by national and by state legislation.

I am glad to see manifested more and more each year among cheese makers the same feeling that has been prominent in dairymen's associations—the want to build it up and make it a strong and influential body. You are coming here each year and taking more and more interest in each other, and I hope you will go to the legislature of Wisconsin to get aid to maintain the association and make it as strong as possible. I assure you what I can do and what my friends can do will be most cheerfully done.

I want to greet you again and express my interest in your meeting, and know that you will have a good and profitable time while you are here in Madison.

The President: The Dairy division of the Department of Agriculture has been so kind as to send a representative to be

with us during this meeting, who has endeared himself to every cheese maker in Wisconsin. I now call upon Mr. Monrad, special agent of the Department of Agriculture.

Mr. Monrad spoke as follows:

I want to call you to order. I am on the program for tomorrow night and I don't want any tricks played on me. The "boys" know I am going to chip in when I have something to say, and often when I have nothing to say. I have nothing to say now but to express my pleasure at being here again. I have been pleased to call myself the godfather of this association and intend to maintain that right, and I have watched with great pleasure its growth. I have seen a great many other associations which were supported by considerable state aid, even to the tune of thousands of dollars a year, and they have not made as good sound progress as you have, and for that reason I want to congratulate you, boys, and hope you will continue thus.

I know you have several ladies making cheese in this state, and I want you to induce them to come and attend these meetings.

I thank you.

H. C. Alvis, vice president, called to the chair.

ANNUAL ADDRESS.

President J. A. Carswell, Lone Rock, Wis.

Mr. President and Gentlemen of this Convention: It gives me great pleasure to meet so many of you cheese makers and those interested in the great industry of Wisconsin assembled here today. And as I look over this assemblage and see the great number here whose hair has whitened with the experience of well-spent lives, and the young men with vigor and life just

entering upon the arena of life's action with all of life's possibilities before them, brings to me forcibly a recognition of the responsibilities that come with the honor of being a member of the Wisconsin Cheese Makers' Association.

In talking to you today I can only speak in generalities as in the papers and discussions which are to follow the technical points of interest in this great industry will be so thoroughly worked over, discussed and digested and the truths added to that ever-increasing store of knowledge which is placing the grand old state of Wisconsin among the foremost of cheese producing states of the Union. There never was a time in the affairs of men when that motto of this Union was more applicable to the every day transactions in life than at the present time. It is by a conservation of the energies of the people that great industrial enterprises are built up, exerting their mighty influence upon the general commonwealth and the body politic.

Less than a generation ago the southern and southwestern portion of this state was given over to an industry which in its glittering prospects of wealth lured the venturesome spirit from all portions of the globe, and the click of the drill, the boom of the blast, and the hustling activity of a mining town all told of the feverish industry that permeated the time.

Learned geologists, those deep in the mysteries of mineralogy, delved deep in the earth, tearing the living fragments from their parental home, turning and searching with both eye and lens to read the cabalistic signs of hidden treasure. Fortunes were made and unmade in an incredibly short length of time by a lucky or unlucky stroke as the case might be, and galena, dry bone, black jack and lodes belonged to the common nomenclature of the day. Then, as my recollection reaches back, cheese makers were just about as plentiful as snowballs at a Fourth of July picnic.

But the years have slipped by and the ever-changing hand of destiny has transformed the scene. The moss-covered rock piles and the mouldering trams in silence mark an epoch in this

state's history which has gone with the years that have fled. Instead of the jigs, smelters and refineries, we have the factories and farms, the cheese-vats and the churns, which are producing the revenues of that country, and the Babcock test instead of the assay determines the wealth of the products.

Another generation with the same devastation of the magnificent forests of Wisconsin and our lumber kings will be no more, and left behind all through the northern and central portion of Wisconsin will be a pathway strewn with a range of stumps left bleaching in the summer sun, to be transformed into meadow and pasture lands teeming with flocks and herds; a landscape to be dotted with towns and village schools, and from the chaotic ruins of nomadic lumber camps are to abound prosperous homes, with the advantages of education and lecture and social life, fitting the people for the highest offices of American citizenship; and to you, brother cheese makers, and with you rests a large part to be taken in this good work. It depends upon you largely how well, how successfully, how intelligently, we perform our part in this great reconstruction. It takes no prophetic finger to point to the fact that Canada, Michigan, Wisconsin and a portion of Minnesota, is destined to become the home of the cheese industry. Already the fast milk train of the east has penetrated far into the interior. As far west as Herkimer county, N. Y., factories that only a few years ago were enjoying ten, fifteen and twenty thousand pounds of milk daily, have closed their doors, and as one of the proprietors remarked to me, "never to open again."

I also corroborate what Mr. Schoenman, Decker and Faville say about the sale of our western products. I saw Wisconsin cheese sell one-half cent above New York state brands, but, gentlemen, we cannot stop for laurels won. We must push on with the same vigor in the future as we have in the past. If we remit our efforts for a single year this great throbbing, pulsating and pushing world will leave us so far behind that our days would be relegated with the last year's almanac.

Gentlemen, there are but a very few suggestions that I can offer to you but what has already been placed upon the program to be carried out in the next two days of this convention, and I would only say to you in closing that you are not only invited, but you are requested in the papers or in the discussions that follow the papers as they will be read here in this convention, to ask questions, offer suggestions, and in any way that you can add interest to this convention, that we may all feel when we go away from here that this has been the most profitable portion of the year.

Gentlemen, I thank you for the attention and the compliments you have paid me. (Applause.)

The President resumed the chair.

The President: The appointment of the committees will be given this evening, as I have not as yet seen all those whom I wish to see. The meeting is now adjourned until 7:30 this evening.

EVENING SESSION.

Convention met pursuant to adjournment at 7:30 P. M.

The President in the chair.

Music: Orchestra of Short Course and Dairy Boys of the University of Wisconsin.

The President: Prof. John W. Decker will show you some stereopticon views showing the growth and development of the Swiss, Brick and Limburger Industry in Wisconsin.

THE FOREIGN CHEESE BUSINESS IN WISCONSIN.

An Address given by Prof. John W. Decker.

(Illustrated by stereopticon views made from photographs taken by him.)

In the course of our address we will by means of pictures show the process of manufacture of four kinds of cheese which are made in Wisconsin, and are termed "foreign" cheese. The four kinds are the Swiss, Brick, Limburger, and Edam. With the exception of the last-mentioned cheese, the business is so extensive as to be really as much American as the American cheddar cheese. Four hundred carloads of cheese, amounting to about ten million pounds, were shipped out of Monroe the past season, and the amount made in Dodge and other counties will probably bring the amount up to fifteen million pounds.

LOCATION OF BUSINESS IN WISCONSIN.

Green county is the great Swiss cheese county of the state. In this county nearly all of the "drum Swiss," or "round Swiss," cheese, is made and considerable block cheese. The district extends over into the eastern border of La Fayette and Iowa counties, and the southern part of Dane county. The towns of Washington and New Glarus in Green county, and the town of Primrose in Dane county, a strip of county six by eighteen miles in extent, is where the most of the brick and Limburger cheese of this section is made.

Jumping over into Dodge county we find more brick cheese factories, some block Swiss factories, only a few drum Swiss, and a good many Limburger factories. Scattered over Fond du Lac county are about eight brick cheese factories, and then in northern Winnebago county west of Lake Winnebago are brick and block Swiss factories. Then jumping still further north into Marathon county are probably a dozen more brick and limburger

factories. There are three factories in La Crosse county and quite a number in Trempealeau and Buffalo counties.

It is with pleasure that I present this subject, for the cheddar cheese makers know little about this extensive business in our state. The work of the Association has been almost entirely among the cheddar makers. In the past ten years the quality of cheddar cheese has been greatly improved, and the intelligence of the makers raised immensely by the work of the Dairy School

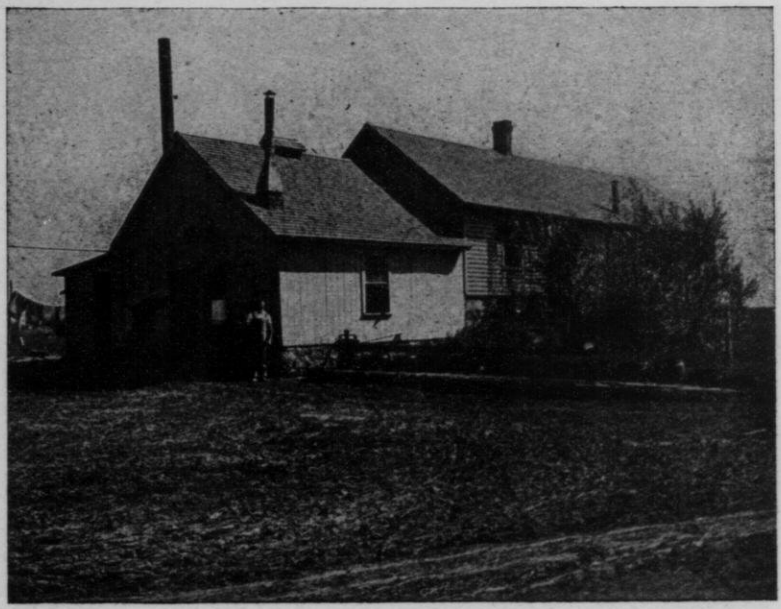

FIG. 1.—Five Corners cheese factory, 3½ miles southeast from Monroe, Wis. This is a combined butter and cheese factory, butter being made during the winter. The portion of the building extending back is the residence part, under which is the cellar.

and the Dairymen's Association. The makers of brick, Swiss and Limberger are almost entirely foreigners who speak English poorly, or not at all. They are where the cheddar makers were ten years ago. They need our help, though many of them do not know it, and are satisfied to travel the road their grandfathers' trod fifty or a hundred years ago in Europe. We must get hold of them and wake them up and make them feel that they should have a part in the good things the cheddar makers are partaking

of. I will introduce them to you tonight and I want you to get acquainted with them. I will take up each kind of cheese by itself, describe it, and tell how it is made.

FIG. 2.—The Raub Factory, 3½ miles east from Monroe, Wis. The cheesemaker, Mr. John Wyss, lives in the wing. The barrels in front are for the whey, each patron having a barrel. The trough over the barrels has a hole over each and the whey is thus distributed to the different barrels.

SWISS CHEESE.

Swiss cheese is an imitation of the imported Swiss cheese, and is often quite as good as the imported article. It is made in large round cakes about four inchs thick and nearly three feet in diameter, and the cakes average one hundred and eighty to two hundred pounds in weight; or, it is pressed in blocks six inches square by twenty inches long, weighing thirty pounds. This latter style is known as block Swiss.

Swiss cheese should have a good "dough",—that is, should have such a consistency of texture that it can be molded in the fingers like dough. It should have large round holes or "eyes" nearly half an inch in diameter distributed evenly through the cheese, and these eyes should have a glossy surface. Fig. 3 shows a cheese cut open so as to show the eyes. Sometimes the cheese gets to "working" too fast and the eyes get blown up too large, and the cheese puffs, as shown in bock cheese in Fig. 5.

In other cases pin holes form the same as in cheddar cheese, and such a cheese is termed a "nessler." If the cheese is pasty in texture, the "eyes," if any form, are not glossy and cracks or checks appear in the texture, and such a cheese is called a "glassler," because it resembles the fracture of a piece of glass. A cheese without any holes is said to be blind. Fig. 7 shows a number of plugs illustrating the different kinds of cheese.

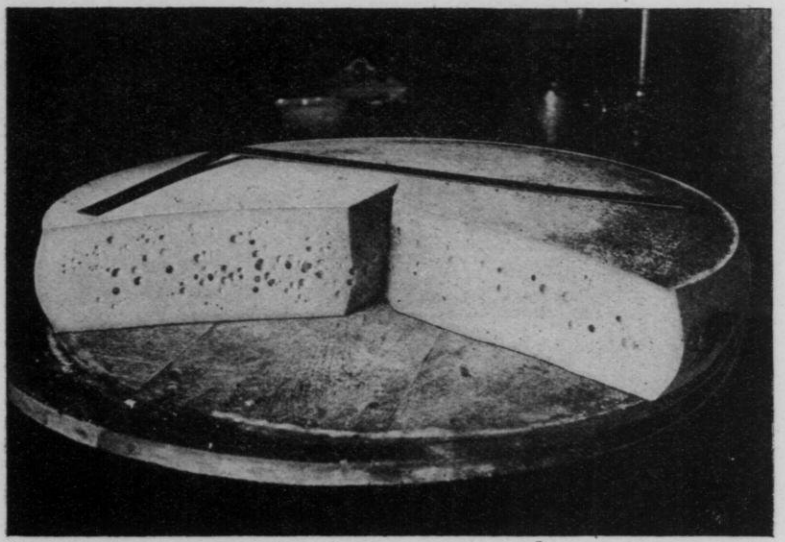

FIG. 3.—A typical Swiss cheese, cut showing characteristic holes or "eyes." A square on top of it shows its size. The eyes reflect the light showing that they have a shiny surface.

In flavor, the cheese should be fine; in color, it should not be yellow, but white, to imitate the imported cheese.

Cheese is divided into three grades:

	Texture.	Flavor.
No. 1.	Right dough and good eyes	Good.
No. 2.	Glassiers, nesslers, blind	A little off.
No. 3.	Cracked, rat-eaten	Bad.

When a buyer grades a cheese he puts one, two, or three marks in the edge to indicate the quality.

No. 2 brings about one cent less than No. 1, and No. 3 half price, or less.

Swiss cheese is cured at least three months before selling, and is sold in the ideal way—that is the buyer grades the cheese in the curing room in the presence of the maker.

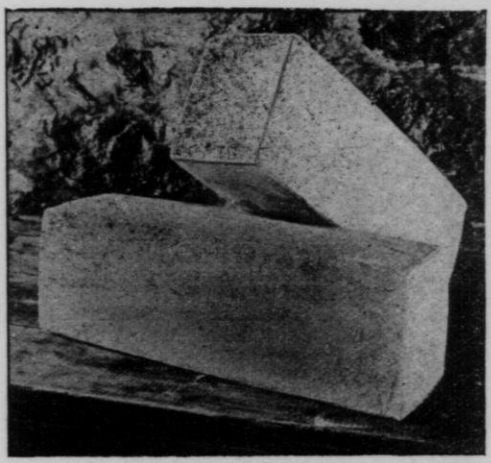

FIG. 4.—Block Swiss cheese as it appears when of fine quality.

THE PROCESS OF MANUFACTURE.

Swiss cheese is made twice a day in large copper kettles holding two or three thousand pounds of milk. The milk is strained into the kettle and being still warm as it has just been milked and brought to the factory, the rennet is added and the milk curdled. The rennet used is made by soaking rennets in whey to which a little salt has been added. This is a bad thing as the whey often inoculates the milk with gas germs which cause much trouble. The Swiss maker has had it handed down to him from his grandfather that rennet extract will not make good cheese. Our cheddar makers believed the same thing fifteen years ago. I believe that the glassler cheese comes from too sweet milk—that there is not enough acid in the milk to make the rennet expel the moisture sufficiently, and in such cases the whey may act as a starter and be beneficial, but I believe they should steer clear of a whey rennet.

When the curd is firm enough it is cut with a Swiss harp into large cakes and then stirred with a wire stirrer. Both instruments are shown in Fig. 8. When the curd is fairly fine the kettle is swung over the fire. The kettle hangs on a large wooden crane so that it can be swung over or away from the fireplace as desired. The front of the fireplace is made of sheet iron and swings around the front of the kettle.

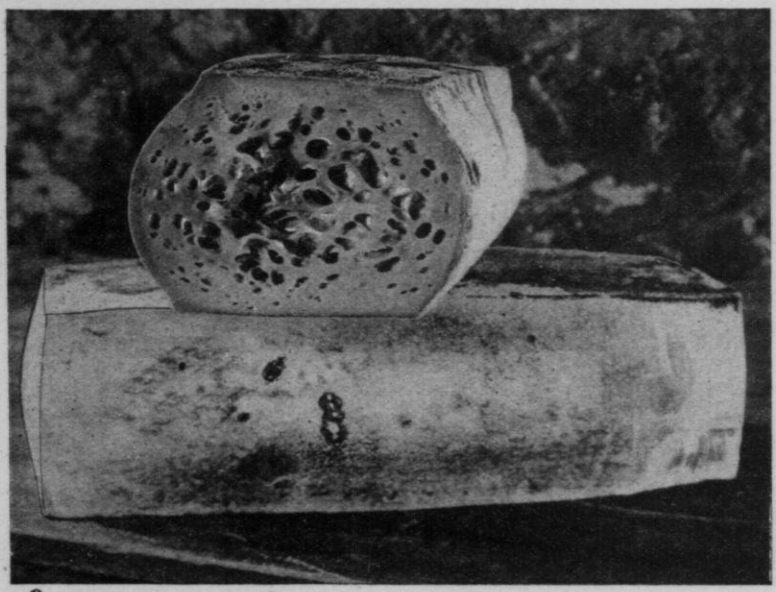

FIG. 5.—Bloated block cheese. The salt did not penetrate to the center and a large gas cavity formed there.

The maker stirs the curd constantly till it reaches about 41 Reamer or about 130 degrees F., and then swings it away from the fire and keeps stirring it until it is firm enough. He tells the proper cook by feeling of it, and by the squeaking between the teeth. When stirring the curd round and round in the kettle, the current is broken by a wooden wing inserted in one side of the kettle. When the curd has been stirred enough this wing is taken out, the curd is started around, and settles in the eddy in the middle. After settling together for a few minutes it is gathered up into a linen strainer cloth. The cloth is wet on the edge, and the edge rolled onto a steel band. The opposite edge is

held by an assistant, or in the operator's teeth, while the edge of the steel band is shoved under the lump of curd. The corners are tied together and the cloth hoisted with a block and tackle which runs on a track like a hay fork. It is then pushed over to the pressing table, which is an inclined table built on a stone or brick foundation at one side of the room.

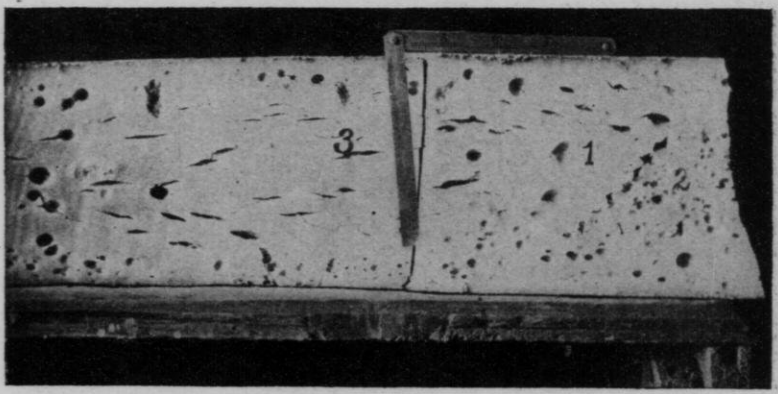

FIG. 6.—A cut through a Swiss cheese of second quality. The hole next to number 1 is round but has a dull surface. The holes near the number 2 are small and are typical of a "nessler." The cracks near the number 3 are typical of a glassler. The rule lying along the side shows the relative sizes of the holes.

If a drum Swiss is to be made it is let down into a round hoop, but if a block Swiss into a rectangular mold. The mold or hoop is adjustable so that the volume can be changed to make the cheese a uniform height, but vary in diameter to suit the quantity of curd. A heavy press board is placed on top and the weight of a heavy beam placed on it. After pressing a while it is turned over and another cloth wrapped on the other side of it; in fact, the cheese is turned a number of times and the cloth adjusted carefully. If block Swiss is to be made, at the end of twelve hours it is cut into blocks six inches square and placed in another mold with partitions, or in separate molds.

The cheese is pressed for twenty hours and then has the date marked on it with lamp black, and is taken into the cellar and placed in a tank of brine to be salted. The brine is made strong enough to float an egg, and the cheese remains in it three days.

It is then placed on a shelf and a little coarse salt is sifted on it. In order to get the eyes started the temperature of the room should be about seventy degrees. After the eyes start the cheese should be removed to a cooler room.

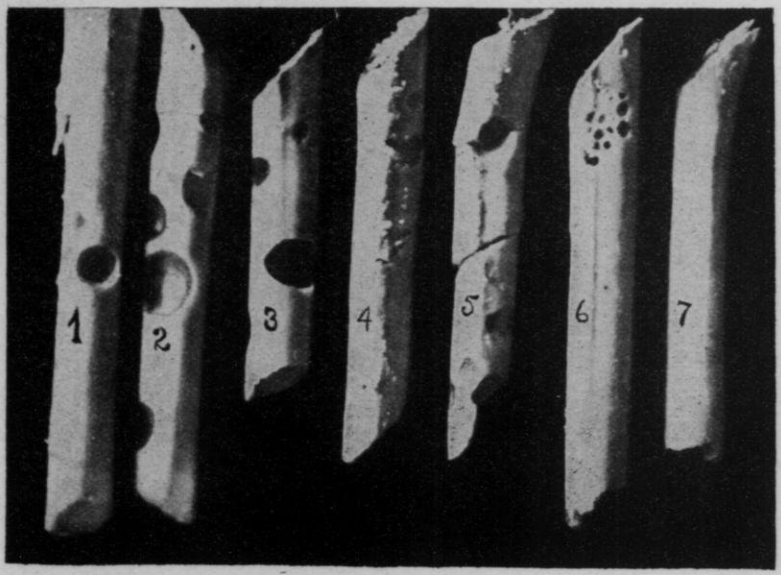

FIG. 7.—A series of plugs from Swiss cheeses of different quality. Nos. 1, 2, 3 would be classed as No. 1 cheese, though 2 has rather too many holes. Nos. 4 and 5 show the cracks of a glassler and the corresponding pasty appearance. No. 6 at the upper end indicates a nessler, though a typical nessler would have the small holes the entire length of the plug. No. 7 is what would be termed a blind cheese as there are no "eyes" or holes.

If the cheese molds it is brushed or washed so that it will keep bright. It is important to have enough moisture in the room. If it becomes too dry the eyes will not form. A steam boiler is usually kept to let the steam out and supply the moisture needed.

SHIPPING THE CHEESE.

When the cheese has been sold, it is boxed ready to ship. The drum Swiss is put into a round tank made so that six cheese will just fit into it, and six of these cheese will often weigh a thousand pounds. Fig. 17 shows a load of three of these tanks which weigh together a ton and a half.

The block Swiss is put up in boxes 6x20x36 inches, making six cheese in a box weighing 160 to 180 pounds.

The cheese goes all over the United States.

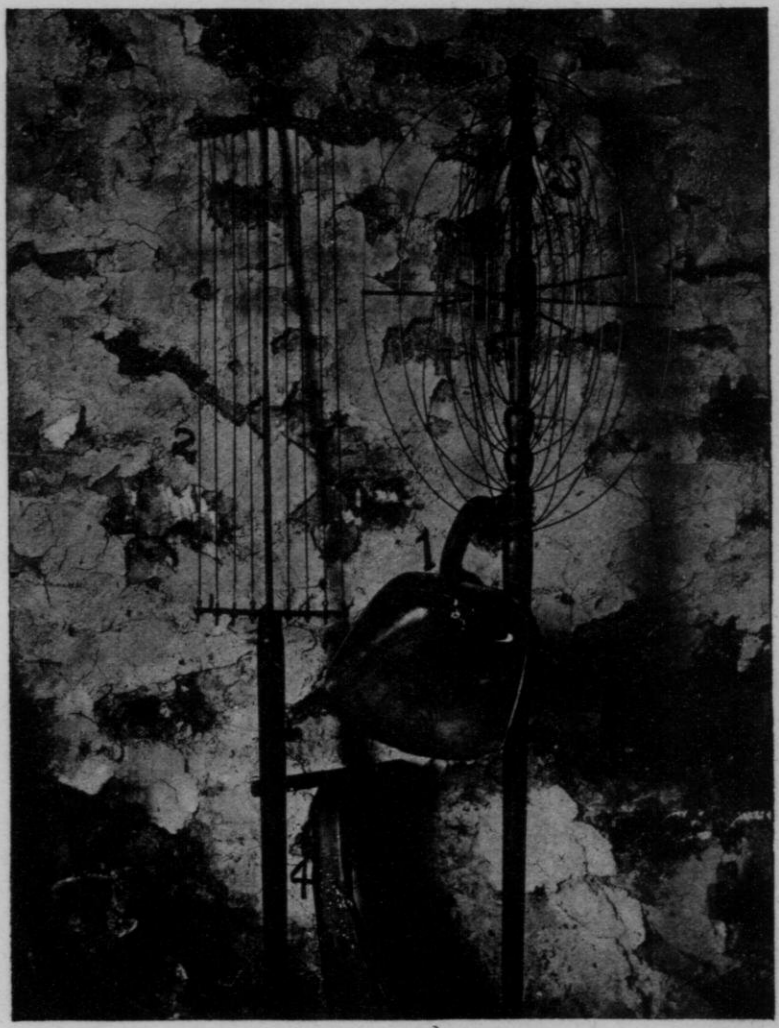

FIG. 8.—Tools used in making Swiss cheese. 1, a wooden scoop. 2, Swiss harp. 3, Wire curd stirrer. 4, Wooden partition which fits into kettle to break the current when stirring.

BRICK CHEESE.

Brick cheese is made from sweet milk usually delivered twice a day, though this is not necessary where the farmers take good care of the milk.

FIG. 9.—Swiss kettle in the Raub factory. The kettle hangs on a heavy wooden crane. The front of the fire place over which the kettle hangs also hangs on a crane and can be swung out so that the kettle can be swung away from the fire. The opening below the grate will be seen in front of the kettle. The round cover is dropped over the top when kettle swings forward.

The curd is cooked up in a vat in every way like cheddar, excepting that no acid is developed before drawing the whey, and the temperature at which it is cooked is about one hundred and fifteen. The whey is drawn when the curd is firm enough and the curd dipped into wooden molds. These molds are wooden (I have seen perforated tin molds) either eight and a half or ten inches long by five inches wide and six or eight inches deep. The sides have grooves cut with a saw and perforated to facilitate the escape of the whey. An inclined draining table with sides about two inches high is used on which to press the cheese. Usually a series of perforated draining boards is laid on the table and covered with a linen strainer cloth. The molds are placed on top of this side by side. Fig. 19 shows the construction of the

molds and draining boards and Fig. 20 shows them in use. The curd is placed in the molds and the whey drains off. A follower is placed in the top of the mold and two bricks placed on top for weight. I suppose that the cheese gets the name "brick cheese" because it is shaped like a brick and is pressed under the weight of bricks.

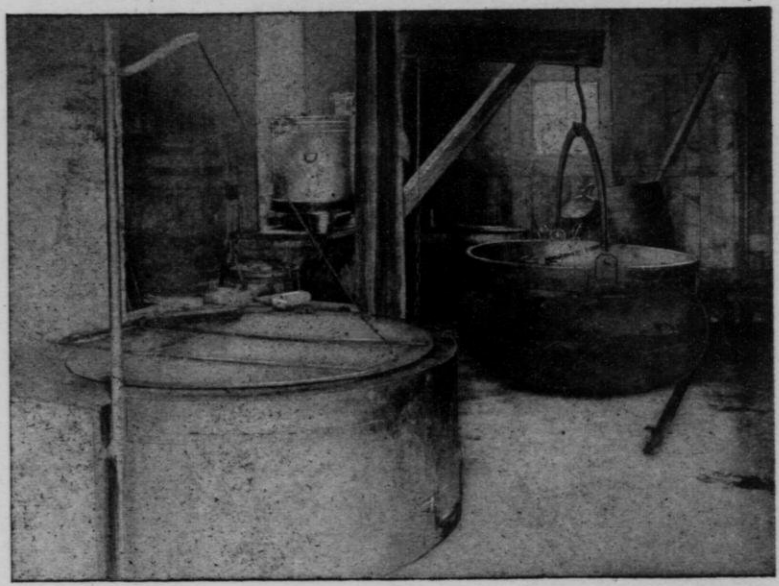

FIG. 10.—View in the Stearns factory showing the kettle swung around in front of the weigh can. The cover of the fire place has been dropped.

It is turned over several times to press and drain evenly. At the end of twenty-four hours it is taken into the salting room which is a part of the cellar. Here it is rubbed with salt and piled together on a table with sides six or eight inches high. The second day the crevices are scraped full of curd. Salt is rubbed on each day for three days, and gradually works into the cheese. The moisture that is expelled by the salt drains off from the inclined table. The salt should be rather coarse, for fine salt dissolved so fast that it cuts the casein and makes a slimy or "burned" surface. The cheese goes onto the shelves in the curing cellar where it is turned and washed two or three times a

week until cured. It is shipped out at about a month old. Each cheese is wrapped in a sheet of manila paper. There are about twenty to twenty-five cheese placed in a rectangular box, the cheese in a box weighing one hundred to one hundred and twenty pounds.

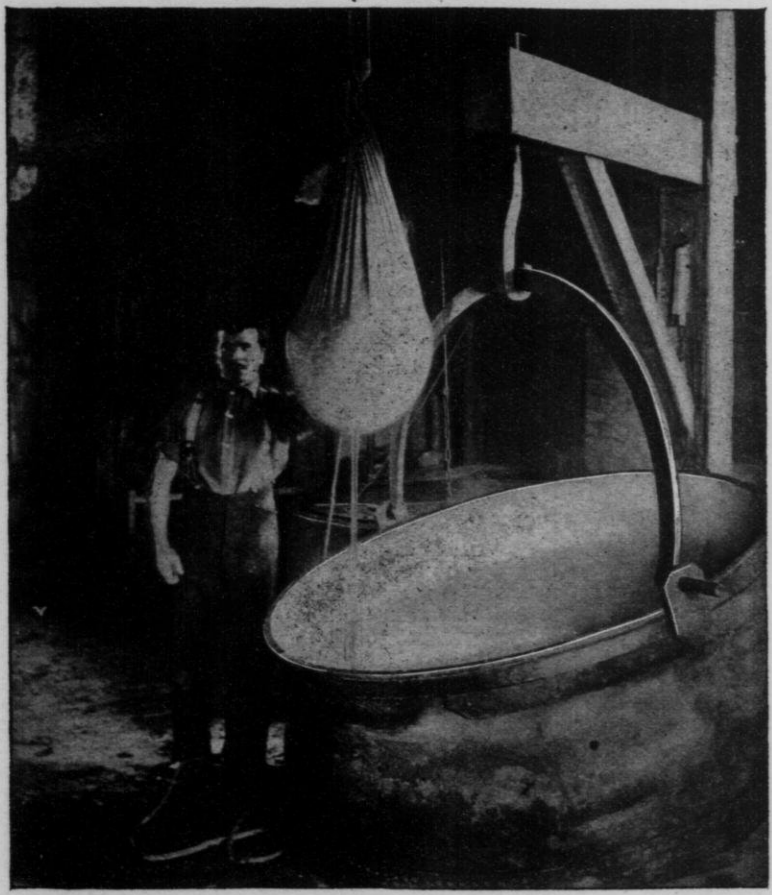

FIG. 11.—Taking the curd out of the kettle. The block and tackle with curd attached is run on a track over to the press.

A round cheese is made in every way like brick cheese, except that it is pressed in round instead of rectangular molds. It has been called Munster. It is shipped in the same sized boxes as ordinary brick.

LIMBURGER CHEESE.

Limburger cheese is made much like brick cheese—the real difference being that it is softer than brick.

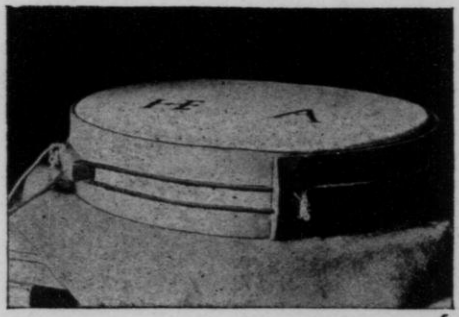

FIG. 12.—A round Swiss cheese in the hoop. The cheese is made the thickness of the hoop, and the diameter is adjusted accordingly by the rope which runs around it. A round board lies on top and presses the cheese into the hoop.

It is made in an ordinary vat out of sweet milk. It is cooked at 94 to 98 degrees F. The curd is placed in molds similar to the ones used for brick cheese with the exception that they are twenty inches long. The curd is not pressed as in brick cheese, but it is simply allowed to settle. It is taken out of the molds in a few hours and cut into blocks five inches square. These blocks are then placed on a draining table with wooden partitions be-

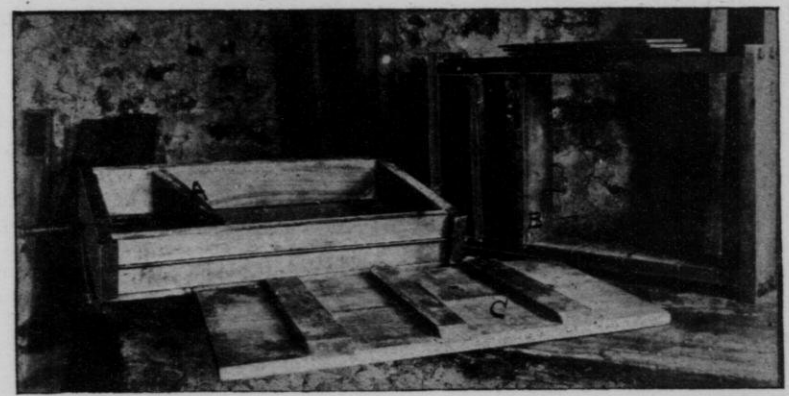

FIG. 13.—Block Swiss moulds. A, the adjustable end, moved by a screw. B, the partition which fits into the grooves making the right sized moulds after the blocks are cut. C, the cover or follower.

tween. When a row has been completed a long wooden strip is placed against them and another row laid down. These partitions and strips keep the cheese from spreading. Such a draining table is shown in Fig. 23.

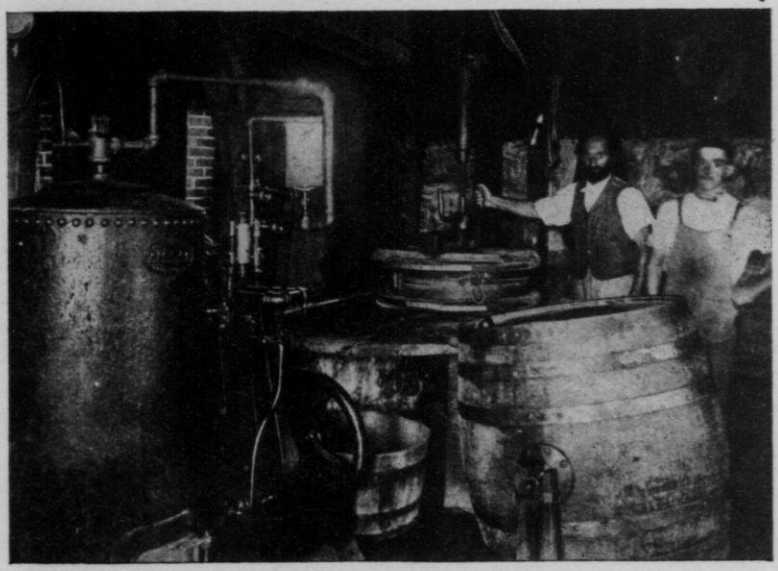

FIG. 14.—Interior of Five Corners factory, showing a cheese in the press and the means of adjusting the pressure. The small engine and churn are for making whey butter.

The next day the cheese is taken into the cellar and salted the same as brick cheese. The cheese being soft, a rubbing with the hands will fill up all crevices. They are then placed on the shelves to cure. The cellar must be moist and the cheese is dipped in water every day or two to keep it soft. A putrefactive fermentation starts on the outside and works to the center in the course of a month or six weeks. In the cellar this cheese does not smell strong, but when exposed to a warm temperature for a few hours it will assert itself. It is wrapped in manila paper and then in tin foil and is packed in boxes like brick cheese. Fig. 24 shows a limburger cellar. The salting table is immediately in the foreground. The cheese is piled on the shelves.

FIG. 15.—Curing cellar in Five Corners factory, near Monroe. The large drum Swiss cheeses are on the shelves. The small boiler supplies steam for moisture when too dry.

FIG. 16.—Block Swiss cheese in cellar at Stearns' factory. The large brush B on the post is used for washing drum Swiss cheese. The brine tank A is to be seen.

FIG. 17.—A load of three tubs of cheese weighing a ton and a half being delivered at Gunert's warehouse, Monroe.

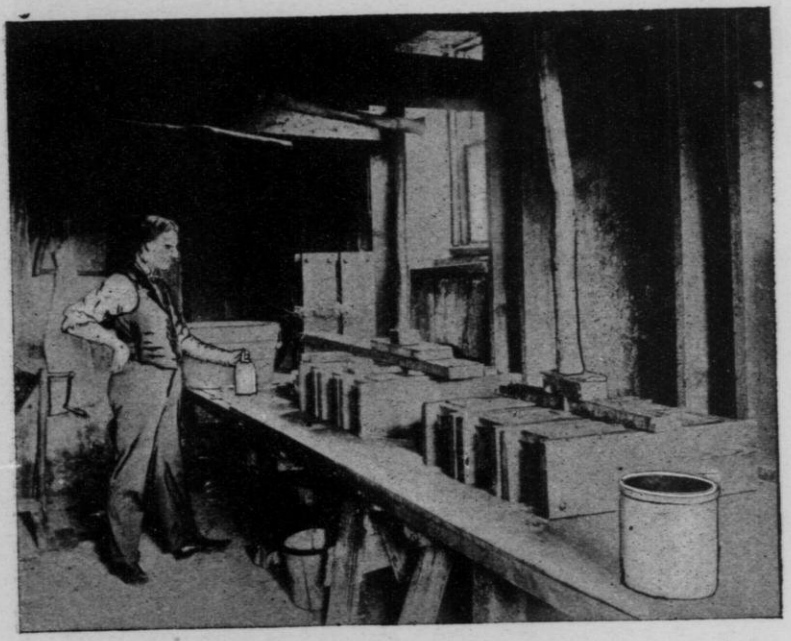

FIG. 18.—Wisconsin State Instructor, U. S. Baer, making a curd test. The two presses are different from the forms shown in figure 16. Here each block is in a separate form.

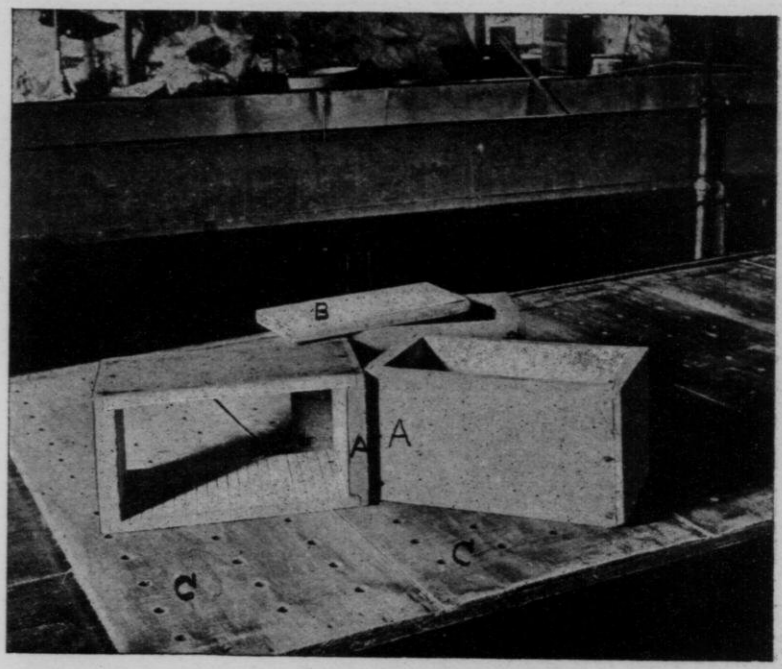

FIG. 19.—Brick and Limburger cheese moulds. A, moulds. B, follower. C, draining board.

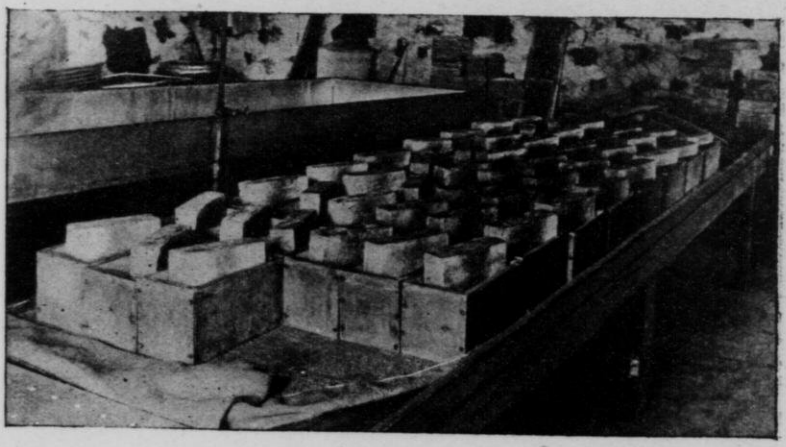

FIG. 20.—Brick cheese in the moulds. A cloth is placed under the moulds.

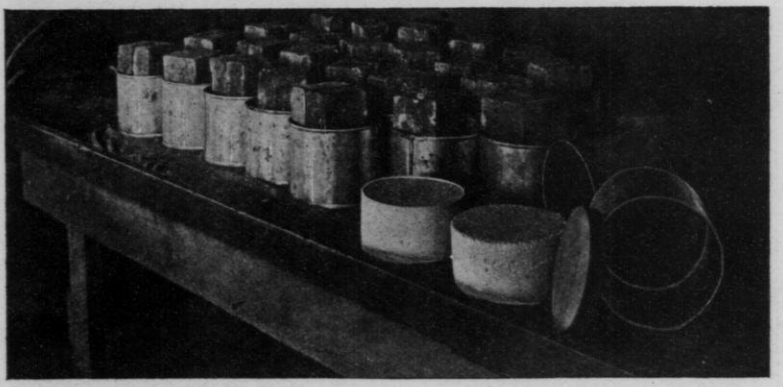

FIG. 21.—Round brick or imitation Munster cheese in the tin moulds.

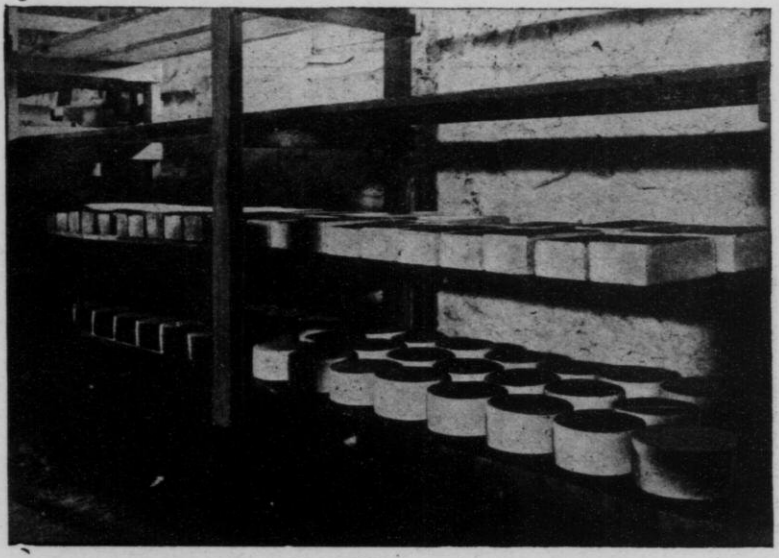

FIG. 22.—Brick and Munster cheese in curing cellar.

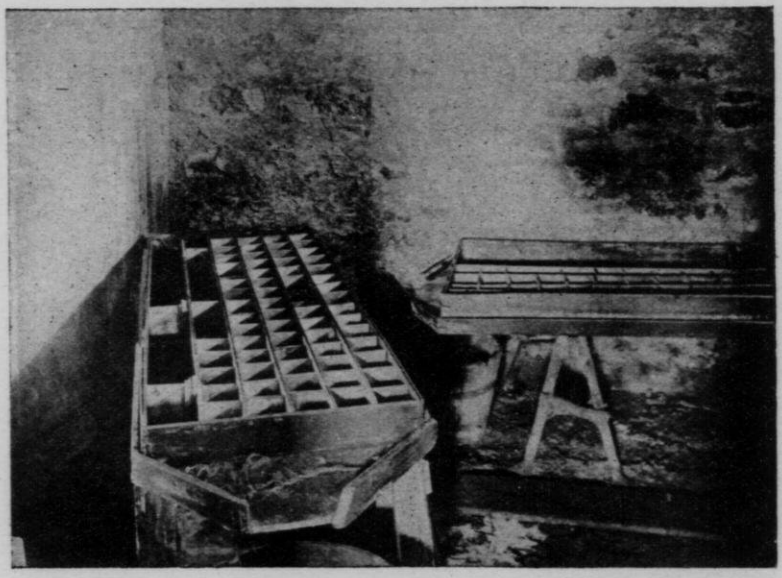

FIG. 23.—Limburger moulds on draining table showing the long pieces and the short partitions between.

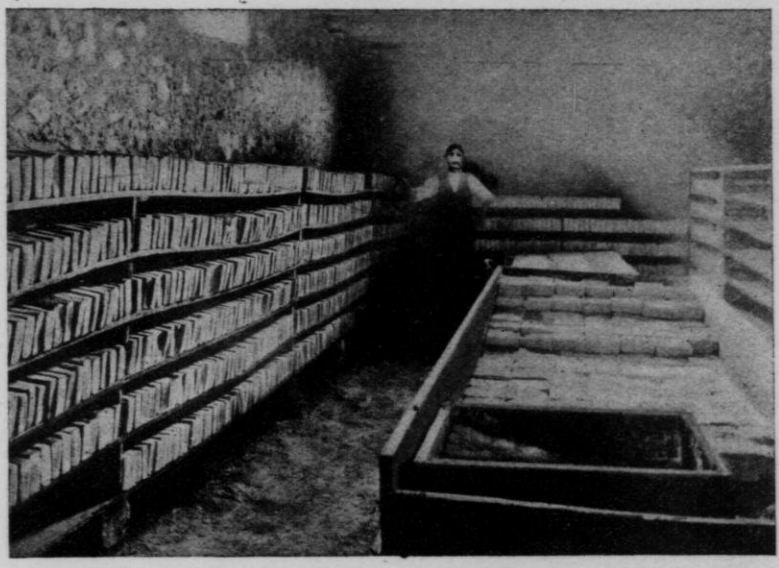

FIG. 24.—Limburger cellar. In front is the salting table with the cheese in the salt. In the foreground is a box containing salt. The cheese is to be seen on the shelves.

EDAM CHEESE.

Edam cheese gets its name from a city of that name in North Holland. We get the cheese in some of our best grocery stores. It is round like a cannon ball, six inches in diameter, weighs four pounds, and costs the consumer one dollar.

It is made in Wisconsin in very limited quantities, but when properly cured is equal to the best imported Edam.

As I have visited Holland, and took some interesting photographs bearing on the subject, I will explain the cheese and its manufacture as I found it there.

FIG. 25.—Farm buildings at De Ripp, North Holland. J. W. Decker in foreground.

As you know, the land is low, a great deal of it being below the sea level and surrounded by dikes over which the water is pumped into the sea by big wind mills and steam pumps. On the flat grassy pastures are found black and white cattle known to us as the Holstein Friesians. It is from their milk the Edam cheese is made. There are but few factories, the most of the cheese being made on farms in a very crude manner. The farm

building, including living rooms, stable, etc., are usually under one roof. Fig. 25 shows such a place where I saw Edam cheese made. Fig. 26 shows the inside of the stable with cheese curing on a shelf. The cattle are turned into the fields in May and remain out till November. At this place near De Rijp the night's and morning's milk, about 600 pounds, was put into a large wooden tub. A little milk was heated in a kettle and added to the milk to raise it to a temperature of 86 degrees F. Then the color and rennet extract was added. I should say that before these were added a starter of sour whey was added. They sometimes have serious trouble with gas germs and the lactic acid whey starter is added to overcome this. I believe it is also what gives them their characteristic flavor, for a good Edam flavor is the same as a good cheddar a year old.

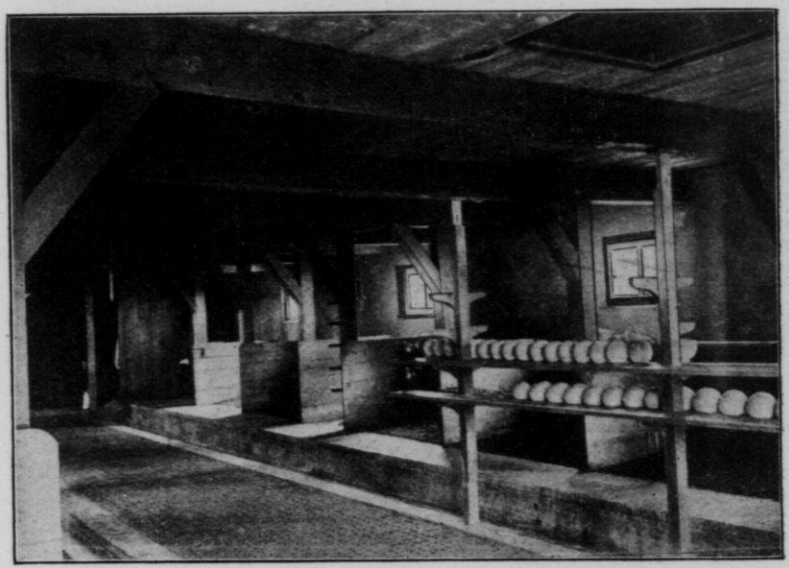

FIG. 26.—Inside of stable shown in Fig. 25. The cows are now out at pasture. Edam cheese is curing on the shelf.

The milk curdled in thirty minutes and was then cut the same as cheddar cheese. As soon as sufficient whey separated it was dipped out and heated in a kettle, and then poured back into the tub. This raised the temperature to 90 degrees at which temper-

ature it was firmed. It became as firm as cheddar or Swiss curd, and would squeak between the teeth. The whey was then drained off and the curd was put into the molds.

The molds are made of wood, one piece being turned into a cup with a spherical bottom and a top piece to fit into it closely, so that the cheese will be spherical. There are a few holes in the mold and top to let the whey drain out. The curd is worked down into the mold and squeezed and pressed by the hands to make it perfectly solid. It is then put under pressure for a short time and then taken out and wrapped in cloth and returned to the press. Usually two molds are put together one on top of the other and a vertical timber 4x4 inches three feet long drops onto them for pressure. At this place the farmer had a gang press.

FIG. 27.—Curing room of an Edam cheese factory in North Holland.

The cheese is pressed till the next morning and then taken out and rubbed with salt and put into a wooden salting cup the same shape as the wooden molds. After salting for three or four days they become hard enough to resist pressure with the fingers, and they are placed on the shelves to cure. As I have said, most of the

cheese is made on farms, but there are a few factories. I visited one factory receiving nine thousand pounds of milk a day. There were five hands employed, and they paid for milk according to test. The milk was tested at the experimental station at Hoorn once a month. Fig. 27 shows the cheese in the curing room at this factory.

The cheese is held till about a month old. Any mold that may have gathered on it is washed off, and the cheese when dry are rubbed with linseed oil and sent to market, where they bring nine or ten cents a pound. The Edam cheese that is brought to this country is held till well cured, and then sells at retail for twenty-five cents a pound.

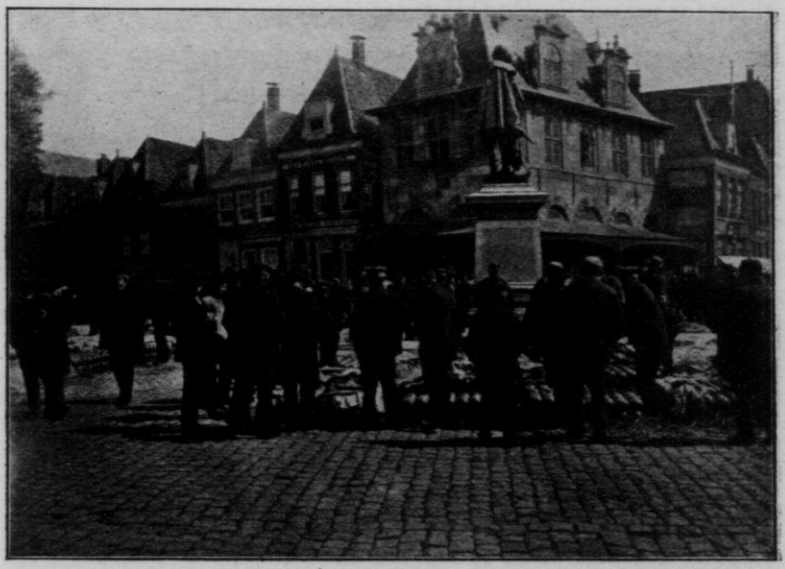

FIG. 28.—The weekly cheese market at Hoorn, North Holland. The market building where the cheese is weighed is just beyond the statue.

We can make just as good or even better cheese than they, for we have richer, better milk. They have a cool moist climate, which is all in their favor, for Edam cheese should be cured at about 60 degrees F. If we can keep the temperature of our curing rooms right and then do not get in too big a hurry for returns and sell the cheese green, we in Wisconsin can compete with the

world on Edam cheese. N. Simon at Neenah has made some that were fine.

A CHEESE MARKET IN HOLLAND.

Edam cheese in Holland is carried in carts to the market. Straw is laid on the pavement and the cheese piled in a pyramid on the straw. A cloth is then thrown over it to protect it from the heat of the sun till the market opens.

FIG. 29.—Weighing Edam cheese at the market at Hoorn.

The buyer passes along the piles and plugs one cheese in a pile, and makes an offer which is accepted or rejected. Fig. 28 shows such a market scene at Hoorn. When the cheese is sold it is piled onto skids and carried by porters shown in Fig. 29 dressed in white suits to the market building to be weighed. At the Hoorn market building there are three immense balances hung from the ceiling. The cheese is placed in one scale pan and heavy weights on the other to balance. This is the official weighing. The cheese is then turned over to the buyer.

Such is the process of manufacture and the marketing of Edam cheese in Holland. We can make just as good an article in Wisconsin. A case of twelve cheese weighing forty-eight pounds brings $7.50 or sixteen cents a pound. I have had letters from quite a number of firms in the east wanting Edam cheese, and I believe that there is a field here that should be worked.

Music: Octette of male voices from the Short Course and Dairy School.

The President: The next we have on the program is the "Outlook of the Cheese Industry in Wisconsin," by W. W. Chadwick, Assistant Dairy and Food Commissioner, Madison, Wis.

OUTLOOK OF THE CHEESE INDUSTRY IN WISCONSIN.

W. W. Chadwick, Madison, Wis.

According to the last report of the Department of Agriculture there are 15,990,115 milch cows, nearly 16,000,000 in the United States. In 1895 an enumeration of the milch cows in this state two years old and over was made for the first time and the number reported was 842,039. Of this number the milk of about 200,000 is used to manufacture cheese.

It has been said "Americans taste cheese, while Europeans eat it." In Great Britain and most of the countries of Europe cheese is one of the chief articles of food. They use it as freely as we do meat. This substitution is found to be economical and satisfactory to consumers. In these foreign countries the consumption of cheese per capita is several times as large as in the United States. It seems clear that a taste for cheese has never

been generally cultivated in this country. One reason is that we have cheaper meats, and then the consumer does not have to pay as close attention to the cost of his table.

According to our last dairy and food report we have 1,571 cheese factories in our state and we manufacture about one-fourth of all the cheese in the United States. I have visited many of these factories, to ascertain their condition as to location, cleanliness, condition of milk, and if filled cheese was being manufactured. We received many communications soon after the laws suppressing the manufacture of filled cheese and regulating the manufacture of skimmed cheese were enacted, in 1895, asking us to visit various cheese factories and creameries where the informants thought the laws were being violated, but we were unable to find any filled cheese being manufactured. I found some skimmed cheese being made in Manitowoc county contrary to law. I made complaint against the party and he pleaded guilty, paid his fine and said he would sin no more.

The cheese industry is not all it should be in our grand old state, where we have the right soil, grasses, water and climate for its production. I have visited several hundred cheese factories and creameries in this state during the past four years. I have taken the average cost of twenty-seven of these, in as many different counties, during different months of the year, and find the average amount of butter fat in the milk delivered to be 3.7 per cent.

Many of our farmers pay no attention to breed or breeding of their dairy herds. We all know that when proper care is given to the right kind of sires the result is better milk. We can not expect good cheese to be made from poor milk, any more than we can look for good bread from poor flour. In order to produce good milk we must have good healthy cows, provide them with the right kind and quantity of wholesome food and keep them in perfect health, giving them the proper amount of exercise,

pure water and fresh air, and have their stables properly ventilated.

Too great care cannot be given milk. Much of the milk delivered at the various factories I have visited in the state is too filthy to be used for human food, and hardly fit to give a pig. It is drawn from cows in a dirty stable, put into a dirty can, then in a dirty wagon and delivered at the factory by a dirty person. Many of the cheese factories are located near sloughs, pigsties, barn-yards and other filthy places and are not kept clean. Most of the trouble in the various factories is caused by filthiness.

In many parts of the state there are too many factories of inferior quality, because farmers want to have their milk delivered but a very short distance. It would be much better to have better factories and a less number of them, as cheese can be manufactured cheaper where 6,000 pounds is delivered daily than where only 3,000 is delivered.

I have visited a number of factories and found many of them making poor cheese and they were at a loss to know the reason why. In most of the factories where Swiss cheese is made they have as many barrels for whey as there are patrons. These barrels are usually sunk about a foot and a half in the ground, and the whey is dipped from the barrels with a pail. Some of that whey is put in the barrel in the spring and remains there all summer, for the barrel is not washed from spring until fall. I think a galvanized steel tank should be in use for the whey at every factory, and every time it is used it should be thoroughly scalded and cleaned just as carefully as the cans in which the milk is delivered.

Too much can not be said in favor of our Dairy School, for I have noticed that all over the state wherever its graduates are employed fine goods are made. It was my good fortune to be Superintendent of the Dairy Department at the State Fair one year and I noticed that a large number of prizes were captured by our Dairy School students.

It has always seemed to me, and my observation has borne

me out in the opinion, that milk should be sold by the test instead of by the hundred pounds. There is no more reason why milk should be sold by the hundred regardless of the per cent. of butter fat it contains than that oats should be sold by the bushel regardless of weight. Where milk is sold by the hundred, and a large part of it that is made into cheese is sold in that way, I often find that one or more of the patrons adulterate their milk by either skimming or watering, and sometimes they do both. When complaint is made against them they either plead guilty and pay their fine, or are tried, and are usually convicted. After having visited a factory and convicted one or more dishonest patrons the milk delivered is always very much better, and I have received many letters stating that it takes one and sometimes two pounds less milk to make a pound of cheese. I have visited some of these factories a second time and have always found them in much better condition.

Every dairyman should test each cow in his herd with a Babcock tester and if any cow is not paying for her keep she should be disposed of as soon as possible and a good animal secured in her stead. When we have a person in our employ who does not earn half his wages we very soon find some one to take his place. If all our dairymen would secure the right kind of sires the milk of the whole state would very soon average 4 per cent. of butter fat, that being a gain of 3-10 of 1 per cent. over the present average. This alone would add at least 4,000,000 pounds per annum to our present yield.

As to the future of the dairy industry in our state I think there is no limit to its possibilities. The reputation of our cheese product has been very much damaged by the filled cheese that was made a few years ago, but now that its manufacture has been entirely prohibited, there is no reason why we should not be a much closer second to New York state than we are at the present time.

I am a firm believer in the expansion of the cheese business, and I think there is no doubt that we can double and even

treble our production when we have under cultivation all the land in Northern Wisconsin that is now waiting for the industrious and honest dairyman.

The President: We have now a few moments to spare if anyone wishes to ask Mr. Chadwick any questions.

DISCUSSION.

Mr. Aderhold: I would like to ask Mr. Chadwick what kind of laws we have to govern the sanitary condition, or rather the unsanitary condition, of many of our cheese factories.

Mr. Chadwick: We have laws that govern those conditions, but I cannot give you just the law. We have a law that governs factories that are kept in that manner, and I have reported eight of these factories that I visited that were in that condiion,—reported them to our Dairy and Food Commissioner.

Mr. Decker: Is it in the province of the Dairy and Food Commissioner to look after these things, or the Health Commissioner?

Mr. Chadwick: Perhaps it would be both. We have looked after them as far as we could, but there are over fifteen hundred in the state, and it would be impossible for any one or two persons to visit all of them in one year.

Mr. Decker: What can be done more than reporting it to the commissioner? If the commissioner could do anything, in what way would he proceed?

Mr. Chadwick: There was a law enacted (I cannot say just what year, but I think '95) that gives him power to have that matter attended to, and I think they can close up the factory—if I am not mistaken. I will say that I found this condition of things more particularly among the Swiss factories than any others. As Prof. Decker showed you in his pictures this evening, they put this whey into those barrels, and they have

as many barrels as there are patrons. Sometimes if a patron brings a large quantity of milk they will have two barrels and put that whey in these barrels and dip it out with a pail. It is impossible to secure all of that whey, and these barrels are not washed from spring to fall, and they have trouble with the cheese; bacteria gets in there, and the farmers sometimes think it is the fault of the cheese makers; and then some of these patrons have been known to put the milk that they take to the factory in these cans after taking the whey home—sometimes washing them with cold water, and in some cases they have been known to put the milk in and take it back to the factory without the cans having been washed, which is supposed to cause the trouble. I have talked with Prof. Russell, who is as good authority as any, I presume, and he says that the filthiness in these factories is the cause of their trouble nine times out of ten.

Mr. Monrad: Did you find many underground whey tanks?

Mr. Chadwick: Not many; there are some.

Mr. Decker: More in the district northeast?

Mr. Chadwick: Yes, and there are a good many in the northern part of the state.

Mr. Monrad: Don't you think they are as bad as Swiss barrels?

Mr. Chadwick: Yes, I think they are. They are made of wood, and I never found a cheese maker yet who ever washed one of these out.

Mr. Decker: I want to say that another cause of trouble with Swiss makers—when they have trouble with nessler cheese—what we call pin holes in cheddar cheese—is caused by their way of preparing rennet. They have an idea because their grandfathers never used rennet extract, they need not, and so they soak up the rennet in whey every day, and the whey contains germs that tend to cause so much trouble.

It is the work of this association and the work of the dairy school to look after this matter.

Mr. Mason: I would like to ask Mr. Chadwick if there is a direct law against factories having such tanks and carrying the whey home in such condition? I mean factories that run whey into dirty tanks, leaving the skippers, grease and dirt in it, and then draw that whey home in the milk cans. If we have a direct law, I think we ought to enforce it soon.

Mr. Chadwick: Yes, we have such laws.

Mr. Pearson: Mr. President, I understand there is a law regulating the size of skimmed cheese.

The President: Yes.

Mr. Pearson: What is the amount of skimmed cheese made in conformity with that law?

Mr. Chadwick: There is some skimmed cheese made. The size of that cheese is ten inches in diameter and nine in height, and there is considerable of that cheese made and bandaged properly, and as I said, we found one party who manufactured this skimmed cheese, and did not make it of the proper dimensions. He was making butter at the same factory.

Mr. Pearson: Is this skimmed cheese which is being made as the law prescribes, sold locally or sent away to the large cities?

Mr. Chadwick: I think as a rule it is shipped out.

Mr. Decker: Sold for fish bait in Chicago.

Mr. Aderhold: Is there any skimmed cheese made in Wisconsin, and where?

Mr. Chadwick: Yes, there is some made in Outagamie county by N. Simon & Co. He had some in his warehouse in Neenah that he showed to me.

Mr. Aderhold: When was that?

Mr. Chadwick: About two years ago—quite a quantity of it in his warehouse that year. It was of the proper dimensions, bandaged and all.

Mr. Aderhold: Do you know whether he kept that up?

Mr. Chadwick: He told me he had some on hand that he wanted to get rid of.

Mr. Aderhold: Do you know of any other cheese factories in Wisconsin making skimmed cheese?

Mr. Chadwick: No, I do not.

Music: Short Course and Dairy Boys' Orchestra.

The following committees were then appointed by the president:

On Resolutions:

E. L. Aderhold,
A. Schoenman,
W. C. Dickson.

On Legislation:

Hon. H. C. Adams,
Prof. J. W. Decker,
J. K. Powell.

On Dairy Products:

Hon. D. M. MacPherson,
C. A. White,
R. A. Horton.

The President: We will now receive the report of the secretary.

REPORT OF SECRETARY.

U. S. Baer.

Mr. President and Members of the Association:

Because of ill health I was not in attendance at the last annual meeting of this association, therefore I have nothing to offer in the way of a report of that meeting; but it was with considerable gratification that reports have come to me from many sources throughout the past season, which invariably pronounced the meeting a success from opening to closing.

In compiling the stenographer's report of the proceedings of the meeting, I noted that the papers presented and the discussions which followed were of a high and progressive order, and that a spirited, intelligent consideration of many questions was conducted with the utmost interest.

Notwithstanding some discouragements, the efforts of this association in behalf of the cheese interests have availed much, to that extent, that its effect and influence is being felt beyond the confines of our own state.

This seventh annual meeting, it seems to me, has a special character, in the sense that it marks the seventh anniversary of the founding of our association, and we have a right, gentlemen, to feel proud of our work when we look back, and can say without fear of contradiction, that this association since its organization has had its share in all the progress made in the cheese industry of this state, in spite of the fact that our finances have always been limited, to that extent that your officers' work has been handicapped from year to year, because of no state aid and our small membership fees.

Permit me to say that if we are to hope for help, be it from the state or any other source, private or public, we must be willing to help ourselves, and, gentlemen, I appeal to you tonight to become members, if not already so, and I trust that not one cheese maker in attendance at this meeting will leave the city without first taking out a membership, securing the annual report and becoming one of us. In union there is strength and mutual aid, and the future success of this association depends largely on the hearty co-operation of all the cheese makers in the state, in fact all who are interested in any way in this line of business.

The success which this association has achieved is due, first, to its having met with men of good intentions, who have with their enlightened dairy views furnished it with talent that has made us noted in cheese circles; second, the dealers and transportation companies have helped furnish it from year to year

with sufficient funds necessary to the carrying out of its plans, and, by their presence at our annual meetings, given additional vigor to all the progress which we have made; third, to the activity of some of our members, who have exerted themselves with a zeal and an energy that do them honor and entitle them to the gratitude of the dairy and agricultural classes of this state.

Near the close of the past year three hundred copies of the annual report of this association were published, of which about one hundred and fifty copies were mailed to persons interested in the cheese industry in this state, and over one hundred copies were sent into nearly all the states of the Union and to the provinces of the Dominion of Canada.

This office has received acknowledgments from Canada, from the far east and various other points, expressing surprise at the amount of practical information relating to the art of cheese making contained in these volumes, and believing that no better literature to build up the dairy and agricultural interests of this state can be sent out than the annual reports of the different state societies devoted to the various branches of agriculture, it is here suggested that this association make provision in some manner, if possible, for the publication of at least three thousand copies of the report of the proceedings of this meeting for distribution, these reports to be gotten out and mailed within sixty days after the close of this meeting, instead of delaying the publication until nearly the close of the cheese making season.

The State Dairymen's Association have employed two traveling cheese instructors the past season; your humble servant having been one of the two, I do not wish to dwell at length on the work of this nature in the field, but am led to believe that the work has given general satisfaction, as there is an increasing demand among factorymen for the instructor's services, and we should aid the Dairymen's Association in their work in reaching that class of cheese makers and dairymen who are still

in the dark, but who help to make the reputation of our dairy products as much as those of us who avail ourselves of the benefits to be derived from these different sources of information. There is no longer any question but that practical work of this nature would prove of great benefit, and be demonstrated in a short time by a better class of cheese being sent out by our factories.

Surely no one can deny that there is a large amount of poor cheese made at the present time in this state, and there is no other way of making it better in certain parts of our state than that offered by this system of instruction. There are those localities and classes of cheese makers that positively cannot be awakened out of their lethargy without an authorized person is sent right into their midst to labor with them.

As one of the main objects of this association is educational, the teaching of better methods of cheese making and dairying in general, it is with much pleasure and pride that we have watched the growth of our Dairy School, the most successful school of its kind in America. So rapid has the growth of this school been that its present quarters, Hiram Smith hall, is entirely inadequate to the demands made upon it, and those in charge are making or will make an effort to secure an appropriation from our representatives in legislature assembled to enlarge and equip the school's present home so that it will no longer be compelled to turn applicants seeking this course of study from its doors.

It will be a source of pride, as well as much satisfaction, that all those of our people who desire instruction in this important industry will, with the faculty's contemplated improvements, no longer be required to wait from one to two years to secure admission or seek the same in some other state; so that those in charge of our Dairy School should receive the hearty support and co-operation of this association, and every member should feel a deep interest in all of this school's efforts in the way of improvements and ought to stand up for the

school that dignifies his calling and is making itself recognized as leader among the learned institutions of the country.

We have been especially fortunate in having a Dairy and Food Commissioner who has been deeply interested in dairying in all its branches. The firm stand which Commissioner Adams and his assistants have taken for pure, cleanly dairy products, certainly merits the hearty commendation of this organization.

At the time that I assumed charge of the affairs of this office no records of the preceding meetings were turned over to me, otherwise than the secretary's minutes of the different meetings. Last spring I determined to secure, if possible, complete reports of the proceedings of all meetings of this association up to date. After overcoming some difficulties and at some expense to myself I finally succeeded in securing complete records of all transactions of all the meetings of this organization, which records I stand ready to turn over to my successor, trusting that he will continue to preserve such records for future reference.

Major Henry E. Alvord, Chief of Dairy Division, has suggested to me that it would be found to be of advantage to all concerned, if the several associations in the interests of the dairy in the Northwest should co-operate in arranging a circuit of meetings in such a way that persons wishing to attend several in succession could do so with the greatest possible economy of time. It would not be difficult to arrange for two meetings to be held in the same week in adjoining states, and in two other adjoining states the next week, and so on. I trust that this matter will enlist your attention in your present deliberations.

The itemized report of the treasurer will show the sources from which all moneys paid into the treasurer's hands were received, and disbursements paid on orders received from this office which he holds as vouchers.

In conclusion I desire to express my high appreciation and heartfelt thanks for the confidence reposed in me for the three

terms I have served as your secretary, which has ever been extended to me on every occasion, as opportunity offered, by all members of this association.

The President: There is another announcement I wish to make to you, and that is, Mr. R. A. Pearson, Assistant Chief of Dairy Division of the Department of Agriculture, Washington, D. C., will speak here tomorrow.

We will now close with a song by the octette of male voices.

Meeting adjourned to 9 a. m., February 2, 1899.

SECOND DAY'S SESSION.

Thursday Morning, February 2, 1899, 9 o'clock.

Meeting called to order by the president.

The President: As one of the most important considerations of our morning session, we have deemed it expedient, in accordance with certain legislation that will be asked for of the members of the legislature of this state, to incorporate this association. Our secretary has with him a draft of the Articles of Incorporation, which I will ask him to read to this convention for their consideration and recommendation, if you deem it expedient.

Secretary Baer then read the draft of the proposed Articles of Incorporation.

The President: Gentlemen, you have heard read this draft of the proposed incorporation. We have found that the Wisconsin Cheese Makers' Association exists in name only. We can neither sue or be sued, nor receive public aid, nor be anything only the Wisconsin Cheese Makers' Association in name. In order to put ourselves upon a footing where we can receive not only recognition in this state, but the world at large, the

officers of this association have deemed it expedient to offer these suggestions and to put it in shape for this meeting to act upon. Now, if there is anyone in the meeting who has anything to say, any suggestions to offer, or any amendments they would like to make, or anything in opposition to incorporating this association, I would be glad to hear from anyone at this time who has anything to say in regard to this matter.

Mr. Powell: I move for an amendment in regard to the election of officers. I think it would be better to elect at this meeting a director for the term of one year, a director for the term of two years, and a director for the term of three years, and hereafter there shall be elected at each annual meeting a director for the term of three years. That gives an old officer in the association each time, and I move that the secretary amend Section two of Article four of the draft to read in that way.

The President: I will state (not as an objection) that while I think the ground is well taken, we talked with our lawyer upon that subject (of this matter of directors) and he stated to us that if we so wished, there was nothing in this provision of the statute that would prohibit or interfere with the selection of the officers of the association, in connection with the election of the directors and officers of the association. If we elect directors outside, the directors then would have to elect officers, but the members could vote for a director and president, and director and secretary, and director and treasurer, and not conflict with our usual manner of doing business. Of course, it would not be absolutely binding upon these directors, as I understand the law in regard to corporations of this kind, even though a few vote in that way. That only represents the inclination of the members of the association. The directors could go outside and ignore that vote, if they saw fit to do so, although they are not very liable to do that. Regularly, the directors of a corporation are the sole governing authority, and elect the officers themselves.

Mr. Mason: I second Mr. Powell's motion.

The President: You have all heard the motion as received and seconded. All in favor of the motion make it manifest by saying "aye." (Vote taken.)

The President: The ayes seem to have it; the ayes have it, and the motion prevails.

Now, gentlemen, you have this draft before you as amended. What is your pleasure with it?

Upon motion of Mr. Schoenman, supported by Mr. Waterstreet, a vote was taken upon the adoption of the Articles of Incorporation as amended. The motion prevailed, the vote being unanimous.

The President: Upon our program this morning is an article by our ex-president, J. K. Powell, on "How Can Wisconsin Produce Better Cheese?"

HOW CAN WISCONSIN PRODUCE BETTER CHEESE?

J. K. Powell, New Lisbon, Wis.

I am asked to tell you how Wisconsin can produce better cheese. Wisconsin is a great dairy state, and produces a large amount of cheese. If I were asked to tell you how some cheese makers could improve their make, it would be an easy matter to tell you. A large per cent. of our cheese is as good as is produced anywhere in the world, and there is no good reason why *every* factory in the state shall not produce all good cheese. Dealers tell us that the quality of our product improves every year, and that the improvement has been greater the past two years than in any other like period. They tell us that Wisconsin cheese sold higher in the markets last season than New York cheese, because it was better cheese. It seems as though we were on the right track, and this improvement is due to

instructions given in our Dairy School, to our traveling instructors, and to the Wisconsin Cheese Makers' Association.

There is also quite an amount of poor cheese made in this state. There are factories that have never made good cheese, I mean fancy cheese. There are others that make good cheese a part of the time, and some that make good cheese all the time.

To make good cheese all the time, it is necessary to have a good factory and apparatus, good milk, and a good cheese maker. A first-class maker will not, and ought not to attempt to make cheese in a factory that is not in condition to make and cure a first-class cheese. A good maker has no excuse for receiving poor milk and ought not, under any circumstances, to take it in a factory. This being true, if there are poor cheese being made in this state, the cheese makers are in a large degree to blame for it.

One danger that confronts us is that many skillful makers depend too much on their skill in producing a good cheese out of poor milk, and often are successful so far that their cheese sell for a good price, and perhaps the buyer may dispose of them without loss, but by the time they reach the consumer they do not give satisfaction, and often work injury to our interests.

In regard to poor milk delivered to our factories. We cannot get the milk producers to come here to our meetings, and if we could it would not do much good if we talked to them steady for a month. The only way there is to get them to bring good milk all the time is for the maker to refuse to take anything but good milk at any time, and to make a cheese for them that will bring a fancy price, thereby showing them that it pays to do things right.

While the farmers are often guilty of not taking proper care of utensils and milk, there are others at fault. Many factories are dirty in ever sense of the word. Again, we have quite a few men running factories that do not know the first principles of cheese making. We do not often find them now near a Board of Trade market, where they come in direct competition

with other factories, but if you will take a trip through our northern counties where the industry is new, you will find makers that know nothing about a hot iron test, curd test, rennet test, or curd mill. They ship their cheese to commission houses and get very small returns for them, though they often get all they are worth; and the farmer soon gets discouraged with dairying, and the factories instead of growing larger, grow smaller.

We have all the laws necessary compelling the farmer to sell nothing but pure, clean, wholesome milk, and imposing a penalty for violating these laws. Should not the farmer and the good cheese maker have some laws protecting them and their product from the poor cheese maker? Would it not be well to have a law compelling every cheese maker to have a license, these licenses to be granted by a board composed of the instructors in our Dairy School and the traveling instructors? They could hold examinations at convenient places through the state during the winter, and all those passing the examination would be granted a permit and allowed to take charge of a factory, the instructors to visit them during the season, and report on their work throughout the season, and at the end of the season all makers that were deemed worthy by the board would be granted a license. The instructors should have power to revoke a permit or license whenever they found the holder negligent of his duties, or in any way unworthy.

If we can adopt some such plan as this, we would soon have none but first-class makers, and a uniform fancy cheese throughout the state.

Believing in short papers and long discussions, I have merely touched some of the important points, trusting that the members will bring them out.

The President: Gentlemen, you have Mr. Powell here before you. His face and his words are familiar to every cheese maker in Wisconsin. "Fire" your questions at him as fast as possible.

DISCUSSION.

Mr. Powell: There is one point I was talking about in cheddar cheese. It takes skill to manufacture a good cheese out of poor milk. Without good milk it is impossible to make a real fancy cheese, that is, a cheese that will stay fancy. In taking milk badly tainted, or with too much acid, over-ripe, a skilled maker can make a pretty good cheese of it, but it either has a bad flavor or lacks flavor altogether, which is a very bad fault in cheese.

Mr. Schoenman: Do you think if a man has a cheese that is not very good, he ought to send it to the regular buyer, or to try to ship it to a commission house?

Mr. Powell: It is all right to smuggle it through, but it will give the cheeese maker a poor reputation,—would think he didn't have common sense.

Mr. Faville: Is it all right to smuggle it through?

Mr. Powell: It would be sure to come back on him.

Mr. Spooner: I would like to ask what is a good flavor in cheese?

Mr. Powell: Good cheese flavor is what I call it, a regular cheese flavor—good flavor—smells like cheese.

Mr. Spooner: Cheese that is very sharp and strong, says one man, "that is good." Another man wants it mild. What is good flavor?

Mr. Powell: A good flavor is a good, strong flavor; if he wants it sharp he must have it by age. You must have a good flavor all the time, from the time the milk is drawn from the cow.

Mr. Spooner: What flavor makes it a good cheese?

Mr. Powell: A good cheese flavor.

Mr. Spooner: I have heard it said that cheese must be three or four months old before it develops a flavor. You take that cheese to the trade here in the city, and they say: "We don't

want that cheese; we want new cheese; we can't sell it." Again, what is this flavor?

Mr. Powell: It depends on the age it develops its best flavor.

Mr. Spooner: In my opinion if cheese is strong at all it is off flavor. I think cheese to be of a good flavor must be mild and pleasant to the taste—no bad taste left in the mouth after you eat it. Now, I have tasted cheese this summer—New York cheese, at that—and I could taste it all day, and that is true. You have probably experienced the same thing. Some people say that cheese has a beautiful flavor, but a storekeeper will tell you that he will sell five cheese of a mild flavor to one of the other.

Mr. Powell: I think that is foreign to the subject, "How can Wisconsin produce better cheese."

Mr. Aderhold: I think one of the drawbacks we run across in the northern section of the state is that we generally have one or two buyers that will accept carloads of cheese without deducting the price, the quality of which is not anywhere near as good as it ought to be. We find quite a good many factories scattered around that cannot sell cheese to any buyer and get a straight price. They all sell to one or two buyers, and they will take these goods, and the cheesemakers don't try to do any better. One of the best incentives towards improvement is to get a good deal of competition among buyers. Don't contract cheese; sell on the market. Get a good deal of competition and get good offers, and then they will discriminate according to the quality.

Mr. Mason: I think we are neglecting part of our paper, "How are we to secure better cheese." Now, the suggestion Mr. Powell offers in saying that every cheese maker ought to have a license to make cheese is very good. I heartily endorse that suggestion, as I believe it would shut out cheese makers who would not pay five cents to come to the convention, but pay out one or two hundred dollars every year for poor cheese. I think it ought to be endorsed.

Mr. Powell: Mr. Aderhold was speaking of the factories in the northern part of the state. I have bought cheese in the northwestern part of the state, in Taylor, Dunn and Chippewa counties. I found a good many factories there where the makers did not know the first principle of cheese making. There cheese was not worth four cents a pound on the shelves. They were getting from 1,800 to 2,000 pounds of milk. Some good man ought to go up among those cheese factories and stay there until he got them in line. The farmers do not know anything about cheese making, and the factories are just dying out, and they certainly ought to have some protection and help up there.

Mr. Aderhold: Let us go back to the question of licensing cheese makers. How can we get at it? Wouldn't it be a difficult thinig to get at? Could we prevent any cheese maker from making cheese so long as his patrons were foolish enough to deal with him?

Mr. Powell: If we have laws to prevent anyone from teaching school or practicing medicine, I do not see why we cannot do the same thing in cheese.

The President: I will answer Mr. Aderhold's question by saying that Mr. Powell is on that committee of legislation.

It is time we drew this discussion to a close as there are a number of other papers for this morning's session, and we will hear now from Mr. Mason on the "Qualifications Necessary to be an Up-to-Date Cheese Maker."

THE QUALIFICATIONS NECESSARY TO BE AN UP-TO-DATE CHEESE MAKER.

Peter Mason, Oslo, Wis.

The qualification of a cheese maker can best be determined by success of the business with which one is connected. If we are

careless or dishonest, or neglect our business, it will be sure to go under, sooner or later.

In this stage of time one must be more sure of a business mind than in former years, because competition drives us to figure closer, adopt new methods of making and marketing our cheese, seeking a better market than the common board of trade will insure.

The past season a great many of our makers contracted their season's make to different cheese buyers, for instance, daisies at flat price, which made Y. A. a scarcity on the market and the buyers would hold the price of flats down in order to get their daisies cheaper. I hope the past season has been a lesson to all those who made such contracts not to be caught in this trap again.

Cleanliness is of great importance for an up-to-date cheese maker. A doctor called at my factory and asked what kind of an institution we were running and I told him we were trying to make cheese, and he said it was the first cheese factory he could not smell eighty rods before he got to it. Now, I do not wish to give myself any credit for being clean enough in or about the factory; however, I wash the whey tank every day and scald the whey. We have perfect drainage, perhaps better than the average, but I believe we can at least clean our tanks and make our factory smell a little sweeter, if we want to. If we could bring a sample of whey from every factory and let our legislator smell of it, I do not think it would take great sums of money and great pleadings to have laws to prevent farmers to carry home their product in those conditions. In order to be an up-to-date cheese maker, it is absolutely necessary that he has taken a course at the Wisconsin Dairy School. The reason I say Wisconsin Dairy School is because it is the best of its kind yet known. If we get down to business and learn all we can, we certainly can solve the great problems that confront us today in a more perfect manner than we otherwise could.

Promptness is of great importance both upon the maker and his patrons. If a cheese maker himself is careless and never on

time, his patrons will also follow his example by coming to the factory at all hours of the forenoon, and the result is generally he will have some very poor cheese on his shelves.

Another point which I believe is not out of place at this time: that is the use of liquor, vile and profane language, which I believe should be driven from our factories because morality demands that we should be more of a gentleman than to allow any of these to exist in or about our factories.

Another point which is advisable to the cheese maker is factory meetings. In having these meetings the maker will be confronted with problems that will set his mind at work, which he otherwise would not. It also forms a better acquaintance between the maker and his patrons and in general it will unite the maker and his patrons into one common cord of prosperity and happiness.

Last, but not least, is the scoring of cheese; if a maker sends his cheese to the county or state fairs, or to the conventions, it will be scored on the merits of export cheese. Those that are usually interested to score cheese are cheese buyers, and they say export cheese will in time be a home trade cheese, and therefore serves two purposes; but a soft cheese can serve only one and that is for home demand. Very true, but we should make a distinction between the two and have separate premiums for each of them, and give those that are making a soft cheese equal rights with those that are making export cheese.

In closing I will say that a good cheese maker that wants to be up-to-date in all things pertaining to his business, should strive to get a diploma from the Wisconsin Dairy School, and second, to attend the Wisconsin Cheese Makers' Association every year.

DISCUSSION.

Mr. Schoenman: I would like to ask, since you have brought up the scoring of cheese, what you think about coloring? We

have markets that take a high color, a low color, and a medium color.

Mr. Faville: And some markets want no color at all. Cheese that comes to Madison from New York has no color at all.

Mr. Schoenman: Do you think it would be right to score cheese on account of dark or light color?

Mr. Mason: I think the scoring of cheese by color is not right by any means. The scoring of cheese should mean when it is streaked and the color not evenly distributed through it, but I do not think the color of cheese should have anything to do with the scoring at all. Simply this: that, for instance, we are coloring for the southern markets cheese that is very yellow. If cheese is streaked white and red it should be scored off. But if a man send cheese to the convention of a white, amber or straw color, or red, I think it has nothing to do with the quality of the cheese whatever.

Mr. Monrad: Don't you think a rich creamy color is preferable to dark red?

Mr. Mason: The most perfect color is amber, just enough to take the white off, and not have any red.

Mr. Schoenman: Don't you think we are growing in that direction more and more?

Mr. Mason: Every year. I had a man say to me, "I would make soft cheese if I could sell it." I said to him: "The reason you don't sell it is because you haven't got it." I have made soft cheese for the last three years, and never saw the time I could not sell all I could make, and more, if I had it.

Mr. Waterstreet: Mr. President, I would like to ask whether a cheese maker should guarantee his cheese?

Mr. Mason: I think a cheese maker should guarantee his cheese. There are two reasons for that. In the first place it gives the poor cheese maker a mighty poor show and don't leave him much money at the end of the season, and ought not to. Another thing, it will send more milk home that is not fit to make cheese of, and for that reason I think a cheese maker should guarantee his goods.

Mr. Schoenman: Don't you think cheese makers would get into tight places where they do all those things?

Mr. Mason: If a cheese maker would sacrifice his reputation for a few dollars he ought to.

Mr. Powell: Do you know of any factory in the state of Wisconsin where a cheese maker is compelled to take any and all kinds of milk?

Mr. Mason: I don't know of any, and I have worked nine years.

Mr. Powell: I would like to ask Mr. Schoenman if he knows any such.

Mr. Schoenman: I know a factory where they don't send any milk home.

Mr. Mason: Well, if they do take it they have to pay for it.

Mr. Ward: If they sold a lot of cheese and the market should drop, or if they found fault when there wasn't any, must the cheese maker stand that loss?

Mr. Mason: I wouldn't. I should expect the cheese to be inspected before leaving the factory, and if it left the factory without inspection he would have to stand it. I wouldn't stand a loss on cheese after it leaves the factory door for anybody.

Mr. Baer: I would like to ask Mr. Mason if that guarantee system, in connection with poor curing rooms, is not working ruin to the cheese business, and hasn't it actually been one of the curses of our industry? When you guarantee to produce nothing but good cheese at Board of Trade prices, you give your patrons all the chance in the world to produce bad milk. You are simply teaching them to produce bad milk. I have found it that way. When a maker guarantees his cheese his patrons are not going to put any more work on the milk than is absolutely necessary.

Mr. Mason: I think he would find he was guaranteeing the milk if it was sent home every other day.

Mr. Aderhold: You can't send it home before it is spoiled, can you? And nine cases out of ten the change comes after it

gets in the factory. It has the germs in it, but the change is not made until after it is in the factory.

Mr. Mason: The greatest trouble I meet with is that I can not sympathize with a man that takes in poor milk. I never did such a thing. I couldn't help anybody out who takes in poor milk.

Mr. Monrad: Can you always detect cold milk?

Mr. Mason: If the taint is so slight that you cannot detect it with your nose, it is not bad enough but that you can make a pretty good article.

Mr. Monrad: When you use the fermentation milk test, would it show up stronger after passing through the fermentation test?

Mr. Mason: Not very bad; not as bad as if you could smell it distinctly before you took it in.

Mr. Faville: They have not all got your nose, Mr. Mason.

Mr. Monrad: You are speaking of whether a maker should guarantee his cheese. I must say that I am against it under the present conditions, and until we have invented a test.

Mr. Faville: Mr. Monrad is right. The responsibility should be divided between the patron and the maker, and should not all be put on one man. He don't want to make his patrons mad and send home the milk. It puts the responsibility all on one man, when it should be divided.

Mr. Waterstreet: Don't you think a good cheese is often spoiled in the curing room?

Mr. Faville: Can't all cheese makers have a good room?

Mr. Powell: I don't think so.

Mr. Crandall: I'd like to say that we poor cheese makers are working at a disadvantage. I always used to guarantee everything, drop in the market, and everything else. Last season we had a poor curing room and I shut down on it and said I would not guarantee flavor, or the effects of hot weather after the cheese was put on the shelves. They finally let me out and we got better milk this summer. The responsibility was divided and not all on me.

Mr. Powell: I believe the cheese makers ought to be responsible. I don't know of any cheese maker in this state who is obliged to work in a factory without a good curing room and utensils.

Mr. Faville: We all haven't as much money as you.

Mr. Powell: I spend all my money going to conventions. I don't know of any one who has to work in a factory where there is not a good curing room.

Mr. Mason: We are neglecting one part of my paper. I will not excuse a cheese maker for making poor cheese. If you get the farmers together and explain to them the reasons for all these things, I have never yet seen the time when they would not comply with my request. I say I cannot tolerate that, and I will not give in that a cheese maker should not guarantee his goods, because I believe it is his fault if the cheese is not good. He is supposed to understand his business. The farmers are not supposed to know. They don't calculate to learn what bacteria will do, and if a cheese maker will stand back and let them do the running of his factory, he cannot expect anything else but a very poor lot of goods.

Mr. Van Leeuwin: We cannot guarantee our goods under any and all circumstances. If we are going to guarantee our goods we must have provision for a good curing room and the privilege of receiving and rejecting all milk, if necessary. Under these circumstances we could guarantee our goods. But ought we, as cheese makers, to do this injury to the cheese business? It makes me tired that some fellows will guarantee good cheese under any and all circumstances. We cannot do it, and must not do it, for we injure our reputation for goods every time we do it.

Mr. Aderhold: Mr. Powell made a statement that he thought a good cheese maker wasn't obliged to accept a position where they didn't have a good curing room. Now, if that is the case there would be only two or three positions that a cheese maker could accept in Wisconsin. (Applause.)

Mr. Powell: Mr. Chairman, we might put it in another way. There might be twelve to fifteen hundred new curing rooms built this spring.

Mr. Baer: Mr. Van Leeuwin speaks of reserving the right to send all bad milk home. He forgets that in Wisconsin we have seventeen hundred cheese factories only two or three miles apart. I was visiting factories in Iowa county and sent nearly half of the milk home from one factory, and it went to the next factory and was taken in there the next morning. The following morning I visited that factory that had accepted the milk I rejected at the former factory, and I "fired" it the other way. The consequences were that four farmers sold out and went out of business.

Mr. Powell: Don't you think those factories make better cheese now?

Mr. Baer: Yes, the quality of the cheese of both factories was improved.

Mr. MacPherson: I would like to make an observation here. In appearing before the cheese makers of Wisconsin I can assure you it affords me a great deal of pleasure. I have been listening to the discussion, and this point is intensely interesting. This question before us is a very important one. Cheese makers and milk producers are no doubt interested in this matter. My opinion is that all cheese makers should be responsible for their work, should guarantee their work, and the others, the milk producer, should guarantee his work, should guarantee to deliver pure milk to the factory, and by dividing this responsibility and making all parties guarantee their goods, then you would have the proper conditions. You systematize the work in such a way that you will, with good skill, have good results.

In this connection, I would like to say that when the result of manufacturing cheese is not favorable, the quality is not up to the standard, and when the fault cannot be found,—whether it is in the milk delivered or in the skill of the maker,—then I should say the proper method is that the loss should be divided,

and should not be sustained by the cheese maker; should not be sustained by the milk producer, because it might be due to the combination or neglect of the two; hence, the division. So when summing up this question you will find the proper way to discover the delinquent and make him responsible. If you cannot discover the proper way, divide the loss. When it is carried on in this way you do not create those abnormal conditions of patrons leaving the factory and the factory closing, and the cheese maker losing his position. Their interests ought to be mutual and should be conducted on a mutual basis, and their interests will grow up together, and when losses do occur, the loss should be divided.

Mr. Aderhold: I want to get back to another phase of this question and that is accepting inferior milk. I am going to stand up for Mason this time. There are many makers who haven't sufficient backbone to reject an inferior milk when they discover it, and I want to say what I think about that kind of work. I think it is perpetrating a dirty trick on patrons who bring good milk, and having it mixed up with inferior milk. I call it a dirty trick.

Mr. Monrad: I think Mr. MacPherson struck the right key note in this matter. You will always find that the medium way is the best. As I understand him to say it was this: that the cheese maker agrees to be responsible for the loss when the loss can be traced directly to his negligence, and, on the other hand, he should be relieved of all loss if the fault could be traced directly to the milk producer, and if to neither, then it should be divided. Right in this line I want to remind you cheese makers that in 1890 in this very room I told you about how they did things in Switzerland. There the cheese maker is responsible, but he takes the fermentation test and if he discovers the milk is bad he doesn't need to take the fermentation test, but he takes it anyhow, and the next day if that shows any faulty milk a memoranda is made of that. And when the cheese is put on the market the very man who delivered that milk has got to stand

the loss. (Applause.) Now, I say, that until we take that ground I think it is unjust to make the maker responsible. Mr. Mason is right; it is the short road; it is the shortest road.

Mr. Faville: It is the just one.

Mr. Powell: I agree with Mr. MacPherson and Mr. Monrad and all of them, but I don't think you have got it where I want it. I agree with Mr. MacPherson that the responsibility should be mutual. The patron should be responsible for the milk delivered and the cheese maker responsible for his work. It is a mutual agreement and you should have meetings and agree to do that. He has agreed to be responsible and should see that the patrons fulfill their part.

Mr. Crandall: Nine times out of ten the responsibility falls on the cheese maker.

Mr. MacPherson: If the cheese maker receives the milk he is responsible.

Mr. Mason: Mr. Aderhold made a suggestion that I believe is advisable. That is when a patron comes in the morning with milk, take the evening's milk and empty it out carefully, and take a pint of the milk in the bottom of the can and pour it in a can or a dipper and let him drink it. Now, if he refuses to drink his own milk he admits it is not good.

Mr. Faville: Pour it into a glass so that he can look right through it, and I'll bet if the man has any conscience at all he will look out after that.

Mr. Powell: That would be insulting.

Mr. Mason: No, sir, because it is his own milk.

The President: We could prolong this discussion all day, but there are several other papers.

The next paper is "Care of Delivery Cans and Cheese Factory Apparatus," by Chas. B. Moore, Apex, Wis.

Mr. Baer: I understand he is sick, and he has not sent me a paper.

The President: Coming to the next paper, "Educating the Patron to Care for Milk for Cheese Purposes," by Eddie Schwingel, Avoca, Wis.

Mr. Baer: I have received a letter from Mr. Schwingel saying that he and his family were ill with the "grip," but he enclosed a paper for me to read.

EDUCATING THE PATRON TO CARE FOR MILK FOR CHEESE PURPOSES.

Eddie Schwingel, Avoca, Wis.

The great difficulty in making cheese is to get good milk for that purpose. No cheese maker can make a first class cheese from second class milk. No doubt every patron has been instructed as to how he shall care for the milk to produce a good article. There are some patrons who furnish good milk the whole season, while there are others that do not. This is either due to neglect, or carelessness, or they do not thoroughly understand how to care for the milk. Therefore, it is very important for the cheese maker to use all the energy he has to educate them to take better care of the milk than they do. The most serious obstacle the cheese maker has to contend with is tainted milk. There are many causes for bad flavored milk; it is due mostly to patrons either being neglectful in handling the milk, or as to where they pasture their cows, and what kind of water they have to drink. Cows should not be pastured on low, swampy, marshy land, where there are dirty slough holes or stagnant water. This kind of pasture and water does not make good milk, even with the best of care. There is some bad milk that cannot be detected at the intake, and difficulties develop later on. But by the use of the Wisconsin Curd Test, this bad milk can be located, and one may tell which patron or patrons are furnishing the bad, and trace it, whether it is due to neglect in caring for the milk, or the fault of the cow.

The test has been a great help to the cheese maker in educating the patron. I find that visiting the patron at the farm one

evening, and explaining to him just what he must do, helping to handle the milk that evening, will do more good than a dozen lectures at the factory. By so doing you have a chance to see just how things are situated, and inspect the utensils used for milking, and where the cans are kept, and whether they are clean or not, as neatness is a great help in caring for milk. By doing this they can be educated much more readily. To produce good milk, good pastures and plenty of good clean pure water must be provided for the cows. While in milking the cows should be stabled. It is better than having them chase one another around the yard. The stable should be clean and well ventilated and the cows should be clean or you will not get clean milk from them.

Before commencing to milk, the loose dirt and dust should be brushed from the sides and udder of cow. The milking should be done in clean tin pails, and the hands should be clean and dry. The milk should not be exposed to foul air, and as soon as it is drawn from the cow it should be strained and run through the aerator into the can.

After the milking is all done the milk should be well aired by dipping it with a long handle dipper that will reach the bottom of the can.

In airing the milk the dipper should be shoved to the bottom of the can, then raise it above the top of the can and pour the milk slowly back into the can until perfectly cool. The cans should not be left near the barn yard, or any filthy place. The night's and morning's milk should be kept in separate cans. The morning's milk should receive just as much care and aerating as the night's milk. Care should be taken that the cans are smooth and well soldered, so that there are no corners for the dirt to get into.

When cans get old and rusty they should not be used, for they will spoil more milk than two or three new ones will cost.

The whey should not be hauled home in the cans, but when this is done the whey should be emptied as soon as returning home from the factory. The cans should be washed immedi-

ately; in washing the cans they should first be rinsed with cold water, then washed with hot water, and scalded with boiling hot water; place the cans where they will drain and be in the sun, and have good circulating air.

The cans, pails, strainer cloths, aerator and dipper should be scalded, then rinsed with cold water just before being used for milking purposes. Nothing but good milk is wanted for cheese purposes. As uniform milk makes uniform cheese, and such cheese will bring satisfactory prices, therefore, every patron should strive to deliver good milk and realize good prices.

The President: The next paper will be "The Ripening of Milk in Relation to Flavor in Cheese Making," by Wm. Waterstreet.

THE RIPENING OF MILK IN RELATION TO FLAVOR IN CHEESE MAKING.

Wm. Waterstreet, Madison, Wis.

Mr. President, Worthy Members of the Wisconsin Cheese Makers' Convention, Ladies and Gentlemen:

The subject assigned me to present at this meeting is one worthy of our utmost consideration, as Wisconsin, through the earnest endeavor of our cheese makers has pushed herself to the very front ranks in cheese making and now stands peer not only to her sister states, but to the world in general. It is of the utmost importance that this high standing should be maintained, and in order to do so, no subject appeals to us more forcibly than the subject: "The Ripening of Milk with Relation to the Flavor in Cheese Making."

One of our most common troubles with cheese is when there is a lack of flavor in the product. Flavor is the factor of greatest importance, as the market value depends more on this than on any other condition. Often this poor flavor may be due to the improper handling of milk on the farm or before it reaches

the factory. Poor and off-flavored milk is no doubt the cause of poor flavored cheese in most cases. The maker in the first place should not take in such milk, and he should also teach the patrons the proper way to care for the milk. Bear in mind that it requires first class milk to make a first class cheese. The flavor can be greatly improved after the milk is in the vat, even if it is a little off by proper ripening the milk. Some cheese makers set their milk in the morning after it is all in, regardless of its sweetness and pay no attention to how gassy and off-flavored it may be. Such milk is very common in the hot summer months. The flavor of milk like this can be greatly improved by ripening the milk with what is called the pure-culture starter or the lactic ferment. I think nearly every one here, at least the students of the Dairy School, know how to use it. This starter contains nothing but the pure lactic acid bacteria, and they are the ones and the only ones we want in cheese making. By the use of such a starter we can nearly overcome all abnormal fermentations that are common in milk. I have used it for the past season and I think this is just what is wanted for ripening the milk. When the cheese maker is bothered with gassy and off-flavored milk, it is of the greatest aid in refreshing these abnormal fermentations. This starter is prepared in the following way: In the morning set a 3-quart pail containing two quarts of milk in boiling water for an hour, then cool the milk to 80 degrees Fahrenheit, mix in one small package of ferment and keep the pail in water until the following morning. The milk should then be moderately thick. If not, set the milk in water at 90 degrees F. and don't shake it and it will soon get thick; then pasteurize the amount of milk desired for a starter and cool it quickly to 70 degrees Fahrenheit, and when it gets below 100 degrees, stir in the startoline fine and add it to the starter milk. Keep the starter at about 70 degrees Fahrenheit, or below, if you can. Every afternoon fill a pint bottle with the starter and keep it at about 60 degrees Fahrenheit, about 10 degrees lower than the starter, as the acid germs become more ac-

tive as the propagation is carried on. It is necessary to reduce the amount of startoline correspondingly. The proper amount of startoline to use at first is one ounce by measure for each two pounds of starter milk; use less every day. In a week or ten days an ounce may be enough for 5 to 8 pounds of starter milk. Use nothing but fresh milk from a clean can; have a thermometer for this purpose alone. Stir the starter a few times when hot, and after it is cooled to the proper temperature, keep it in a good clean place, well covered. In using this starter it is very essential to draw the whey a little sweeter. The acid will develop more uniformly, as there is nothing to hinder the development of the lactic acid. This starter can be used for three months or longer, and if properly taken care of, there is no reason why it cannot be used from April to December.

If the milk in the vat is good, free from poor flavors, I do not think that it is necessary to use a starter at all, for then we have the right kind of flavor in the milk, which a good starter contains. In this case all the good a starter would do is that the maker would get through earlier in the day, therefore I would recommend the use of a starter from spring until fall. In the summer months we must use it for ripening the milk to get the desired flavor. In the fall and spring we use it to hasten the lactic acid along.

Years ago when the cheese industry was in its infancy, the buyers were not so particular as at present. I had a cheese maker tell me recently that when he made cheese some years ago, he paid no attention to the amount of acid the milk had and in what condition the milk was in. He would set the milk at eight o'clock and draw the whey at 9 or half past, salt at 10, put the curd to press at 11, and there was never any kick coming on the cheese. Such cheese today would not bring but three or four cents per pound, and would soon be the ruination of our markets at home and abroad.

It, therefore, becomes the duty of every member of this asso-

ciation and every cheese maker in the state to labor faithfully for purity and perfection in cheese products.

Thanking you for your kind attention.

The President: You have Mr. Waterstreet before you. Any questions will be in order now.

DISCUSSION.

Mr. Mason: Mr. President, I would like to ask what per cent. would be the maximum he would advocate in using starter.

Mr. Waterstreet: Two per cent.

Mr. Aderhold: How much do you use as a rule?

Mr. Waterstreet: I use between sixty and seventy pounds of starter.

Mr. Decker: We are on a very important topic just at present about flavor in cheese. Mr. Waterstreet has said that lactic acid germs give cheddar flavor in cheese. During several years I have conducted experiments in making cheese in different ways, and I arrived at this conclusion through some of the experiments.

In one class of experiments we have made cheese from very sweet milk. The ordinary rule is to set by the rennet test so that in two hours we will have the curd ready for dipping by 1-8 inch strings on the hot iron. Such rennet test with us is fifty seconds. The milk, as it comes in sweet, will test from 100 to 150 seconds, probably 120 seconds. The milk that is thus used is typical sweet milk. The cheese made from it never develops a real nice cheddar flavor. It develops a fair flavor, but we would prefer the cheddar flavor. I should say that where milk has ripened down and we get 1-8 inch or a little more acid on the hot iron, we get this cheddar flavor in cheddar cheese.

Another line of experiments was with handling sour milk. We washed out the acid by firming it in warm water; that is, we

washed out the acid, as is shown by the titration test. That cheese was apparently better, and in three or four weeks was of a clear texture, and was not cut by acid. It also devolped a regular off flavor; did not develop cheddar flavor at all.

A third experiment that came to my attention last summer brought this more forcibly to me. I was in a brick cheese factory in which they said they had a high acid curd. It did not appear like sour cheddar cheese; that has the real color cut, is brittle and which will break right off. When I asked further questions, I found they had 1-8 inch acid on the curd before they drew the whey and put it into the mold. That cheese had developed a typical cheddar flavor.

From these three different lines of experiments I think cheddar cheese is developed by lactic acid germs. We want to induce lactic acid fermentation to get cheddar flavor. However, I think it is carried too far.

We want better curing rooms where we do not need to run so much acid to hold the cheese down solid. We want cheese that will pull a plug you can see through, and cheese that has a better flavor, and we can get this by developing the right amount of acid, not too much. At a temperature of sixty degrees even sweet curd cheese will cure solid, and so, if we get just enough acid to give us our flavor, we can cure it solid, if we have a good curing room.

Mr. Faville: I want you to make it plain to a thick head like mine what cheddar flavor is.

Mr. Decker: It is hard to tell; it is according to a man's taste.

Mr. Monrad: A man who doesn't know the difference between cheddar and limburger flavor ought not to be a member of this association.

Mr. Powell: Some brick factories last summer used the commercial starter for making brick cheese. I will say we used that starter in our work all summer. If we wanted to get the curd perfectly sweet we did not put in a great amount of starter before putting in the rennet, and we found that the cheese cured up and gave a better flavor. That was brick cheese.

Mr. Decker: I think that the matter of starter is a good thing. I think sometimes the trouble with glassler cheese in our Swiss factories is that the milk is too sweet and that the acid does not expel the moisture. I think in brick cheese with enough acid to make the rennet act we will get a good firm curd.

Mr. Monrad: Did you test any of these in Swiss cheese factories; did you test the acid, or curd, or whey?

Mr. Decker: No.

Mr. Aderhold: I was afraid that there has been a tendency to use too much starter here in the past year, but it seems as though Swiss cheese makers and brick cheese makers have got to come to us to learn how to make starters and use them. Now, Mr. Waterstreet used more starter than it is best to use generally. He used two per cent., but the amount that is right generally is from one-half to one per cent. Now, I would like to ask Mr. Decker how much acid he thinks is necessary to produce the proper cheddar flavor, how much spin it should develop. In fact, I would like to ask another question: this first experiment you speak of when making cheese prefectly sweet that did not develop much flavor,—were they open, or close, or moist?

Mr. Decker: I will say that cheese, because it was so sweet, did not expel moisture fast enough and thoroughly enough, but they were very good cheese, but I could detect small pin holes where the curd did not seem to come together well. They were cured at a low temperature, low enough so that the gases did not form.

Mr. Aderhold: Where there is a surplus of moisture you would not expect a cheddar flavor.

Mr. Decker: You can get a cheddar flavor whether it is moist or not if you have lactic acid germs.

Mr. Aderhold: Supposing you are consuming still less moisture, don't you think there would be more cheddar flavor?

Mr. Decker: No, sir.

Mr. Aderhold: How much spin in your opinion should we have at dipping in order that the proper cheddar flavor be developed?

Mr. Decker: I think we ought not to get too much acid at the time of dipping. Curds work differently in different factories. Be careful not to get too much, but enough to get a good start; then develop three-fourths to one-eighth. This is cheddar cheese.

Mr. Aderhold: This is a very interesting topic and there is room for a good deal of research. Of course, our Experiment Station has not the time to do it, but the cheese that scored highest at the state fair last fall was made up of sweet milk practically. There was no spin on the iron when the whey was drawn, but there was a starter used, and that, of course, would help develop flavor.

Mr. Decker: I would like to say in explanation that where we have added starter and brought it almost to the spinning point, it would develop some flavor, and that it would develop some flavor afterwards.

Mr. Mason: When you speak of cheddar cheese, you mean export, I suppose.

Mr. Decker: I mean cheese in which you develop acid to the spinning point at least.

Mr. Mason: I think we ought to make a distinction. There are two kinds of cheese made in this state. We get mixed up if you don't tell what kind you are making. I propose to make a soft cheese,—no export cheese. In that case a fellow is liable to get mixed up in using a starter. You have to work it different.

Mr. MacPherson: What is the difference in the making?

Mr. Mason: Making a hard cheese?

Mr. MacPherson: In manipulating?

Mr. Mason: Less acid, less salt, and more labor. I don't believe in having too much acid because I don't want that hardness to it. Acid makes a cheese hard.

The President: I think it would be well to stop here as it is coming on the next paper, and we travel all over the ground.

Mr. Monrad: Mr. MacPherson tried to get the floor a little while ago.

Mr. MacPherson: I was going to observe on this very important question of flavor of cheese that very many makers lose sight of this important fact,—what is the amount of moisture in the curd at the time the acid starts? Now, through my experience of thirty years and over, I find the amount of moisture in the curd at the starting of the acid is the most critical stage in cheese making, and there is just this: You can have the same result if you draw the whey sweet and have your curd sweet if you give it sufficient time to compensate for sweetness of curd, you can arrive at the same state of flavor. It is only a question of time, and it is a question of moisture and acid.

I would like to throw out this idea. I see bright men and clever men and also professors here. We have had splendid results in regard to different tests, but if there is one test that is needed today more than another, it is a moisture test. We start in the curd with eighty-seven per cent. of moisture when we make cheese. We desire to get down to thirty-three or thereabouts, and we have no means at the present time of determining at any stage of the process what per cent. of moisture is contained within the curd, and I can assure you here, gentlemen, that the amount of moisture in the curd when the acid starts is the question to decide, and if I may throw out this suggestion: if we can get some small instrument or process whereby we can determine the amount of moisture in the curd at different stages,—then we can have exact results in cheese making. It is the one thing needed to govern results, and in regard to this acid the whole matter pertains to moisture in cheese.

My address will be in particular as to this critical point in cheese making.

Mr. Spooner: I would like to say that I agree with Mr. MacPherson in regard to acid in the curd. Now, I run a factory fifteen miles from here, and we don't develop any acid before the whey is drawn. We hadn't a poor cheese, not one. Our cheese sold two cents above the market, that is home trade cheese, We have shipped a great many to this city, and I find that this

cheese will keep for months just as well, and better than if we had dipped the curd after it had developed an acid.

Mr. Mason: Did you use a hot iron?

Mr. Spooner: I never use a hot iron before drawing the whey.

Mr. Mason: You say you never develop any acid in the whey? How could you tell if you did not use the hot iron?

The President: We are extending this paper into the one to follow on "Cutting and Cooking of the Curd and Drawing off the Whey."

CUTTING AND COOKING OF THE CURD AND DRAWING OFF THE WHEY.

R. C. Dassow, Sheboygan Falls, Wis.

The cutting and cooking of the curd and drawing off the whey is an important part in the process of cheese making, if not the most important part, for if the curd is cut right and cooked properly, and the whey drawn at the proper time, a good cheese will most likely be the result.

But to get the proper cook on a curd sometimes takes good judgment with different lots of milk in different stages of fermentation; as, for instance, with a gassy curd when the lactic fermentation is checked by the gas-producing bacteria, or when the lactic fermentation is well advanced and the cooking process must be hurried to keep ahead of the acid, it is sometimes difficult to get the proper cook on the curd. In order to obtain that end the curd must be cut accordingly. By the use of the rennet test the maker, knowing the condition of the milk, should cut the curd so that a good cook may be obtained, when the curd is ready to dip. When the milk is over-ripe, it is well to cut a little finer than when a slow-working curd is expected; or as with gassy curd, when the fermentation is checked, it is well to cut a little

coarser, so that more moisture will be held in the curd, for then it is likely to get too dry before the whey can be drawn.

The size of cubes that may be cut depends some on the season of the year. In the spring and summer when the curd is easy to cook, the cubes may be cut larger than in the fall when the milk is rich and harder to cook; but take it in the general run the curd should not be cut too coarse. If the cubes are too large, they will not cook through and there will be whey spots left in the cheese. But in different localities with different lots of milk, it will vary some. When the milk is set and is thick, it should be cut as soon as it will break clean over the finger. It should not be left to get too hard, for then an even cut cannot be obtained.

I cut with the horizontal knife first lengthwise the vat; then crosswise with the perpendicular knife, and then lengthwise with the same knife till the cubes are small enough, and after the curd has been loosened from the sides of the vat and has been stirred up once, steam may be turned on, or a fire started under the vat, as the case may be, and the temperature raised to 100 or 102 degrees Fahrenheit, as may be needed to get a proper cook on the curd by the time the whey must be drawn. Sometimes 98 degrees will be high enough if there is time to firm the curd before dipping. It is not well to run a vat too fast with normally good milk, for a cheese with too much moisture will likely be the result, or there will be a loss of butter-fat, which means a small yield.

From two and one-half to three hours from setting to dipping is about the time it should take when there is good milk in the vat and nearly full, but if only half full, or less, and steam is used, less time may be taken, say, about two hours; or with gassy milk it is sometimes an advantage to run it a little faster, in order that the lactic acid germ may overcome the gassy fermentation sooner. It should take at least one-half hour to raise the temperature, for if the curd is cooked too fast it will get hard on the outside and not cook through.

The curd should be stirred and kept moving while it is being heated, but care should be taken not to bruise the curd, as that sets free the butter-fat, and there will be a loss in quantity.

When the curd is properly cooked it should show 1-8 to 1-4 inch of fine strings on the hot iron, and sometimes as much as 1-2 inch may be necessary, this depending on the season of the year, the condition of the milk, and the condition of the curing room in hot weather. If the curing room is such that the temperature can be kept as low as 60 to 64 degrees, but little acid is needed, and such cheese is better than if cured in a hot curing room and more acid is run; but most curing rooms are such that the temperature cannot be kept low enough, and more acid must be given to suit the condition of the curing room. When a gassy curd is expected, more acid is necessary to keep the cheese from "huffing" on the shelves. If our curing rooms were such as they should be, less acid might be given and the yield increased to that extent.

When more acid is run the curd must be cooked firmer than if a small amount is given, for a moist curd cannot stand the same amount of acid that a dry curd would, but with a gassy curd a little more moisture may be retained to prevent the gassy fermentation crowding out the lactic acid germ.

When the curd is cooked and strings enough on the hot iron, the whey should be drawn off. The whey gate and connections should be large enough to take the whey off fast. Sometimes with a fast working curd, it will be necessary to draw off some whey before, as this checks the acid a little, and there will be less to draw off when there is acid enough.

When the whey is nearly off, make a gutter through the curd in the middle of the vat, and when the upper end of the vat is bare, move the curd forward, put in a rack, place the cloth on that, and draw the surplus cloth in front of the rack and throw on one-half of the curd and throw the surplus cloth over it. Place another rack in the vat and place the remaining cloth over that and throw on the curd. Place the remaining cloth from the ends and sides over it and cover up.

It is well to have the curd firm enough that not much or any stirring on the racks is necessary, as there is some loss in butter-fat when stirring on the racks is practiced; but it may be done when it is not possible to get it firm before, reserving that part of it in case of need.

DISCUSSION.

Mr. Mason: I would like to ask the gentleman if he advocates the use of a fork in stirring the curd.

Mr. Dassow: Yes, after it is ground.

Mr. Mason: Don't you think a maker can determine the moisture of his curd a great deal better if he gets into it with his hand, than by using a fork and just looking at it?

Mr. Aderhold: How long have you got to keep your hand in it?

Mr. Monrad: I see the next paper is along this line; in fact, we have already encroached upon it.

The President: I would state that neither the gentlemen or his paper are here.

Mr. Aderhold: Oh, start the ball rolling. It is too bad so many are absent on account of the "grip." They ought not to do so much handshaking. Did you say you cut the curd three or four times?

Mr. Dassow: Until it is fine enough.

Mr. Aderhold: I want to know how many times you go over it.

Mr. Dassow: Three or four times.

Mr. Aderhold: You have both the horizontal and perpendicular knives?

Mr. Dassow: Yes.

Mr. Aderhold: When it is gone over three times it is in cubes?

Mr. Dassow: Yes.

Mr. Aderhold: You go over it again and some of the cubes cut up even and some uneven?

Mr. Dassow: Yes.

Mr. Aderhold: That is what I want to bring out. These knives ought to be made so we can cut over three times.

Mr. Dassow: We are cutting cubes now one-half inch square.

Mr. Van Leeuwin: I would like to ask about using starter. In case the milk has plenty of acid, or a high acid at the time it is received and ready to set, what would you do in that case? Would you use the starter or pour it in the whey tank.

Mr. Waterstreet: I wouldn't use it. I wouldn't take any sour milk in in the first place.

Mr. Faville: The milk might not be sour and still ripe enough to set.

Mr. Waterstreet: I can always use some starter; sometimes a little less than others, but I can nearly always tell when I take milk in whether it is too ripe to take or not.

Mr. Aderhold: You say you reduce the amount of startoline or culture that you use?

Mr. Waterstreet: Yes.

Mr. Aderhold: Why?

Mr. Waterstreet: Because the acid grows as propagation is carried on.

Mr. Aderhold: Supposing you don't reduce it, what would be the result?

Mr. Waterstreet: I should think the startolene would get too sharp, get too strong.

Mr. Van Leeuwin: I would like to ask Mr. Aderhold what he would do in case he was using starter every day if he had some milk that was ready to start as soon as he tried it, that is as far as acid is concerned. You have a high acid milk. What are you going to do with the starter in that case?

Mr. Aderhold: It seems to me you have been caught in that fix. I would like to hear from you.

Mr. Van Leeuwin: I would like to hear from Mr. Aderhold.

Mr. Aderhold: I wouldn't use the starter. Now, this question I asked Mr. Waterstreet comes back to the directions that are sent with lactic ferments,—Hansen's lactic ferments. They are very misleading in this respect. They say use ten per cent. of culture or startolene,—that is, the amount of culture you use should be ten per cent. of the starter you wish to make. In case you want to make fifty pounds of starter take fifty pounds of pasteurized milk and put in five pounds of culture or starter. According to these directions you should keep on doing that every day, but we have found that the germs increase very rapidly in activity, and if we keep on using that percentage of culture we will have the whey standing on the starter within a few hours after we use culture. In Pennsylvania last winter we used this starter for five weeks and the bacteriologist investigated the ferments from time to time. He found first four germs, three lactic acid, and one wasn't lactic acid. I don't know what it was. After a while he found the germs increasing very rapidly in activity, and I found I had to reduce almost daily the amount of culture I used in my new starter. I started with three per cent. instead of ten, which was sufficient, and at the end of five weeks I was using one-sixth of one per cent. of culture. I had reduced the culture eighteen times. It was sufficient. It was loppered every morning when I used it.

Mr. Powell: At what temperature was that?

Mr. Aderhold: Seventy degrees.

Mr. Monrad: Pasteurized milk?

Mr. Aderhold: Yes.

Mr. Monrad: Did you test that milk before pasteurizing it?

Mr. Aderhold: No, but it was sweet milk and it was heated to two hundred degrees. It was well pasteurized. This lactic ferment has been used for butter making, and it has been their intention to have one germ or more in it to produce flavor in butter. Now, in cheese making we cannot have anything but lactic acid in starter, but during the past season these lactic ferments are not as pure as they used to be. In Michigan we found a good many mould germs in the original packages, and in the

Kingston Dairy School in Ontario they have found these germs, and also a pigment with color that produced a red color, and if it is going to be continued with us we had better get culture from some other source. Now, when culture is good it is a pure acid. If you can get milk free from undesirable germs, keep in cans sterilized, and always use pasteurized milk. If you don't use it, it will be like throwing at a mark and hitting once in a while and sometimes missing it.

Mr. Monrad: I am glad to hear Mr. Aderhold is converted. He claimed he could take milk and make just as good starter as lactic ferments.

Mr. Van Leeuwin: I want to ask if we want to use this starter at all times. I think I asked Mr. Aderhold that same question two years ago what to do in case we had the milk ready to set at that time, and I wouldn't say positively, but I believe he said then to use starter just the same.

Mr. Powell: I believe that question ought not to be discussed. A cheese maker should not take milk which is ready to set. A cheese maker should have the milk always under his control.

Mr. Schoenman: I would like to give Mr. Aderhold credit on the starter business. He knew I was using starter last year. He came to me and said: "I have something to tell you." He said, "How are you getting your starter developed?" He said, "I have found by experience that if you let it start too much it will get too sour. At the time it coagulates is the best time." He said, "You try it," and I will say that in using starter this year that was the best pointer I got from anybody.

Mr. Aderhold: I have been told by a bacteriologist that some lactic acid germs will produce an agreeable flavor, and other lactic acid germs will produce an offensive flavor, so in that case all lactic acid germs are not the right kind.

I want to speak about having a starter on the thin side rather than have it loppered. Theoretically it is all right, and I have found that if it is loppered for any length of time it is liable to take a sour or buttermilk taste, and our bacteriologist tells me

that the germs are apt to become kind of paralyzed in the acid they produce, but if you pasteurize it and the starter is not loppered,—is just getting sour,—it will have a disagreeable smell, and a good many of you will think that it is off. But at the same time if you will let it become loppered and if you find it sour to the taste, you will find it is all right. The disagreeable smell is caused by acid, etc., altogether. If you are in doubt about this let some of it get thick and smell of it.

Mr. Schoenman: I would ask if that disagreeable smell is not a scalded milk smell?

Mr. Aderhold: Yes.

Mr. Monrad: A very important point has been started here. The best stage is when it is just loppered, and we have got to watch that stage and then be prepared to put the starter in the ice box. I have kept starters good twenty-four hours by putting them on ice. But be careful not to disturb it. Carry it carefully so as not to shake it, and you will find that you can hold it quite a while.

Mr. Aderhold: What is the objection to using it before it is loppered?

Mr. Monrad: We have had no experience.

Mr. Aderhold: Theoretically there is no objection.

Mr. Monrad: I have had no experience.

Mr. Aderhold: Theoretically there would be no objection?

Mr. Monrad: You won't get me into deep water; I don't know anything about it.

Mr. Decker: I think you would get a uniform amount of acid there,—the same every day, or the same every other day.

Mr. Baer: I want to ask if it would not have the same effect after it is loppered?

Mr. Monrad: You are trying to make a scientific bacteriologist out of me and I won't answer that question.

Mr. MacPherson: I would like to offer a word or two in this connection. We come here to learn, to try to be informed. This last paper is a very valuable one and strikes on valuable hints. But there is one point I would like to observe—this word "cook-

ing" the curd, gives a wrong impression. It is the wrong word, I think, in the art of cheese making, or the science of cheese making. What do we cut the curd for? To liberate the moisture. What do we heat the curd for after cutting? To liberate the moisture. What do we throw the whey off for? To set the moisture. Now, that is the point. The whole process is raising the heat from eighty to eighty-six degrees to ninety-eight or one hundred. It is merely forcing out the surplus moisture or whey to obtain consistency in the whey so that this lactic acid, which has been so well discussed, comes in and enables that seed to develop proper growth, and develop a sharp or proper flavor. Now, "firming" of the curd is the proper expression. You term it "cooking" the curd. That should be changed to firming the curd, or heating. The entire process is for the firming of the curd.

As I said before, if we had a simple method to determine the amount of moisture we would have cheese making in our pockets. I am working on that line to discover a simple process to determine the moisture in the curd. Now, the heating of the curd is to set the moisture so as to enable the lactic acid germs to develop a proper flavor and consistency, and to make a cheddar flavor. It is agreeable to the taste and nourishing to the body when taken. It is the whole secret of cheese making.

Mr. Monrad: Don't you think the acid should be started?

Mr. MacPherson: The whole aim and desire of cheese makers is to prepare the curd for the reception of this acid. When the moisture is right and the acid is right and the temperature is right, you have the cheese all right and ready to travel on to be No. 1.

Mr. Monrad: It is the same as driving two horses, one developing and one ascertaining the moisture, and the idea is to hold them in check and get there at the same point.

Mr. MacPherson: Exactly.

Mr. Baer: I want to ask why you change the acidity of the starter at the time it thickens? Last year it was eight or nine, and now it is six or seven.

Mr. Decker: I don't think we have changed it at all, and I think it remains six or seven. If you hold it long enough it will develop nine-tenths, but stop at that point.

Mr. Faville: I want to say that I am a good deal encouraged. When you first began to talk about starter it opened my eyes. The cheese I have been able to get mostly in the market has a sour, unpleasant taste that I could not account for, and which I don't fancy either. I suspected after hearing about the starter that they put the sour taste in there, and now I am delighted to hear that the cheese makers are putting in less starter, and probably they will get to the point of leaving it out entirely and make good cheese.

Mr. Monrad: You haven't improved any, Mr. Faville.

Mr. Mason: I believe we are all coming to the conclusion that we did use too much acid, and I have come to the conclusion that the less acid we can use the better our cheese are.

Mr. Aderhold: The whole fault is in the curing room.

Mr. Faville: The whole thing is in the curing room. There is more cheese ruined on account of bad flavors developing by being placed in an improper temperature before going to the press.

Mr. Aderhold: I always like to hear Mr. Faville talk, or anybody else tell his opinion. It is a help to us all, and I agree with a good deal Mr. Faville says, and I want to tell Mr. Faville where he can get some fine cheese that will suit him. There is a man here who makes cheese perfectly sweet. That is Mr. Spooner. Now, Mr. Spooner, sell Mr. Faville some cheese.

Mr. Crandall: I would like to go back to the Swingel paper. What is the effect of leaving some milk in the udder upon milk drawn from the cow afterwards? Is that milk spoiled the same as that left in a vessel in an open temperature or is it all right there?

Mr. Aderhold: Who is it you are asking?

Mr. Crandall: Anybody who will answer. I refer back to that paper.

Pres. Carswell: Will you state the question again?

Mr. Crandall: I would like to ask if there was some milk left in the udder at the last drawing, would that milk be spoiled when you drew it?

Mr. Monrad: You may search me.

Mr. Van Leeuwin: That milk would be in good shape. Milk becomes contaminated after drawing by influences from outside.

Mr. Aderhold: I think it would be all right, because when people can't find their cows at night the milk seems to be all right the next morning.

Mr. Spooner: I would like to ask Mr. Aderhold if cheese can be pressed too hard; if it can be injured in being pressed too much?

Mr. Aderhold: I think it is not so much how hard you press it as how often. If the hoops are good, fit all right, it will stand severe pressure. It won't do any harm, if they remain straight in the press.

The President: It is now the noon hour and time to draw this discussion to a close before we trespass upon the other papers. Adjourned to 2 p. m.

FOURTH SESSION.

The convention met pursuant to adjournment at 2:00 p. m. President Carswell in the chair.

Music—Selected.

MANAGEMENT OF FACTORIES AND MARKETING THE CHEESE FROM A PROPRIETOR'S STANDPOINT.

Chauncy Beckwith, Dixon, Wis.

Members of the Wisconsin Cheese Makers' Association: It is with a consciousness associated with that of fear, yet overjoyed with a keen sense of pleasure which fills my heart with gratitude, as I see you here today, interested in your occupation, interested in the commonwealth of America, the pride and flower and everlasting body of this republic. You have a right to be here, a just right to be here, and should be proud to be here in the interest of that business which affords so many good men and noble women a business that is second to none.

Although we do not live in gilded palaces, with pillars like those of millionaires, yet in the eyes of the Almighty God who gave us consciousness to realize the beauty of this earthly life, we are all alike, and those whose homes are beneath humble roofs are just as near, if not nearer heaven.

The fear I speak of is the fear that I, of so few years' experience,—and most of that founded on my father's,—cannot do you the good an older person can, but you all have invested within you the power of discerning,—to distinguish right from wrong; therefore, you can derive the same benefit from them. If wrong, I beg you to remember them and do not practice them; if unworthy, forget them. But, if they may aid you in any way, it will please me greater than my poor words can describe, and my inefficient action can define.

I am in favor of every factory being owned and operated by a single individual,—running his own factory, running his own business, buying his own supplies, hiring his own cheese maker, and being salesman, irrespective of any committee. Your patrons ought to be the judges, and if the bills of sale are not what

they ought to be they will soon remind you of it. Your bills talk better far than a committee.

Gentlemen, I am not in favor of holding any cheese meetings. It doesn't make any difference who you are, or where you come from, or who your patrons are, there is always some one who is not satisfied,—some one who thinks he rules the whole world and could make it better,—some one whom the Lord himself could not please, and who says things in the meeting which anger you, and you in a fit of passion say things that cause a disturbance, and every row and disturbance in a factory shortens its life, because the patron and proprietor must work together. It is nothing of this kind patrons want, and if you deal honestly you need no meetings.

I am against farmers manufacturing their own milk, not, dear friends, that I wish to dictate terms to any single individual in this world, for I know every man has a right in this world to do as he pleases, just as long as he does not infringe upon others. It would be for your own interest, and, indeed, I think benefit, for you to patronize the cheese factory in your vicinity. You can't afford to hire a good cheese maker and manufacture your own milk, and consequently turn out poor cheese upon the market; you can't put your whole time and energy into cheese for so small amount, and anything you don't put your whole heart and soul into is not worth undertaking. Things done by halves are never done right.

I think it pretty profitable for you to patronize a good factory or good man, who puts his whole life and energy into the factory (which you can't afford to do for a small dab of milk), and if it is marred his character is marred. I think it is a self-evident fact that a combination of farmers (I am one myself and am proud of it) cannot agree, no matter how small the number may be, if only two: As soon as a salesman is appointed they are jealous, and God knows he ought to be pitied, for there is no more pitiable position than that of salesman under the present system of selling.

I am against corporations running factories because they can

do, and do do more mean tricks and dirty tricks, under the name and vote of that corporation than an individual would do, or dare to do. If you accost them upon an act they have done, they will tell you it was the vote of the corporation. The individuality of the firm is lost, and with it that which every man holds dear is gone.

Another essential thing in cheese factories is the hiring of your maker. Hire a man that you have confidence in, and one that has confidence in you, and between whom there are no secrets. Without this your factory will not be successful. Hire a maker that can make good cheese out of any kind of milk. This may seem strange to you, but I repeat it. I don't mean an A No. 1 cheese, but I claim a good maker can make a fair cheese for quick consumption out of poor milk, and can take the taint and smell out of it, and we have one here today that can do it. If you have confidence in your maker and you place confidence in your trade, you will not lose your cheese maker or paralyze your own trade. Without this confidence in your cheese, there can be no pleasure or success in a cheese factory.

It is essential not to hire a cross maker. There is enough worry and enough trouble in every day life without meeting such a man at the factory and feeling worse for having met him; on the other hand, hire a maker who will greet you with a cheery good morning and a kind word, and send each patron, and even the proprietor, away feeling the better for having met him,—send them away with one bright ray of sunshine cast across their lives that day, and it will reflect back in a hundred —yes, a thousand-fold of success to the factory, and mutual prosperity to the patrons and the proprietor, for their interests are mutual.

It is essential, also, that your cheese maker should keep ever fresh in the minds of the patrons the necessity of bringing you good milk, because as much lies in the patron as in the maker. You cannot make an A No. 1 cheese without good milk. Without good milk you cannot make as good a yield. When they

once understand this,—that their interests are mutual,—they will be more careful to bring you good milk.

There is also much in taking care of the cheese after they are made as in making them. Cleanliness is next to Godliness, and there never was a place where this was more appropriate than in the walls of a factory. If you are not a clean maker, no matter what your experience or teaching, you will have no success.

Therefore, there is as much in caring for the cheese after it is made as in the making.

I advocate a good curing room. I think one built of stone, with an underground ventilation is the proper one, and then, if it is too damp it can be dried by fire.

I believe in making a full cream uniform cheese, weighing from sixty to seventy-five pounds in the box. Then put them on clean shelves. Don't have them all grease or spots, and have no mark or character on them. They are not newspapers to be read. You can buy "dailies" cheaper than you can cheese. Send them out looking nice and clean. You know if you sit down to a meal of victuals off a dirty table, no matter how good they are, the victuals don't taste good. Appearance has one-half to do with it.

Sell cheese in one direction. If you sell cheese to a man and he gets to use that cheese and likes it and can come back and get cheese of the same grade that satisfies his customers, you have that man's trade. We started some years ago with one wholesale grocer, and today have a larger trade in the west and south than we can supply from two factories. It doesn't make any difference where you sell,—east, west, Chicago, or any place,—and this is a good thing to remember always—hold one-half of the rights.

Friend, you have no right to sell cheese in a slipshod way. It is a solemn obligation to your patrons, and although not written it is implied, that you hold to your rights. You ask a salesman or proprietor how they are selling cheese. On the Board of Trade. It humilitates me to think of it, and it grieves me to speak of it, and it is a disgrace to the cheese factory that it is sold

on the Board of Trade. I denounce it as unfair and unjust, and that a salesman should not sell a single box on the Board of Trade under any circumstances to be examined at their destination.

They say farmers are fools. I am a farmer, and I say we sell cheese like fools. At the first meeting when we come together, all is pleasant. We come with happy faces and cheerful hearts, meet the buyers, and everything is lovely. We sell our cheese, and are all anxious about the one-eighth, one-half, or one quarter cent. more paid to a competing factory. Before leaving you tell the buyer you have an A No. 1 cheese; but it doesn't make any difference what you do when you get through they have the whole string in their own hands and pay what they please. It doesn't make any difference what they agree to pay you. Once in their hands and miles away, they have the cheese at their disposal.

Now, I think we make as good cheese as the average run of factories, but we never sold a lot of cheese on the Board of Trade to be examined at its arrival, but there was some fault and rejections. We can ship cheese without going out of the factory to our trade without a cut. These cheese are all right, but no cheese made on the face of God's green earth will stand inspection in Chicago on a down market. If the market goes up, cheese goes, and all is lovely; but if it goes down, they are rejected.

Is that the way to sell cheese? Certainly not. You have no right to do it. Besides this, you wrong your patrons, and more deeply, you wrong your maker. Many an honest man who works from sun to sunset trying to make an existence, will make an A No. 1 cheese that he knows to be good and send them to Chicago, where they are cut and docked. Returns come in, and the money is made by the buyer.

Is this right? Certainly not. And you go to your maker, and ninety-nine times out of a hundred he has put his hands in his pocket and taken them out again, and put them in again to pay

for slack selling with his honest wages. That is the way you sell. There is not a grey-haired farmer here today that would send a horse to Chicago to be examined there. Why, he would have the spavins, ring-bone and everything else. That is the way it is with cheese. It is not right, and I appeal to you as a proprietor, makers, but with a heart large enough to want to see equality and fair play,—to pass resolutions here today correcting it, and if you do not pass them, to resolve in your own minds and hearts not to hire out to a single proprietor and warrant your cheese in Chicago. If you warrant them on the table you have done your part. That is the place where they should be warranted.

Another feature in our trade is freight rates, and it is a hard and difficult thing to get at. Gentlemen, the greatest danger that threatens this immense republic today is the combination of capital and corporations, of which the railroad is the most numerous and wide-spread, and, consequently, the greatest danger. There has never yet been built one for the benefit of the people, but for selfish motives and gain, and the greater the traffic the greater the gain, and they not only control and dictate terms to their employes, but the whole world. Therefore, I say to you, in the field of our work it is our right to watch every interest in the cheese business; also in the political field when we have men that stand for the commonwealth of America,—its strength and beauty,—against thieving and wronging corporations, it is our right to support such men.

Friends, I have not anything to tell you about how to make cheese. I leave that to the makers. I was merely asked to speak a little about the running of factories and selling of cheese.

In closing, I appeal to you as you leave this hall today to drop all petty jealousies. If the chance comes to you to aid a brother maker, whether in your own factory or outside of the factory, extend to him the heart hand of fellowship, thus benefiting those in the cheese business, benefiting the society and making it grander and greater every year,—a credit to society, an honor to yourselves, and please the Almighty God who gave you birth.

DISCUSSION.

Mr. Monrad: I understood the speaker to say that he did not want any marks on cheese, and yet afterwards spoke about cheese gaining its reputation. I want to know if I understood that right.

Mr. Beckwith: I meant to say that the cheese should not have any marks itself; to brand the box showing the factory it represents, but no mark or stencil on the cheese itself.

Mr. Monrad: If you sell to a commission man or dealer and he gets the reputation for the cheese, how are you protected unless you have a mark on the cheese?

Mr. Beckwith: I am protected by the box, I suppose.

Mr. Monrad: If I make a fancy cheese I would like to have some mark on it whereby the consumer could call for my goods.

Mr. Beckwith: If it is on the box that would be sufficient.

Mr. Faville: A dishonest dealer might put another cheese in the box.

Mr. Monrad: There is another question. You advocate individual ownership of cheese factories. Don't you think it rather risky for an individual to go into that and put up a good curing room, as it ought to be. I agree with you that I believe that the maker is the best man to run the factory. I wouldn't have even the proprietor run it. I believe the farmers ought to own the building, and should put up a good substantial building, as they would a schoolhouse or county building. It is a permanent improvement for that country, and then each would have an interest in that building.

A Voice: I know a place where the cheese business was spoiled by that same thing.

Mr. Faville: It isn't always the case. I know one that has been running twenty years.

Mr. Beckwith: That is my idea. That is the way I look at it.

Mr. Monrad: What is the cost of a good cheese factory properly equipped to handle from five to eight thousand pounds of milk per day?

Mr. Beckwith: I don't know as I could tell what the cost would be.

Mr. Aderhold: What is your ideal method of disposing of cheese. Most of the cheese are sold on the Board of Trade.

Mr. Beckwith: I am opposed to selling it on the Board of Trade, notwithstanding that it is all right if the cheese is inspected at home, or if taken to the Board and examined there in cold storage. I would not sell a box unless it was examined.

Mr. Monrad: That is right.

Mr. Mason: What do you think of contracting cheese at flat prices?

Mr. Beckwith: I don't know as I can answer that question. We don't contract; we ship on orders. I think in late years we have had better success. Years ago when cheese went up in price in the fall we used to hold it, but of late years I do not see much gain in holding cheese. Perhaps it would be all right if you make daisies, but I don't know what would be the idea of making daisies and selling them at flat prices.

Mr. Aderhold: You send your cheese mostly south?

Mr. Beckwith: Yes.

Mr. Aderhold: Why don't you sell in Wisconsin?

Mr. Beckwith: We sell some in Wisconsin.

Mr. Waterstreet: How long do you hold your cheese before shipping out of the factory?

Mr. Beckwith: We are having a big trade and we try to make them so they will cure as quickly as possible. Sometimes we ship cheese two weeks old, which I think is all right.

Mr. Dickson: What would you suggest as a good substitute for the present system of selling cheese on the Board of Trade?

Mr. Beckwith: I think the Board of Trade all right if they examine the cheese at the factory.

Mr. Dickson: What guarantee is the buyer going to have that he is getting the cheese he saw in the factory?

Mr. Beckwith: If you haven't confidence in a man don't buy from him.

Mr. Dickson: It is a poor rule that doesn't work both ways. I think he ought to be able to examine it at the point of destination.

Mr. Beckwith: Examine it at the Board of Trade on the table. A man who buys cheese can generally tell what he examines. If I examine a box of cheese I think I could tell it in New York.

Mr. White: In regard to daisies selling at flat prices: We have purchased thousands of daisies, but we have never been able to get a daisy at a flat price,—always had to pay contract prices. I would like to know if daisies can be bought at flat prices. We have not been able to do it.

Another thing, in regard to contracting: factories will have to contract cheese that are made in special shapes. The markets require twenty pounds of cheese of a peculiar shape, and you will have to meet the market. The factories say: "We want you to guarantee that you will take our cheese when made in that shape."

In regard to branding cheese, I would advocate that every factory get a stencil made and brand on them the different dates on which they are made. There is too much marking on the shelves No. 1, 2 and 3, and leaving the rest of the shelves not branded. You go into a factory and the maker says, "This cheese was made first." It may be. "Well, here is the second day." You bore this; it is all right. Then, perhaps, there is a day's make running in between these numbers that is not branded, and is not up to the standard of the others. This cheese comes in, and there is no way of preventing him from putting them on you.

Mr. Aderhold: I would like to ask Mr. White if he favors branding.

Mr. White: No, I don't. There is nothing to be gained. That is where the kick comes in. Dealers should have special brands, and they should put them on the cheese.

Mr. Aderhold: Then it would be better for the makers to sell such off cheese in different channels and avoid dealers?

Mr. White: If they can, it is to their benefit to do so.

Mr. Beckwith: I have sold cheese of one brand and those cheese, I know, go out under our brand, and they have worked up a good trade. We got lots of letters, and I know those cheese go out under our name as sent from the factory.

Mr. Mason: I think, Mr. White, if you ever travel up around near Manitowoc you would find quite a few factories making daisies that are contracted at flat prices, but furnished with hoops and boxes. The buyers themselves had to admit that if they had not contracted daisies at flat prices, that flats would have been higher. There was all the indication in the world of the price being higher on flats, and it was simply because daisies were contracted for flat prices that the buyers tried to hold flat prices. That is the buyer's own remarks. I don't believe in such transactions. Let us sell cheese for what they are worth on the open market.

Mr. White: Would you make daisies if you knew what the market was? Could buyers get daisies if they did not contract for them? Would you sell fifteen hundred daisies at the same price as flats? They have fictitious markets. The amount of cheese sold in those two markets as reported, is never sold there. The market is fixed by the buyers who have contracted for the cheese.

Mr. Mason: On the Board of Trade they give fictitious reports. I counted up once and got seventy-eight boxes of flats, and when reported it was five hundred and forty sold on the Board of Trade, and there were only seventy-eight boxes there.

Mr. Aderhold: I went to Sheboygan to attend a Board of Trade there, and did not see a pound of cheese or a buyer. I don't believe there is a pound of cheese sold there in a month.

Mr. Mason: I don't want to look down upon cheese buyers. They are all right. They are all right if you use them all right. If you have a poor cheese in your factory, and you are man enough to tell them that the cheese is not as good as the others, they will use you all right. Makers are to blame a good deal in trying to put poor cheese on the buyers. I have found that out

myself. I sell most of my cheese to Mr. De Land at Sheboygan, and whenever there is any cheese not as good as it ought to be, I put a mark on it to call his attention to it, and I can't find any fault with Mr. De Land in this respect.

Mr. Schoenman: I think a man injures himself every time he tries to shove a poor cheese off on the buyer, because if he puts out a poor cheese and tries to fool the buyer, the buyer will fool him in turn. If you have poor cheese, you ought to mark them, and sell them on commission for what they are worth.

Mr. Faville: I know what they used to do with poor cheese. I bought all through this country years ago. I would sometimes find a cheese that was a little off. "Never mind," they would say, "you need not take that. We will work them off on the home trade." They used to do it. I have heard it hundreds of times.

Mr. Monrad: That is right; they do that in Canada, too.

The President: The next on the program is an address by Prof. T. L. Haecker of St. Anthony Park, Minnesota. Secretary Baer has received a telegram from Prof. Haecker stating that it was impossible for him to be present with you at this time, but he has sent his paper, which the secretary will please read.

ADDRESS.

Prof. T. L. Haecker, St. Anthony Park, Minn.

It has fallen to my lot to carry on a series of experiments covering some half dozen years with a view of ascertaining the cost of milk and butter production with cows of different breeds and types. In summing up the results of this work I am forced to

the conclusion that the subject of rational feeding is, for the time being, of greater importance to the average dairyman than is that of breed or type. Had the work been carried on for only two or three years and feed stuffs during that time ruled comparatively high, my conclusions would have been different. When I find that by proper feeding under present conditions almost any kind of a cow will return a good profit in the dairy, that the average cow in Minnesota is returning in dairy products a sum barely equal to the market price of the feed simply because of a lack of understanding of how to feed, and when we consider how many common cows there are in the state whose product might be doubled by better methods, we can readily understand how much more important it is that the kind we have are properly fed than to point out by experimental demonstration what they might realize by feeding the kind they haven't got, but should get. It has been clearly demonstrated that cows bred specially for the dairy make a much larger return for food consumed; but our dairy farmers, unfortunately, have not many of that kind, and to change them will require years of careful selection and breeding. It is, therefore, of primary importance that farmers first learn to make the best of what they have. During the past few years I have received reports from many of our creameries giving the estimated number of cows contributing milk; pounds of butter made; receipts for butter; expense of manufacture and amount paid to patrons. From these reports it appears that the average gross return to the farmer per cow is only about $22. During the years 1896 and 1897, the time covered by the reports, it cost us at the Experiment Station on an average $20.14 per year to feed our cows that would be classed as common cows, charging local market price for feed. It, therefore, appears that the ordinary cows, as ordinarily kept on Minnesota farms, receiving $15 worth of feed per year, return for butter fat only $7.00 annually over the market price for the feed consumed.

Taking the records of all the common cows that were in the station herd during the two years, we find that they made a gross

return for butter of $44.53, valued at 15c per pound, being about the average that farmers received during that time, and 15 per cent. per 100 pounds of skim milk. Since these cows are no better than the average cow of Minnesota, it is but fair to conclude that the $22.53, which our common cows returned in excess of that received from those contributing to Minnesota creameries, is wholly due to a lack of knowledge of proper feeding and care.

The statistics referred to also show that there are in round numbers 435,000 cows that are contributing milk to Minnesota creameries and bringing a gross return for butter of $9,570,000, and if these cows received proper feed and care they would bring in a gross return of $18,340,000, being a gross loss, because of improper feeding and care, of $8,770,000. I estimate that by an additional $5 worth of the right kind of feed, together with comfortable housing and regularity in feeding and milking, this enormous loss could be saved to our farmers. The $5 worth of extra feed would amount to $2,175,000, which would leave a net increase of over $6,595,000, as compensation for the extra feed and care.

I have in these calculations taken into account only the cows that are contributing milk to creameries because we know scarcely anything as to what the others are doing. Of those there are some 300,000 in the state and assuming that they too are returning $22 per head less than they would return with good feed and care, we have an additional loss of $5,100,000. In view of these enormous losses because of a want of knowledge of the science of feeding is it any wonder that I have been forced to the conclusion that under present conditions the feeding problem is the most important one that we have to deal with?

The error that our farmers are making is not so much in under feeding as it is in not providing their cows with the right kind of feed. This fact was very clearly demonstrated in a letter from a dairy farmer stating that he was feeding good millet hay, all they would eat, a bundle of unhusked corn, averaging about ten ears to the bundle, and five pounds of roots. In ex-

amining the chemical composition of the food stuffs and the quantity given, we find that the cows were receiving all they could eat.

A cow fed with such a ration is to all external appearance well fed. But when we examine the amount of protein provided by this ration, we find that for a milch cow, she is only half fed. Cows require of the group of nutrients known as proteids from two or two and a half pounds per day, according to the amount of work they are doing. This ration furnished only .98 of a pound, being only a trifle over what is needed daily for bodily maintenance. An animal weighing one thousand pounds, kept quiet and comfortably housed, needs .65 of a pound of protein per day for rebuilding the body tissues that break down daily, so there are left available for milk or meat only .33 of a pound of protein or about enough to make a pound of gain, or to produce the amount of milk required for half a pound of butter daily. This is not an exceptional case, but it is a fair illustration of the almost universal practice among farmers. That such is the case is confirmed by the statistics referred to which show that the average cow yields only 165 pounds of butter per year. Allowing half a pound a day during 300 days, which is the time ordinary cows are expected to give milk, we have 150 pounds per cow. The 15 pounds additional, for which statistics give her credit, is made up during the short period in the spring when she is in good pasture.

Great efforts have been made to introduce improved stock among our farmers; so far these efforts have received but little encouragement on their part. Unless they understand the principles of feeding and have acquired the habit of taking proper care of improved strains of live stock, there is little use in placing such in their charge even as a gift. They must first learn how to properly feed and care for common stock before they can expect to do justice to a full blood, which universally requires more skilful handling than does the common animal. Improved stock is made such by skilful breeding and feeding, and if the best representative of its kind is placed in charge of a person

lacking knowledge and skill in feeding and breeding, reversion quickly follows and the farmer concludes that after all common stock is best adapted for him.

The first step toward substantial improvements in feeding is to show the enormous and unnecessary losses that our cow owners are annually incurring for want of knowldege on this subject, which will create a desire to learn improved methods. This should be followed by furnishing literature containing tables giving the comparative value of feed stuffs, their chemical composition and average content of digestible matter, the uses that are made of the different nutrients with plain instructions for compounding rations and best methods of feeding and caring for the herd. This information is needed not only by every creamery patron but by every farmer in the state who owns live stock.

The question of feeding dairy stock in such a way that farmers can realize the greatest possible benefit from the food consumed, is one of vital importance in these times when the margin between the price of the product and the cost of production has become so small that it is only by reducing the cost of food to the minimum that reasonable profits can be made. In order to feed economically, the animal must be supplied with the nutrients needed for milk production in the proper quantity and in the right proportion. To give an animal more of a certain nutrient than it can make use of is worse than wasted because it not only helps to fill the digestive tract with that for which it has no use, but energy is also wasted in expelling it from the system.

The real feeding value of our different kinds of food is, as yet, little understood. The market prices for the different grains and mill products are based upon supply and demand and not so much upon their feeding value. Farmers, as a general rule, know that bran is good food for dairy cows; they also know that corn, oats and barley are good, but they do not seem to understand why a mixture of such excellent feed as corn, oats and barley will not produce as good results as can be secured by feeding bran and oil meal in connection with them. The reason is plain, when the needs of the animal system and the composition

of the different kinds of feed are known. All animal foods are divided into two classes with reference to bulk—roughage and concentrates. Roughage includes all the coarse portions of a ration, such as hay, stover, fodder corn, silage, roots, etc., while the term concentrates embraces all grains and mill products.

In feed stuffs there are three groups of substances which must be considered in formulating a ration to secure best results. These are known as protein, carbohydrates and fat.

Protein is the name of a group of materials containing nitrogen and is sometimes called the nitrogenous group, in opposition to the carbohydrates, fat and ash, which are non-nitrogenous. The function of protein is to furnish materials for the formation of lean flesh, blood, tendons, nerves, hair, horns, wool and of the casein and albumen of milk. For the formation of these materials protein is absolutely indispensable. It is important to remember that no substance free from nitrogen can be converted into protein or be used as a substitute for protein. It is, therefore, necessary for an animal to receive a certain amount of protein in order to maintain existence, grow or produce milk.

Carbohydrates are made up of several substances, usually divided into two groups—nitrogen-free-extract, including starch, sugar, gums, etc., and crude fiber. Coarse fodders contain large amounts of crude fiber, while grain and mill stuffs contain little fiber, but are rich in starch and sugar. Carbohydrates are either stored up in the body as fat or are burned in the system to produce heat and energy.

Fat, or the material dissolved from a feeding stuff by ether, and for this reason often designated as ether extract, includes the fats, wax and the green coloring matter of plants. The fat of food is either stored up in the body or burned to furnish heat and energy. As a heat producer a pound of fat is worth as much as 2.25 pounds of carbohydrates. When fat has been multiplied by this factor the result is called fat equivalent.

A cow, or in fact nearly any mature animal, can use only from five to seven pounds of digestible carbohydrates and fat equiva-

lent to one of protein. If we feed more carbohydrates without increasing the protein there will be an abnormal shrinkage in the flow of milk because the increase will cause the animal to lay on fat. If the ratio of protein to carbohydrates and fat equivalent is narrowed, the animal will need more heat than the carbohydrates and fat can supply and it will consume some of the protein to make up the deficiency. It follows, therefore, that for the best results the two groups of nutrients—protein and carbohydrates—must be fed within the limits stated.

But all our ordinary feeds, both in grain and roughage, contain carbohydrates largely in excess of an animal's needs, and mix the grain and roughage grown on the farm as we will, it always follows that we are short in protein or have too much of carbohydrates. In fact, all the nutrients needed by our farm animals are found in all our farm feed stuffs in great abundance except protein. In marsh and prairie hay, in timothy, millet, sorghum, fodder corn, stover and straw, there is more digestible carbohydrates than cattle can make use of. The same is true with all our grains. In compounding rations from farm crops we always find it necessary to resort to some mill products, containing a high percentage of protein, to make good this shortage, except in cases where clover hay and alfalfa are available.

Since the supply of ash, carbohydrates and fat is always in excess of our needs, and being practically as free as water, air and light, it follows that they lose all commercial value, leaving digestible protein the measure of the money value of our feed stuffs for milk productions.

A ton of bran costs $10.00. It contains 238 pounds of water. It would be foolish to place any value on the water when there is plenty of it at home in the well. It contains 116 pounds of ash, 58 pounds of indigestible protein, 1,258 pounds of carbohydrates and 80 pounds of fat. It would be absurd to pay at the rate of $10.00 per ton for these materials when we have more at home than we have any use for. So the logical conclusion is that the $10.00 are paid for the 250 pounds of digestible

protein. When bran is used in the ration hay can be fed as roughage, but corn stover cannot be made this part of the ration because it contains too little protein and too much carbohydrates, and in order to be able to feed stover, mill stuffs, containing a higher percentage of protein, must be purchased, which decreases the value of stover in proportion to the extra amount of protein that must be purchased. Or, in other words, stover is worth as much less as its protein content is less than that in the hay. When no hay is available and stover or corn fodder must be fed it will be necessary to resort to oil meal.

A ton of oil meal contains 184 pounds of water, 114 pounds of ash, 72 pounds of indigestible protein, 886 pounds of carbohydrates and 158 pounds of ether extract or fat. Surely no sane person would be guilty of buying these substances and paying at the rate of $20.00 to $25.00 per ton when he is already overstocked with them on the farm. So it must be that he is buying the digestible protein which is the only nutrient lacking. The ton of linseed meal contains 586 pounds of digestible protein, and since the cost of this nutrient in bran was 4 cents a pound, the value of the ton of oil meal is $23.44 when it contains 29.3 per cent. digestible protein, and $22.08 per ton when it contains 27.6 per cent. The wider the nutritive ratio of food stuffs the more protein must be bought to balance the ration and the less money value these food stuffs have.

If we find any farm grown feed that contains enough digestible protein so that it will not be necessary to purchase any mill products, then that feed is worth to us as much more per ton as we would have to pay for the difference in protein if the farm feed contained a lower percentage; or, in other words, the money value of *all* the feed stuffs used in a ration for dairy cows depends upon the percentage of digestible protein they contain.

When bran can be purchased for $10.00 and oil meal for $22.00 we can afford to pay only 21 cents a bushel for corn, 12 cents for oats, 18 cents for barley, for we can get the only nutrient needed at these prices in bran and oil meal. If farmers will bear this in mind they will not feed 35-cent corn, 30-cent

barley or 25-cent oats when shorts can be purchased for $8.00, bran for $10.00 and oil meal for $22.00 per ton.

Another mistake generally made is in buying shorts for dairy cows instead of bran; presumably because shorts are heavy, so is sand. A ton of shorts contains 236 pounds of water, 92 pounds of ash, 98 pounds of indigestible protein, 1,284 pounds of carbohydrates and 90 pounds of fat. As above stated all these substances are in great abundance on the farm. As the digestible protein is the nutrient needed, it follows that the 200 pounds of digestible protein in the ton of shorts fixes its value, and since we can get it in bran and oil meal at 4 cents a pound, shorts, when containing ten per cent. of digestible protein, is worth only $8.00 per ton for dairy cows when bran is worth $10.00. It should, however, be borne in mind that these values only hold good in feeding for milk. If an animal is being fed for gain in weight, shorts would be preferable, especially in the case of feeding swine.

We find that the same inconsistency exists in regard to the market price of roughage. Take, for example, timothy hay and assume that it yields two tons per acre. In two tons there are 136 pounds of digestible protein, which at 4 cents a pound amounts to $5.44 worth of protein per acre, making its feeding value $2.71 per ton. This hay sells in our market for from $4.00 to $8.00 per ton. An acre of clover will produce about two tons of cured clover hay, containing 304 pounds of digestible protein, which at 4 cents a pound amounts to $12.16 worth of protein per acre, making its feeding value $6.08 per ton. An acre will produce six tons of fodder corn containing 312 pounds of digestible protein, which at 4 cents a pound makes $12.48 worth of protein in the six tons of fodder corn worth $2.08 per ton.

In view of these discrepancies between ruling market prices and the actual money value of feeding stuffs, we have for several years disregarded prices of feed and have based our calculations on the cost of digestible protein and have fed it in whatever palatable form we found it the cheapest. It is by this method

and partially through the decrease in price of protein, that we have reduced the cost of producing a pound of butter from 10.6 cents in 1893 to 5.4 cents in 1897.

The profit in dairying, as in any other business, depends upon the margin between the product and the cost of production, and it is, therefore, of primary importance to provide feed stuffs at the least cost, and when grain is relatively high it may become necessary to discard our farm grains entirely, sell them and buy mill feed.

Cows should be fed all they will eat up clean, but such generous feeding should never be inaugurated after they have advanced far in the period of lactation, because in such case they will not materially increase in flow of milk, but will commence laying on fat, which is objectionable. The reason cows should be fed all they will take is because they must first be provided with enough food for bodily maintenance and the more they will eat over and above this, the more they have available for converting into milk or gain. The amount required for bodily maintenance depends on the weight of the cow—the heavier she is the more food for maintenance she requires and the less will there be available for milk production. So if she gains in weight, each succeeding day she will need more food of support and since increase in weight does not increase her feeding powers, she will decrease in flow as she increases in weight.

That generous feeding pays is clearly illustrated in our record for the five years ending December 30, 1897. During the years 1893, 1895, 1896 and 1897 cows were fed all they would take, while during the year 1894 they were fed light.

Year.	Milk.	Butter.	Cost of 1 lb Butter.
1893	6,407	364	10.6 cents.
1894	4,909	271	10.9 cents.
1895	7,418	352	8.0 cents.
1896	7,454	349	6.3 cents.
1897	6,962	351	5.4 cents.

These are averages of the entire herd and show that during the four years when receiving all they would eat up clean they averaged 354 lbs. of butter each, while the average yield for the year 1894, when on comparatively light feed, was only 271 lbs. The cost of production was also the greatest that year. The kind of feed has little, if anything, to do with the yield, so long as they get the required amount of nutrients in the right proportion and in palatable form. We get as much out of fodder corn as we do out of ensilage, and as much from a pound of protein in bran as from a pound of protein in any other concentrate.

They give just a trifle more milk when receiving some succulent feed, such as roots and ensilage, but practically the same amount of butter or other milk solids. We select the cheapest foods and so mix them that the cow gets one pound of digestible protein to six of carbohydrates and fat equivalent. If we should feed a wider ration, that is, one that contained more carbohydrates and fat equivalent than the amount stated, she would gradually lay on fat, shrink in milk and failure to breed would, probably follow. But when the above mentioned nutritive ratio is maintained, no such difficulties are encountered.

Our records show that changes in feed during the winter are objectionable, as changes always cause shrinkage in milk. A more uniform flow is maintained by feeding the same ration all winter, if possible. If it becomes necessary to make a change it should be very gradual, so the system can adjust itself to the variation in bulk, and the muscular action required by the stomach to digest that particular ration.

COMPOSITION OF FEEDING STUFFS.

The following tables give the digestible protein, carbohydrates and fat contained in one hundred pounds each of the feed stuffs commonly used in Minnesota, with their comparative value for dairy cows. The standard ration for a cow weighing 1,000 pounds in fair working condition and giving a good flow of milk, is 25 pounds of dry matter, 2.50 pounds of digestible protein, 12.50 pounds of digestible carbohydrates and .40 of a pound of digestible fat.

TABLE I.— *Comparative value of feed stuffs for dairy cows.*

(Calculations based upon the percentage of digestible protein.)

	Percentage Composition.				Comparative Value per Ton when Timothy is Worth:						
	Dry matter.	*Digestible.*									
		Pro.	C-H.	Fat.	$5.00	$5.00	$7.00	$8.00	$9.00	$11.00	$13.00
Green Fodder.											
Corn fodder	20.70	1 0	11.6	.4	1.47	1.76	2.06	2.35	2.65	3.23	3.82
Oat fodder	37.80	2.7	22.7	1 0	3.97	4.76	5.56	6.35	7.15	8.73	10.32
Red clover	29.20	3.1	14.8	.7	4 56	5.47	6.38	7.30	8.21	10 03	11.86
Sorghum corn silage	26.00	1.2	15.0	.6	1.77	2.12	2.47	2.82	3.18	3.88	4.59
Hay and Dry Coarse Fodders.											
Corn stover (Field cured.)	59.50	2.0	33.4	.6	2.94	3.52	4.12	4.70	5.30	6.46	7.64
Corn fodder (Field cured.)	57.80	2.5	34.6	1.2	3.68	4.41	5.15	5.88	6.62	8.09	9.56
Hay From—											
Timothy	87.68	3.4	43 4	1.3	5.00	6 00	7.00	8.00	9.00	11.00	13.00
Alfalfa	91.60	10.6	37.3	1.4	15.59	18.71	21.83	24.94	28.06	34.30	40.53
Alsike clover	90.30	8.2	41.7	1.4	12.06	14.47	16.88	19.30	21.71	26.53	31.36
Red clover	87 75	7.6	40 0	1.5	11.18	13.41	15.65	17.88	20.12	24.59	29.06
Millet	88 00	3.9	48.5	1.0	5.74	6.88	8.03	9.16	10.32	12 62	14.91

TABLE II.— *Comparative value of feed stuffs for dairy cows*—Con.

	Percentage Composition.				Comparative Value Per Ton when Timothy is Worth:						
	Dry matter.	*Digestible.*									
		Pro.	C-H.	Fat.	$5.00	$6.00	$7.00	$8.00	$9.00	$11.00	$13.00
Hay From—											
Orchard grass	90 10	4.8	42.0	1.4	7.06	8 47	6.88	11.30	12.71	15.53	18.36
Prairie, upland	87.50	3.5	41.8	1.4	5 15	6.17	7 20	8.23	9.26	11.32	13.38
Prairie, mixed	84.10	3.4	41.5	1 2	5.00	6 00	7.00	8.00	9.00	11.00	13.00
Red Top	91 1	4.8	46.8	1.0	7.06	8.47	6.88	11.30	12 71	15.53	18.36
Sedge grass	85.5	3.4	45.3	1.1	5.00	6.00	7.00	8 00	9.00	11.00	13.00
Soja beau	88 70	10 8	38.7	1.5	15.56	18.67	21.78	24.90	28.01	34.23	40.46
Wheat straw	92.59	1.0	38.0	.4	1.47	1.76	2.06	2.35	2.65	3.23	3.82
Oat straw	91.64	1.5	43 4	.5	2.21	2.65	3.09	3.53	3.97	4.85	5 73
Roots and Tubers.											
Potatoes	24.55	2.1	20.2	.....	3.09	3 71	4.33	4.94	5 56	6 80	8.03
Sugar beets	15.00	1.5	12.3	1.0	2.21	2.65	3.09	3.53	3.97	4.85	5.73
Mangels	14.00	1.5	9 0	1.0	2.21	2.65	3.09	3.53	3.97	4.85	5.73
Turnips	9.50	.8	6.5	1	1.18	1.41	1.65	1.88	2.12	2.59	3.06
Ruta-bagas	11 40	.9	7.7	.1	1.33	1.59	1.86	2.12	2.39	2.92	3.45
Carrots	11.40	.8	7.8	.2	1.18	1.41	1.65	1.88	2.12	2.59	3 06

TABLE III.— *Comparative value of feed stuffs for dairy cows* —Con.

	PERCENTAGE COMPOSITION.				COMPARATIVE VALUE PER TON WHEN BRAN IS WORTH:						
	Dry matter.	*Digestible.*									
		Pro.	C-H	Fat.	$5.00	$6.00	$7.00	$8.00	$9.00	$11.0	$13.00
Mill Products.											
Barley meal	88.10	7.4	62.9	2.0	2.96	3.55	4.14	4.74	5.33	6.51	7 70
Corn meal	88 00	9 0	67 4	2.8	3.60	4.32	5.04	5.76	6.48	7.92	9.36
Corn and cob meal	84 90	6.5	56.3	2.9	2.60	3.12	3 64	4.16	4 68	5.72	6.76
Oat meal	92.10	11.5	52.1	5.9	4.60	5 52	6.44	7.36	8.28	10 12	11.96
Pea meal	89.50	16.8	51.8	.7	6.72	8.06	9.41	10.75	12.10	14.78	17.47
By Products.											
Bran	89.50	12.5	42 1	3.6	5.00	6.00	7.00	8.00	9 00	11 00	13.00
Buckwheat shorts	88.90	21.1	33.5	5.5	8.44	10.13	11.82	13 49	15.19	18.57	21 94
Cotton seed meal	91.86	32.0	20.2	10.0	12.80	15.36	17.92	20 48	23.04	28.16	33.28
Linseed meal	90.00	27.6	34.5	7.3	11.04	13.25	15.46	17.66	19.87	24.29	28.70
Gluten meal	90.00	24.5	47.0	6.7	9.80	11.76	13.72	15.68	17.64	21.56	25.48
Germ meal	93.00	12.3	52.4	6.1	4.92	5.90	6.89	7.87	8 86	10.82	12.79
Brewers' grains (dried)	91.10	14.7	36.6	4.8	5.88	7.06	8.23	9.41	10.58	12.94	15.29
Brewers' grains (wet)	24.30	3.9	9.3	1.4	1.56	1.87	2.18	2.50	2.81	3.43	4.06
Malt sprouts	89 80	18.7	43.5	1.2	7.48	8 98	10.47	11.97	13.46	16.46	19.45
Shorts	89.50	10.0	55.9	2.3	4 00	4.80	5 60	6.40	7.20	8 80	10.40

TABLE IV.— *Comparative value of feed stuffs for dairy cows* —Con.

	PERCENTAGE COMPOSITION.				COMPARATIVE VALUE PER TON WHEN BRAN IS WORTH:						
	Dry matter.	*Digestible.*									
		Pro.	C-H	Fat.	$5.00	$6.00	$7.00	$8.00	$9.00	$11.00	$13.00
Grains and Other Seeds.											
Barley	89.10	8.7	65 6	1.6	3.48	4.18	4.87	5.57	6.26	7.66	9.05
Corn	89.10	7.9	66.7	4.3	3.16	3.79	4.42	5.06	5.69	6.95	8.22
Flax	90.80	20.6	17.1	29 0	8.24	9.89	11.54	13.18	14.83	18.13	21.42
Millet seed	87.50	9.0	54.1	2.9	3.60	4.32	5.04	5.76	6 48	7.92	9.36
Oats	89.00	9.2	47.3	4.2	2.68	4.42	5.15	5 89	6 62	8 10	9.57
Peas	90.16	19 4	59.6	.5	7.76	9.31	10.86	12.52	13 97	17.07	20.18
Rye	88.40	9 9	67.6	1.1	3.96	4.75	5.54	6.34	7.13	8.71	10.30
Wheat	89.00	11.0	58.6	1 5	4.40	5.28	6.16	7 04	7.92	9.68	11.44
					PRICE PER BUSHEL ON ABOVE BASIS.						
					Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Barley					8 4	10.0	11.7	13.4	15 0	18 4	21.7
Corn					8.8	10.6	12.4	14.2	15.9	19.5	23.0
Millet seed					8 6	10.4	12.1	13.8	15.6	19.0	22.5
Oats					5.9	7.1	8.2	9.4	10.6	13.0	15.3
Peas					23.3	27 9	32.6	37.6	41.9	51.2	60.5
Rye					11.1	13.3	15.5	17.7	19.9	24.4	28.8
Wheat					13.2	15.8	18.5	21.1	23.8	29.0	34.3

Since the prices of farm products are governed by the laws of supply and demand and not by their actual money value as feed stuffs, it often happens that certain products can be sold for more than their value as feed and others bought for less than their feeding value. To aid in selecting the most economical food the following tables have been arranged, giving the comparative value of the grains ordinarily grown on the farm, calculations being based on the percentage of digestible protein.

Value of feed stuffs based upon their digestible protein content. Protein in barley as a basis.

	When Barley is Worth Per Bushel:							
	16 cts.	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Corn	16.9	19.1	21.2	23.3	25 4	27 5	29 7	31.8
Oats	11.3	12 7	14.1	15 5	16 9	18.3	19.7	21.2
Rye	21.2	23 9	26.6	29 2	31.2	34.5	37 2	39.8
Wheat	25.3	28.4	31 6	34 8	37.9	41.1	44.2	47.4
Bran, per ton	$9.48	$10 73	$11.97	$13.17	$14 37	$15.58	$16.76	$17.96
Linseed meal	21.12	23.79	26.44	29 07	31.72	34 38	35.10	39.65

Value of feed stuffs based upon their digestible protein content. Protein in corn as a basis.

	When Corn is Worth Per Bushel:							
	16 cts.	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Barley	15	17.	18.9	20.8	22 7	24.5	26.4	28.3
Oats	10.6	12.	13.3	14 6	16.	17.3	18 6	20.
Rye	20.	22 6	25.	27 6	30.1	32.6	35.1	37.6
Wheat	23.9	25.9	29.8	32.8	35.8	38.8	41.8	44.8
Bran, per ton	$9 05	$10 16	$11 29	$12.43	$13 56	$14.68	$15.81	$16.94
Linseed meal	19.98	22.42	24.94	27 44	29.92	32.40	34.92	37.44

Value of feed stuffs based upon their digestible protein content. Protein in oats as a basis.

	When Oats is Worth Per Bushel:							
	16 cts	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Barley	22.7	25.6	28.4	31.2	34.1	36 9	39.8	42.6
Corn	24.	27.1	30 1	33.1	36.1	39.1	42.1	45.1
Rye	30.1	33.9	37.7	41.4	45.2	49.	52.7	56 5
Wheat	35.9	40 4	44.8	49.3	53 8	58.3	62.8	67.3
Bran, per ton	$13.58	$15.29	$16.99	$18.69	$19.53	$22.08	$23.78	$25.49
Linseed meal	30.00	33.75	37.50	41 25	43.11	48.75	52.50	56.28

Value of feed stuffs based upon their digestible protein content.

Protein in rye as a basis.

	When Rye is Worth Per Bushel:							
	16 cts.	18 cts.	20 cts.	22 cts.	24 cts.	26 cts.	28 cts.	30 cts.
Barley	12.	13.6	15.1	16.6	18.1	19.6	21.1	22.6
Corn	17.8	14 4	16.	17.6	19.2	20 7	22.3	23.9
Oats	8.5	9.6	10.6	11.7	12 7	13.8	14.9	15.9
Wheat	19.9	22.4	24.9	27.4	29.8	32.3	34.8	37.3
Bran, per ton	$7.21	$8.12	$9 02	$9 93	$10.84	$11.72	$12 63	$13.54
Linseed meal	15.91	17.87	19.85	21 85	23.85	25 80	27.80	29.80

HOW TO COMPOUND A RATION.

In compounding rations several things should be taken into account. First—When hay is fed, the ration should contain concentrates and roughage in about equal weight, while it should contain about once and a half as much roughage when sorgham stover or fodder corn is used, because these contain about 40 per cent. water, while the different kinds of hay contain in round numbers about 10 per cent. When ensilage is used the ration should contain from 20 to 30 pounds, and 6 to 8 pounds of hay. When grain is used for concentrates it is desirable to use two or more kinds because it makes the ration more palatable; cost of the ration should, however, not be ignored in making the selection and when a ration can be made with one kind of roughage and one or two kinds of grain or mill feed at a marked reduction in cost, variety should be waived and the economical ration used, as the maximum yield can be approximately secured by feeding good fodder corn for roughage and bran and oil meal for concentrates. Of these all cows are very fond and will eat a full ration all winter without showing the slightest inclination to tire of them.

Some succulent food is desirable in a ration, but not absolutely necessary under Minnesota conditions. Bran and oil meal are usually the cheapest concentrates and these are sufficiently laxative to counteract the constipating properties in the corn plant, timothy, millet and prairie hay. This combination also gives a fine flavor and waxy texture to butter. If cotton

seed meal should be fed with this roughage the butter would be hard and crumbly and lack that excellent texture and exquisitely delicate flavor for which Minnesota butter has become famous.

The tables give the amount of dry matter contained in a hundred pounds of the different kinds of food in Minnesota, the digestible protein, carbohydrates and fat and their comparative money value as food for dairy cows, calculations being based upon the digestible protein, for reasons already stated. A standard ration should contain 24 pounds of dry matter and of digestible nutrients, 2.5 pounds of protein, 12.5 of carbohydrates and 0.5 of a pound of fat, for a cow weighing one thousand pounds in ordinary working condition. But in practical feeding, cows should be fed according to their feeding capacity and not according to their weight. Good results can be obtained by feeding about 2.25 pounds of protein to common cows and, until more definite information is obtained upon this subject, this will be the basis of our calculations. It also appears that no injurious effects are produced by feeding more fat than is fixed by the standard and that quite as satisfactory results are obtained when the ration contains three quarters of a pound of this nutrient.

In view of the fact that there is considerable variation in the composition of food stuffs, the exact amount of nutrients contained in any food is not known without resorting to chemical analysis, and since this is not possible with the farmer the ration may contain only approximately the amount of the different nutrients mentioned in the standard.

Let us assume that the available farm grown foods are timothy, barley, corn and oats, and undertake to form a ration composed of these only, using 14 pounds of timothy and four pounds each of the grains. By referring to Table I, it is found that in a hundred pounds of timothy there are 87.68 pounds of dry matter, dividing this by 100 gives .8768 the amount in one pound of hay and in 14 pounds 12.28; and by the same mathematical

process we find the amount of the digestible nutrients in the 14 pounds of hay and in the grains used, which is as follows:

Food.	Lbs.	D. M.	Digestible.			Cost, Cents.
			Pro.	C-H.	Fat.	
Timothy	14	12.28	.48	6 08	.18	2.8
Barley meal	4	3.52	.29	2.52	.08	2.5
Corn meal	4	3.52	.36	2.70	.11	1.7
Oat meal	4	3.68	.46	2.08	.24	2.7
		23.00	1.59	13.38	.61	9.83

The ration contains 23 pounds of dry matter which is enough for an ordinary cow, but it contains only 1.59 pounds of digestible protein, which is only enough to produce a half mess of milk after deducting the amount needed for bodily maintenance. None of the food stuffs in the ration can be increased because the carbohydrates are already in excess of the amount needed, and a cow fed with this ration will rapidly shrink in the flow of milk and lay on fat. Local quotations for the feed used are timothy $4.00 per ton, barley 30 cents per bushel, corn 25 cents and oats 22 cents, making the ration cost 9.83 cents. In order to supply the nutrients needed for milk production it will be necessary to take out some of the farm grown grains and substitute some mill product that will supply the protein and decrease the carbohydrates and the cost of the ration. To this end the oats and corn are taken out, and 8 pounds of bran substituted which gives the following:

Food.	Lbs.	D. M.	Digestible			Cost, Cents.
			Pro.	C-H.	Fat.	
Timothy	14	12.28	.48	6.08	.18	2 80
Barley meal	4	3.52	.29	2.52	.08	2.50
Bran	8	7.16	1.00	3 39	.28	4.00
		22.96	1.77	11.99	.54	9.30

This ration is short in all the nutrients except fat, but if enough bran is added to supply the amount of protein needed,

there will be too much carbohydrates. It will therefore be necessary to reduce the quantity of barley meal, and add either more bran or oil meal. The market value of the 4 pounds of oats and 4 pounds of corn taken out of the ration is 4.53 cents and with bran at $10.00 per ton, the 8 pounds of bran cost 4 cents, so in making this change the cost of the ration has been reduced .53 cents. If this ration is increased by 4 pounds of bran, and the barley meal reduced 2 pounds we have the following:

Food.	Lbs.	D. M.	Digestible.			Cost, Cents.
			Pro.	C-H.	Fat.	
Timothy	14	12.28	.43	6 08	.18	2.80
Barley meal	2	1.76	.15	1.26	.04	1.25
Bran	12	10.74	1.50	5.05	.43	6.00
		23.78	2.13	12.39	.65	10.05

This ration furnishes the nutrients needed for ordinary dairy work, but is still short in protein for a large milker. The ration costs a trifle more than the one preceding, but it also contains 2 pounds more of concentrates and the increase in the yield of milk will more than make good the additional cost. Were the rations restricted to 12 pounds of concentrates as were those preceding, its cost would be 8.8 cents. For a cow giving a large flow of milk one pound of oil meal should be added, which would increase it to 24.68 pounds of dry matter, 2.41 of protein, 12.73 of carbohydrates and .72 of a pound of fat.

Taking another illustration and assuming that clover hay is available and that its market price is $4.00 per ton:

Food.	Lbs.	D. M.	Digestible.			Cost, Cents.
			Pro.	C-H.	Fat.	
Clover	14	12.28	1.06	5.60	.21	2.80
Barley meal	4	3 52	.29	2 52	.08	2 50
Corn meal	4	3.52	.36	2 70	.11	1.78
Oat meal	4	3.68	.46	2.08	.24	2.75
		23.00	2.17	12.90	.64	9.83

This ration furnishes the food nutrients nearly in the desired proportion and quantity though it is a trifle short in protein and rather strong in carbohydrates. Cows fed with it can do satisfactory work but the ration is expensive. Taking out the 4 pounds of oats and substituting bran we have the following:

Food.	Lbs.	D. M.	Digestible.			Cost, Cents.
			Pro.	C-H.	Fat.	
Clover	14	12.28	1.06	5.60	.21	2.80
Barley meal	4	3.52	.29	2.52	.98	2.50
Corn meal	4	3.52	.36	2.70	.11	1.78
Bran	4	3.58	.50	1.69	.14	2.00
		22.90	2.21	12.51	.54	9.08

Exchanging the 4 pounds of oats for 4 pounds of bran has made an improvement in this ration and has reduced its cost 75 cents. With a cow having large feeding capacity two pounds of clover could be added which would increase the digestible protein to 2.35 pounds. The last two rations show what a valuable feed clover is. Were peas available, 4 pounds of pea meal could be substituted for the bran which would improve the ration but increase its cost.

When corn, silage, timothy and bran are to be used in a ration it can be made in the following proportions:

Food.	Lbs.	D, M.	Digestible.			Cost.
			Pro.	C-H.	Fat.	
Corn silage	30	7.80	.36	4.50	.18	2.40
Timothy	5	4.38	.17	2.17	.06	1.00
Barley meal	4	3.52	.29	2.52	.08	2.50
Bran	8	7.16	1.00	3.39	.28	4.00
Oil meal	1	.90	.28	34	.07	1.12
		23.76	2.10	12.92	.67	11 02

The ration contains less protein and more carbohydrates than is desirable, but it will give fairly good results. If a mixture of 8 pounds of bran and 2 of oil meal were used it would be bet-

ter. If clover can be used the following combination could be made:

Food.	Lbs.	D M.	Digestible.			Cost.
			Pro.	C-H.	Fat.	
Ensilage	30	7 80	.35	4.50	.18	2.40
Clover	6	5.27	.46	2 40	09	1.20
Barley meal	4	3.52	.29	2.52	.08	.2.50
Bran	8	7.16	1.00	3.39	.28	4.00
		23.75	2.11	12.81	.63	10.10

This ration contains a trifle more protein and is nearly one cent less in cost. By substituting 6 pounds of clover in place of the 5 pounds of timothy, we save the pound of oil meal, secure a better ration and reduce the cost. When early cut fodder corn is provided the following will make a most excellent ration:

Food.	Lbs.	D. M.	Digestible.			Cost.
			Pro.	C-H.	Fat.	
Fodder corn	20	11.56	50	6 92	.24	2.00
Bran	10	8.95	1 25	4 27	.36	5.00
Oil meal	2	1.80	.56	.67	.14	2.20
		22.31	2.31	11 88	.74	9.20

This ration is being fed the college herd this winter and the cows eat it with a relish, are apparently well satisfied with it and are doing excellent work in the dairy. Each cow is fed twice a day all she will take and none are laying on fat.

The President: The next subject on our program is "The Common Interests of Cheese Maker and Patron," by Hon. George McKerrow, Superintendent of Wisconsin Farmers' Institutes.

I suppose you are all familiar with the circumstances of the sudden death of Mr. McKerrow's son, which prevents him from being with us, and as this is a very important topic, I would suggest that we have some discussion at this time on this subject.

DISCUSSION.

Mr. Monrad: I suggest that Mr. Schoenman set the ball rolling. If not, I think Mr. Baer can tell us his experience in schoolhouse meetings.

Mr. Baer: I have only a word to say. Last spring when Mr. Aderhold and I were called to meet with the executive committee of the State Dairymen's Association at Fort Atkinson, they had at a previous meeting proposed that the instructors hold evening meetings for the patrons at the cheese factories where they visited. I was a little skeptical at the time and remember stating before the executive committee that it might be possible to get the farmers together in the evenings of the late fall and early spring, but I did not think we could get them out through the hot summer season when farmers were busy in harvest and hay fields. But we were instructed to go and hold an evening meeting at each factory visited. I want to say that those meetings have been most successful. I usually got to the factory in time in the morning to take samples of the milk for the Babcock test and the Wisconsin curd test, also using the lactometer on all milks delivered. I would then give the patrons notice that I was going to have those tests with me at the meeting that evening, and invite each one to come and see the results obtained from the samples taken, and also promised them to explain the tests so that they could use them themselves on the farm and at their homes. During the busy summer season, it would sometimes be very late before they could meet, but they always came, and often it would be midnight before these meetings would break up. I would make the curd test during the day and have the curds on exhibition at the evening meeting. It has been an easy matter for me to interest the patron in the great necessity of his furnishing good, pure, clean milk for cheese purposes, when I had the curds of the different patrons' milk to demonstrate to him just exactly what quality of cheese his own milk would produce if it were not mixed along with that of his neighbor's.

Then I would make a few tests before the patrons with the Babcock test, adding water to some samples, skimming others, to show them just how the test would surely show up any adulterations of this nature. I have always been successful in getting our patrons interested in this work, and they would get up a discussion as to what caused these various taints and flavors, with the production of gas and pin holes, as shown in the curd test, and before the meeting would close every one would know who had the good milk and who had the bad milk, and no one would be offended.

My experience with Wisconsin farmers has been that they will readily remedy these matters just as soon as they are convinced that they really need remedying.

It was hard work for the instructors, but we felt amply repaid, and I feel that there is no work that I have done in the way of cheese factory instruction in southwestern Wisconsin that has given such general satisfaction as these evening meetings at the factories. (Applause.)

Mr. Schoenman: In regard to this matter, I would say that I have had Mr. Baer myself in my factory, and paid him out of my own pocket, and must say that the most good he did me was when he came there and talked with the patrons in a good social way. He would make the curd test and the Babcock test in that way and get them interested. Certainly I think that this is the best way to get at it. And there is another thing I would like to know and that is if the cheese instructor has a right to condemn cans if they are not fit to be used. Perhaps Mr. Baer can give us something on this subject. In many factories there are cans that are rusty and old and ought not to be used. I think the cheese instructor would do good if he would visit the cheese factories and talk to the patrons about the cans, and tell them that the law requires that the cans must be in such shape or they dare not be used, according to the law. It causes considerable trouble.

Mr. Faville: Mr. Baer's report has done me quite a bit of

good. It made me feel that we patrons of cheese factories are not such a bad lot after all. The worst thing you can charge against us is ignorance. That is the worst thing, and is a common thing today. We patrons will do better when we are properly instructed. He said that is so, and I believe he is an honest young man (Mr. Baer) and I feel good about it.

Mr. Baer: I want to say that the effort to detect tainted milk at the weighing room is a bad business. You take two curds, one full of pin holes and compare it with a nice, clean flavored, solid, clean-cut curd, and you have demonstrated to the man that you know your business, and my experience with Wisconsin farmers has been that if you can convince them they are wrong they are perfectly willing to fix it right. If you say to them, "Your milk is off this morning, you had better air it," they don't pay any attention to it.

Mr. Faville: I remember when I was in the business I had some long glass tubes to detect skimmed milk. I set the tubes up and had them numbered so I would know who they belonged to, and would fill them with milk each morning. I found some had nice cream on them and some cream of the thinness of a knife blade. Then I would kind of motion to some fellow that I wanted him to come in. Then he would finally come in and wonder what that thing was there for. I would show him the difference in the cream, and I have broken up skimming of the milk in that way without making a man mad or saying a word. I learned another thing, and that was when I left the tubes stand there one would stay in a nice natural condition for a couple of days, and another would foam and sizzle and run over, and I discovered who had the good milk and had hadn't in that way.

But they are doing that a great deal better now with the Wisconsin curd test. It is a good deal better. But, as I said before, I corrected bad milk and skimmed milk in several instances without quarreling with any one.

Mr. Aderhold: I would like to find out how many makers here have the curd test in their factories. I would like to have

them raise their hands, and would say to the rest that I think they are not up-to-date.

(Seven in the room using the curd test.)

(Fifty-two makers in the room.)

Mr. Monrad: Mr. President, sometimes we have a happy thought and I believe I have one now and I cannot hold it. I want to suggest to Mr. Baer that the next time he has one of those meetings that he has a reproduction of the pictures Mr. Decker showed us last night, showing the increase in the yield owing to the percentage of fat. Don't you think so?

Mr. Baer: Yes, I think that would demonstrate, in connection with the Babcock test, that the yield of cheese, when the quality is taken into consideration, really follows the fat contents of factory milks, as shown by the test. I invite the members over to the dairy school to see that experiment, which is on the curing shelves in the dairy building.

Mr. Mason: Maybe we didn't understand Mr. Aderhold about the curd test. I would ask what he means by the curd test. I didn't buy a machine, but I took some fruit jars and made a curd test, and I believe it was just as good as a machine you buy for fifteen or twenty dollars.

Mr. Aderhold: You ought to have a tank that will hold water—that is covered and has partitions, and you ought to get the jars made especially for that. Now, you take in your way it is pretty hard to keep the bottles from tipping over. Sometimes you haven't fruit jars enough. It is an important thing to have, and you ought to have them, and I want to repeat that all factories who haven't the test are not up-to-date.

Mr. Mason: When there is occasion to use the curd test, it is generally a time of year when there is no necessity for putting water in it. It is most generally in the warmest time of the year. In the fall and spring we are never bothered with the milk, and for that reason I do not think it would be necessary to have it all the time.

Mr. Aderhold: I would like to hear from those who have

the curd test, whether they think it necessary to heat the milk samples in warm water.

A Voice: I think it is.

Mr. Mason: May I ask how warm that must be.

Mr. Crandall: I like to keep it at 98.

Mr. Mason: Won't it develop at 95?

Mr. Crandall: I think it will.

Mr. Powell: Is it not one of the objects of the curd test to develop the samples as quick as you can and find out what you have got?

Mr. Johnson: I think Mr. Powell has one, and he ought to know how to work it, and not be asking.

Mr. Schoenman: I have a curd test that I think is up-to-date, which cost me four dollars. I have a partition for each glass to stand separate, and on top is a perforated tin—a good deal on the model of the regular curd test—and there is a spring that holds down the top, and you can turn your glass over, and can have from eight to twelve bottles in the hot water tank, and drain the whole lot at one time. The tin is coarsely perforated, and I let it drain after I break up the curd. It is good all right.

Mr. Aderhold: One way of making the curd test is to make a tank something like a sink,—the sides, end and cover of wood of one and a quarter inch lumber, and bottom of galvanized iron, so you can set a lamp under there, and keep the lamp burning so it will hold the temperature all right in cold weather without any trouble. You can get jars by the dozen, and I think in that way you can get a first-class test from four to six dollars.

Mr. Schoenman: I had mine arranged similar to that. I had feet on it about eighteen inches high. If I made a curd test in the fall or spring, I would have a lamp, but in hot weather it is unnecessary. I set it in a warm place.

Mr. Baer: Mr. President, I don't like the idea of not using any water to warm up the samples in the curd test. I think the test ought to be made to conform as near as possible to cheese

conditions. You keep the curd at 98 and run the milk up to 98 before you add the rennet, and hold the samples at that temperature for developing.

Mr. Aderhold: I see one of the best cheese makers in Wisconsin is here, and he hasn't said a word,—Mr. Zwicky.

Mr. Zwicky: There is one question that was not answered this morning. Perhaps I can answer it: "How to secure the best results in handling quick working milk;" that is when the milk is over-ripe, or when you get it nearly sour, before you add the rennet. My method is to heat the milk up to 98 or a 100 before adding the rennet, and after that take and cut it fine and scald it up to 110 or 115 degrees Fahrenheit. If your milk is very ripe, draw your whey and add water for cooking, and afterwards dip it on the racks as you would a normal working curd, but mill it early and salt it early. In this way you get a cheese for quick consumption and a good cheese, but not a cheese that will last and hold its flavor.

Mr. Ward: Did I understand you to say that you added the rennet to the milk at a temperature of 98 or 100?

Mr. Zwicky: Yes, have the milk 98 or 100 before you add the rennet. The idea is to get the curd cooked ahead of the acid; otherwise you will have a sour cheese, and that is the only protection you have to keep it from getting sour.

A voice: I have done that and found the cheese very nice, but lacking in flavor.

Mr. Aderhold: I find that you have a "weak-bodied cheese" unless you use more salt. I would like to bring up another question, and that is this: "Does it make any difference what temperature we cook at so long as we get a proper cook on the curd?

Mr. Monrad: Will you answer that Mr. MacPherson?

Mr. MacPherson: Will you please state the question again?

Mr. Aderhold: Does it make any difference what temperature we cook the curd at, as long as we get a proper cook and the desired amount of moisture?

Mr. MacPherson: I think the way to make a first-class cheese is at a temperature of 97, or 98, or 99, between 97 and 99, and about this gentleman who proposed sour milk, I feel satisfied that that milk at 80, or even 78, and ten per cent. more rennet put in, and heated very rapidly to 105, that you will save from one to three pounds of butter in every thousand pounds of milk, and you will make a far better cheese for this reason. That by setting low and putting in more rennet you take advantage of the situation and hasten the entire process, and the extra heat expels the moisture to have sufficient firmness, and that is the whole secret of making cheese, — to have firmness or cooking, because there is a certain percentage of moisture. There should be forty per cent. of moisture in the curd, and about eighty-four or eighty-three parts out of eighty-seven expelled from the curd, leaving forty per cent. of moisture before the acid begins to materially change, and in that way you save in the yield, you gain in the quality, and you have a better chance of making a superior, longer-keeping cheese, and I would say that the temperature of the curd materially determines the flavor and quality of the cheese. All curds should be maintained for two or three hours at a temperature of from ninety-seven to ninety-nine in order to break down the casein and develop proper flavor in cheese.

Mr. Faville: This making cheese out of sour milk reminds me of a story my father used to tell, and that was, if a man got a good crop by planting late in the season he ought to keep still about it; that the fact was he was too lazy to plant earlier, and therefore he ought to keep still about it. We have no business to have sour milk, — ought not to have it at all. (Applause.) You all understand me. Very well. There is no necessity of having sour milk. It always comes through the carelessness of the producer, and if he understands that it is to be thrown away, he won't bring you sour milk.

Mr. MacPherson: I want to say that it is proper to bring up these questions. A man must take advantage of the opportunities of his talk to develop his intellect. The question is "How to make the best cheese out of poor milk?" We should not have it,

but when you have bad weather, a large amount of electricity in the air, which has a bad effect on all milk that comes in, the question is how to handle it to the best advantage.

Mr. Van Leeuwin: I want to say that I learned under an old Wisconsin maker, and his method was when we had sour milk (and in my country we have milk that is ripe in the morning in spite of anything,) — we would set it at a low temperature and cook low; that is he would not heat it to more than 98 degrees. Of course, that was a mistaken idea. Afterwards I tried setting it at a high temperature and heating (as the gentleman spoke of here) and then washing out the acid with warm water. Then this last summer, it occurred to me that if I set at a low temperature, I might get good results. I set some at 76 degrees. I used three-fourths of an ounce more of rennet than ordinarily, and I rushed it right along and cooked it, and would not stop cooking until the acid started to show on the hot iron. I heated generally to 105 degrees. The cheese would be of a good, meaty texture, and I got a very good cheese, — not a fine quality, but a very fair cheese. I made it up in that way, and I said at the time, "This cheese will not go to the general market, but we will lay it aside and ship it to the commission house, and not even brand it as our own cheese." We didn't want anybody to know it was our cheese. We watched that cheese and it came out, — not fine, — but a very good cheese, and I made it several times out of milk that came in in that condition and got very good results. I will take milk with the Marshall rennet test at one and one half, and made in this way I can make a very good quality of cheese.

Mr. Mason: I think last summer a number of makers were bothered with cheese appearing to be highly acid, which did not appear while it was being made, and after twenty days or so on the curing tables, gave evidence of acid. I have had some trouble myself, but what the cause was, I don't know, or the remedy to be used, I don't know. I had a very little of it.

Mr. Faville: It would break right off and show it was an acid cheese?

Mr. Aderhold: It is the opinion of bacteriologists that it is due to some germ. I have seen this kind of cheese quite frequently since 1894. The cheese has a good color, but when you mash it up it appears white and harsh. It isn't high acid, but moulds like a high acid cheese. I have never been able to get at the cause of it, but I have seen where they have cold curing rooms it was not as bad as in others.

Mr. MacPherson: It largely comes from letting the acid get a little too far before it is cooked. If the curd was hardened five or ten minutes sooner at the right stage of acidity, that character of cheese would not develop. It is the development of too much acid at the right amount of moisture. It may come from too much starter or it may come from a too ripe condition of the milk and allowing the acid to develop a little too far before the curd is properly firmed.

Mr. Monrad: I would ask the gentleman what temperature is the water he uses for washing the curd?

Mr. Zwicky: About 98.

Mr. Monrad: I understand you heat it up to 105?

Mr. Zwicky: No, in such a case where the milk is too ripe I heat it up to 110 or 115, if it is necessary to get ahead of the acid.

Mr. Monrad: But the water you put in?

Mr. Zwicky: I put in hot water not to get a quick scald on it, but to wash out the acid.

Mr. Monrad: You wouldn't put boiling water on it?

Mr. Zwicky: No. Up to 110, perhaps.

Mr. MacPherson: The objection I have to setting at a high temperature is that the rapid action of the rennet firms the curd so solid, that when you come to cut it, it runs ahead of the knife and will not cut, and the cream is liberated, and the curd instead of being cut is very much broken. The principle is right — to get ahead of the acid and expel the moisture, but the disadvantage is the difficulty in the cutting of the curd and liberating of the cream. The high heating is correct.

Mr. Waterstreet: I would ask Mr. MacPherson his idea about washing the curd in cold water?

Mr. MacPherson: There is a period at which you can throw cold water on the curd and do it a considerable amount of good, and that is just before grinding. The inside particles of the curd has sufficient action of the lactic acid that in cooling it, it does it good. I much prefer cooling it with cold air than water. In most cases I advise cooling it down to 80 or 85 before grinding by either cold air or water. I think the application of cold water to the curd before the acid develops is an injury. It affects the keeping quality of the cheese. It gives it a soft texture, and the flavor is liable to pass off, and the curd is liable to open after a few days. That cheese is very objectionable. I much prefer cooling it with cold air.

The President: The committee appointed last year on legislation is with us, and we will receive their report while the other committee is doing its work.

Mr. Powell: Mr. Decker can do it better than I can.

The President: Will Mr. Decker state to the convention what the committee has done?

Mr. Decker: As to the matter of legislation, when looked up by the committee, we found some work had already been done, and the bill will be introduced in the senate by Senator Dennett of Sheboygan county, appropriating a certain sum for the use of this association, and for the printing of our reports. The matter will be presented in due time through Mr. Dennett, and will be referred to the proper committees, and will come before the assembly in the process of legislation. They want to know what we can do with the money appropriated and what our needs really are. As stated yesterday our needs are these: We want money to offer premiums that will draw out exhibits. We believe we can learn a great deal from exhibits, as you will find in a few minutes here, and it will encourage competition. Again, we want to get our reports printed. We want to hire a stenographer, which costs money, and carry on work of this kind educationally, and get our work out among the people. We want

to get the best talent in the country on dairying to come before you and help out on the program. It takes money for these things. So we think we can use five or six or seven hundred dollars this year. These are the reasons why we want an appropriation and you can all help it along by seeing your senator and assemblyman, or writing them a letter. The committee will have all they can do by appearing before the committee and trying to get the bill through. You should see your senator and assemblyman, and tell them there will be such a bill, and that you want their vote and you want them to do all they can to get it through, and give them the reasons why you want it put through.

Mr. Monrad: I want to ask Mr. Decker a question, and give a little warning at the same time. He referred to the use of this money in giving more premiums. I would suggest that part of the money be used in paying express for the cheese first of all before you give any more money in premiums. I think that would induce more people to show cheese. I think most people will send cheese if they do not have to pay express charges.

Mr. Decker: I think that a good suggestion, and we want to get exhibits from the Swiss and Brick factories.

Mr. Monrad: Gold medals and some diplomas I think is all cheesemakers want, as long as they are not put to any expense in sending their cheese here. Stick to the medals and diplomas and be satisfied.

Mr. Decker: Another thing I will tell you, that when I was in Denmark the makers usually showed me some diplomas. I think it has helped bring Denmark along.

Mr. Monrad: They don't even get medals there.

Mr. Decker: I saw some medals and diplomas there.

ANNOUNCEMENT OF CHEESE SCORES.

Hon. D. M. MacPherson presented the report of the judges on the cheese scored by them as follows: the president presenting medals and prizes to those announced as winners of premiums.

EXPORT CLASS.

First premium—Wm. Zwicky, Van Dyne, Wis.
Second premium—Adolph Schoenman, Plain, Wis.

DOMESTIC CLASS.

First premium—Wm. Zwicky, Van Dyne, Wis.
Second premium—W. P. Hamm, Kohlsville, Wis.

The following table shows scores in detail:

Export Class.

No.	Name of Exhibitor.	Post-Office.	Flavor	Texture	Color.	Make up.	Total.
			45	30	15	10	100
1	W. P. Hamm.....	Kohlsville.....	40	27	14	5	86
2	J. A. Carswell.....	Lone Rock	30	25	11	7	73
3	Julius Berg.....	Algoma.....	39	25	14	8	86
4	A. Schoenman.....	Plain	45	29¼	15	8	97½
5	Geo. W. Drischel..	Cambridge City, Ind	40	18	12	9	79
6	C. A. Pickard.....	Ithaca.....	35	24	11	8	78
7	William Nisbet....	Hub City.....	42	20	14	9	91
8	Hugh Nisbet.....	Woodstock.....	44	26	14	9	93
9	Scott Lieurance...	Homer	40	27	15	7	89
10	P. H. Casper.....	Nicholson.....	43	28	15	8	94
11	Thomas Johnson..	Boaz.....	44	29	13	8	94
12	F. E Remmington.	Roscobel	41	28½	14	9	92½
13	H. F. Kellner.....	Cazenovia	42	27½	13	9	91½
14	Jno. Kelty.....	Boscobel	39	25	15	5	84
15	Wm. Zwicky.....	Van Dyne.....	45	30	15	8	99

Domestic Class.

1	W. P. Hamm.....	Kohlsville.....	42	28	14	9	93
2	A. Schoenman.....	Plain.....	40	29	14	9½	92½
3	J. R. Biddulph...	Providence, Ill	35	10	5	9	59
4	W. H. Spooner....	Rutland.....	35	25	13	8	81
5	Wm. Zwicky.....	Van Dyne.....	44	29	15	9	97
6	G. H. Lindeman...	Denmark.....	40	28	13	7	88

Judges:—Hon. D. M. MacPherson, Canada (chairman).
R. A. Horton, Wisconsin.
C. A. White, Wisconsin.

Superintendent:—J. W. Cross, Mauston, Wisconsin.

CUTTING OF THE PRIZE CHEESE.

DISCUSSION.

What is a good cheese?

The President: Mr. Zwicky will now come forward and inform us how he made that cheese.

Mr. Zwicky: I am not a public speaker, so I won't make much of a show, but I will tell you how I made that cheese.

My milk comes in very sweet and in very good condition. I use a good, clean-flavored, sour milk starter, saved from the previous day from one of my best patron's milk,—milk that I am sure is of good quality. I add this starter immediately after taking in a few messes of milk in order to get it at work from the start. I keep the heat on the vat while taking in the balance of the milk and usually heat to 94 degrees, setting at that temperature, unless the milk is overripe, in which case I set at a higher temperature still. I set at about 94 degrees on the average, and then scald up to 104 degrees. When the temperature of the vat reaches 100 degrees, I call it scalded and look at the clock, wishing to employ about forty-five minutes in raising the temperature to this point, after which it will run up to about 104 degrees.

I ripen my milk so that the curds will remain in the whey at this temperature for nearly or quite two hours before I draw the whey, or before the curd will spin about one fourth of an inch on the hot iron.

Then I dip it on the racks and allow it to remain in the pack about two hours in the summer time, with frequent turnings, before milling. I think perhaps one and one half hours on the racks is ample time in the spring and fall of the year.

I mill my curds with a horizontal knife mill, using what is known as the Harris Curd Cutter.

If there is any white whey remaining on the curd after milling I rinse it out with clean water from under the vat at an even temperature, letting the curd drain for about fifteen minutes before adding the salt. I usually salt at three different times, after which I give fifteen minutes for the salt to dissolve and the

curd to drain, then hoop and press it, pressing gradually on the start so as not to start the butter-fat.

Mr. Decker: How much salt do you use?

Mr. Zwicky: From two and one quarter to two and three quarters pounds of salt per one thousand pounds of milk, it depending altogether upon the condition of the curd at the time of salting; if it is moist, I salt high; if dry, use less salt.

Mr. Austin: How much acid do you run on the curd when you mill it?

Mr. Zwicky: I hardly ever test that. I go by the oil and how it flakes in texture and color. If it flakes meaty and that mottled condition of color has developed into a uniform color throughout the entire mass of curd, I consider it in proper condition for milling.

Mr. Decker: When was this cheese made?

Mr. Zwicky: October 17th.

Mr. Austin: How long is it from setting to dipping?

Mr. Zwicky: About two hours in the summer season.

Mr. Dickson: How do you salt it three different times?

Mr. Zwicky: I weigh up my salt, and add about one-third of it each time, always stirring each application of salt into the curd to get it evenly mixed.

Mr. Mason: How do you pile the curd?

Mr. Zwicky: I place a strainer cloth over the racks which I use in the bottom of my vat, throwing the curd up onto them, stirring it slightly with the hand before permitting it to mat. If the curd is wet and hardly firm enough, I stir over two or three times to expel the whey before I let it mat together. After it has firmly adhered so as to admit of its being turned without crumbling up, I cut it into blocks eight inches square and turn them over, after which I turn them quite often, doubling the blocks up, or piling one on top of the other. I usually turn my curds every fifteen or twenty minutes.

Mr. Decker: How deep do you pile?

Mr. Zwicky: Very seldom more than four deep.

Mr. Faville: What kind of a curing room have you?

Mr. Zwicky: The curing room is on the north end of the factory, shaded with poplars on the west side. This shade is the only protection I have from the sun's rays. The building is sided up with upright boards.

Mr. Baer: Why do you set your milk at such high temperatures?

Mr. Zwicky: I think I get a firmer cook on the curd if I set it high.

Mr. Austin: How long does it usually take the vat to coagulate until ready for the knife?

Mr. Zwicky: Customarily about twenty minutes.

Mr. Austin: Then after adding the rennet and coagulation sets in at this high temperature, don't you have to cut lively before the curd gets tough and runs ahead of the knife?

Mr. Zwicky: Yes, of course, you have got to be ready and keep working. Still, I don't have to hurry very much.

Mr. Austin: Does it develop faster by setting it at 94 than it would if set at 86?

Mr. Zwicky: I don't know as it would.

Mr. Waterstreet: How much rennet do you use?

Mr. Zwicky: I use from three to three and one-half ounces of Hansen's rennet extract diluted in one quart of cold water, to one thousand pounds of milk.

Mr. Pearson: Do you think your milk is any better than the average factory of the state receives?

Mr. Zwicky: I don't know.

Mr. Pearson: Do you ever turn milk back and refuse to take it?

Mr. Zwicky: I have done so when I saw that it couldn't be used, — that is after a very close warm night, and I had accepted all the high acid milk that I thought I could safely handle, — then I don't take it, but generally my patron takes pretty good care of the milk and I am not bothered a great deal with milk that is unfit to make cheese of.

Mr. Monrad: Perhaps Mr. Aderhold could answer that

question of Mr. Pearson's. Has Mr. Aderhold been at your factory?

Mr. Zwicky: He passed through there, but others have been there. Some years ago Mr. High was there.

Mr. Monrad: Did Mr. High tell you then, that it was the average or below?

Mr. Zwicky: I hardly remember, it is so many years ago.

Mr. Aderhold: I think from what I have seen of Mr. Zwicky's milk, as well as the man who makes it up, that it is of the average quality.

Mr. Schoenman: The second prize don't suit me very well, but nevertheless, I will tell you how I made the cheese.

I get our milk and make the rennet test, and try to set it about three and one half with the Marschall test, depending a great deal on the rennet we use. Sometimes we have rennet that we have to set at about five. Then, again, we get rennet that compels us to set at three and one half. We aim to gauge our milk so in about two hours from the time we put in the rennet, the whey is ready to draw, and the curd spins one-eighth inch acid.

I would like to state right here that we use good starter, and you ought to remember when you are using a starter to try to draw the whey a little sweeter. Draw the whey just as the acid is ready to start. If you are not careful it is pretty dangerous work if you do not know exactly how to use it, because I have found since I have been using starter that I have had some trouble about getting acid cheese, especially in hot weather, more so that I did before I used a starter. It is a danger I would warn you against. Add the starter just at coagulation. Mr. Aderhold told me to try using starter when it developed to the point of coagulation and no further. I have found out that is the way to use starter. It gives a nice clean flavor that it will not have, if developed to far. It ought to have a mild, pleasant flavor. Then I throw my curds on the rack, and handle it as Mr. Zwicky does.

Mr. Zwicky: How high do you set it?

Mr. Schoenman: As a rule at 86 and scald to 98, or, if

necessary, 100 or 102. I think 98 is the ideal point for firming it, as Mr. MacPherson says. I don't like the word "scald" because they think that means scald.

Mr. Aderhold: I think we have derived a good deal of benefit from the fact that those who have secured the highest scores are a credit to Germany.

Mr. Schoenman: I always cook at 98, unless I think it is necessary to put it higher. The curd will invariably be firm before the acid comes on. I don't believe in guarding against it as Mr. Zwicky does. I think as Mr. MacPherson does, and prefer setting it lower and using more rennet, and scalding a little above 100, perhaps 105, and in extreme cases 110.

Mr. Waterstreet: What kind of salt do you use?

Mr. Schoenman: Genesee salt. I think Genesee salt is the best we have ever used.

Mr. Mason: Do you wash the curd every day?

Mr. Schoenman: No, I think too much of the yield.

Mr. Mason: Does that affect the yield?

Mr. Schoenman: Yes.

Mr. Mason: What was your yield?

Mr. Schoenman: Nine pounds; it would average nine and three quarters for the season.

Mr. Mason: I figured up the yield of my factory this summer, and my overrun was six hundred and seventy pounds of cheese from the 12th of April until the 24th of November.

Mr. MacPherson: State the average butter test.

Mr. Mason: Three and seven-tenths per cent., I think.

Mr. Schoenman: What time of the year was that?

Mr. Mason: During the whole season.

Mr. Schoenman: You washed every day?

Mr. Mason: Yes, every day after Mr. Aderhold was there.

Convention adjourned until 7:30 p. m.

EVENING SESSION.

Convention met pursuant to adjournment at 7:30 p. m. President Carswell in chair.

The President: I wish to say that we have with us tonight a man who has endeared himself to the cheese makers of the state of Wisconsin pre-eminently, and, as it has been remarked here today in the convention, "the godfather of the Cheese Makers' Associaton of Wisconsin."

Ladies and gentlemen of this convention, I take extreme pleasure in introducing to you Mr. J. H. Monrad, who will now address this convention.

ADDRESS BY J. H. MONRAD.

Mr. President, Ladies and Gentlemen:

I don't see very many ladies, but there are just enough to enable me to say it.

I will try to be as short as I can. I came here expecting to represent the Dairy Division of the Agricultural Department of the United States, but consider myself in great luck to find that we have with us Assistant Chief Mr. Pearson. This relieves me of the duty of representing that division, and I shall turn over to him the duty of doing that, and satisfy myself with expressing my great pleasure of being with the boys again. I want to say that I swallowed considerable of my pride when I hired out like a cab-horse by the day, but my desire to see you was too strong and brought me up from New Orleans.

I want to repeat my congratulations to the Association at its wonderful growth, considering it has had no financial aid from the state, and very little support from the dealers and transportation people.

As you remember, we first talked about starting as a national association, and when we separated from the butter makers, you called yourselves the Northwestern Cheese Makers' Association, but finding that you really only represented Wisconsin, you called yourselves the Wisconsin Cheese Makers' Association, and I am old fogy enough to believe that honesty is the best policy in the long run.

I have not much new to report to you. The discussion about the much maligned bacteria goes on, and the scientists seem to be at loggerheads just as much as Prof. Haecker and Prof. Shaw

are as to breeds of cattle in Minnesota. Or, like Hoard's Dairyman and Breeders' Gazette, it seems to me that our scientists are getting into a discussion as to whether they are going to breed a general-purpose bacteria or a special-purpose bacteria for the cheese. (Laughter.)

I am, perhaps, a little conceited when I again recall to your memory that I had the pleasure of first telling you of the Gerber fermentation test in this hall in 1891. At that time I brought out a modification, and it was looked down upon and not much interest taken in it. The only man who did take any interest in it was Mr. Hecker. He was making Edam cheese. He borrowed the apparatus from me and left it at the Experiment Station.

I am glad to see that the Wisconsin curd test has now gained such a great foothold. It is true there were only seven of you who were using it, but if Mr. Aderhold keeps at you he will soon convert you.

I am also pleased to see the farm school idea taken up. I tell you, boys, you are not doing your duty to the farmer or to yourselves if you don't take up that work. Mr. Baer and Mr. Aderhold cannot be with all of you, but that don't prevent you from getting up schoolhouse meetings and showing the fermentation test and the Babcock test, and getting Prof. Decker's pictures of cheese made from various kinds of milk and showing them to your patrons.

I heard something at the Dairy Students' Society meeting the other night. There was some criticism of the dairy school because the cheese makers were compelled to take a course in butter-making. I don't quite agree with you. It may seem to them that they are not interested in it, but I tell you we are working gradually around to the system of being prepared for making either cheese or butter, and you boys will never regret getting started in the use of the separator and the making of butter. Some years ago Dr. Babcock made some experiments running the milk through the separator in order to clean the milk for cheese making. As I understand it, he was fairly successful. Our worthy president has also tried it, so he says, with great success. For this reason, boys, you see the use of the separator may soon become general, and I want the Experiment Station to induce the large factories to carry on experiments under their guidance and to keep an account of the exact expense; also as to its use in recovering the fat from the whey. I throw this out as a hint for Mr. Decker to take up with some factory.

In regard to the sentiment which seems to be growing in Wisconsin toward the making of soft cheese, and your congratulating yourselves on the increasing consumption and higher prices,

I want to sound a warning note. The rising price of home cheese is not so much due to better cheese and soft cheese as it is to the fact that the number of cheese factories have been reduced and many turned into butter-making factories. I do not make this as an assertion, but I think it has something to do with the better market. I do say, however, that this soft-cured cheese is not going to increase the consumption of cheese. People say they prefer it soft and green, but say they like the cheese but it does not like them. Slow-curing cheese, like the premium cheese here, is easily digested. I might say I approve of the European idea of using cheese as meat, and not ramming it down after the pie as is done in the states. I do not think that the proper way to eat cheese.

I don't want to keep you tonight. We have a man with us who knows more than ten other men about cheese,—a man who fourteen years ago I had the pleasure to visit shortly after my arrival from New Zealand, where I had spoiled many pounds of milk into poor cheese in spite of cleanliness and care. I spoke with many cheese makers in America about it, and then I was sent by Hansen's Laboratory to Canada. I was a greenhorn at traveling; weary of calling on this man and that, and receiving the cold shoulder and being told to wait, and then get a very short answer, "Well, you create a demand for your goods and we will buy of you."

I landed in Lancaster, Canada, and called at the office of Mr. MacPherson, if I remember right. I was told I would find him at home. I went there and he invited me in, ordered me to take off my coat, and kept me for supper. At the supper table we started in talking cheese. We started at six o'clock and at twelve Mrs. MacPherson said, "I am going to bed now;" but we kept on talking until one o'clock, and six o'clock the next morning we were in the cheese factory, and there Mr. MacPherson had five or six cheese makers assembled in order to show them how he wanted the cheese made; there was some change he wanted made in the system of manufacture. I also learned he employed instructors. Mr. MacPherson is really the father of the system of having traveling cheese instructors. He saw the benefit of having men visit his factories, and I want it handed down as historical fact that to him is due that system. Before we got instructors in Wisconsin, we referred to Mr. MacPherson, showing his success in introducing that business system.

I will say to you that I learned more in that visit with Mr. MacPherson than I did in a week's talk with other people. I want you to listen to him with great attention, and I won't take any more of your time.

Mr. President, I thank you.

The President: Gentlemen of this Convention: Mr. Monrad has spoken to you better of the speaker, whom I shall now introduce to you, than I can possibly do. Mr. Monrad is particularly acquainted with him, and we all know that Mr. Monrad's words carry weight with them, and I take especial pleasure in introducing to you the Hon. D. M. MacPherson of Lancaster, Dominion of Canada, who will now address you upon the subject on this program for which he is assigned.

THE MODERN IMPROVED METHODS OF CHEESE MAKING, OR THE SCIENCE AND ART OF CHEESE MAKING.

Hon. D. M. MacPherson, Lancaster, Ont., Canada.

I can assure you that it affords me extreme pleasure to be here tonight, although I feel somewhat diffident in the feeling that I am today in the center of learning in this state of Wisconsin, and when I feel that I have before me professors who have led the van of thought and shaped the destiny of large numbers interested in investigations, and who are now making a pace in that race which we must all of us, professional as well as practical men, follow; and I have a feeling of fear in appearing before these men of talent, men of ability, that it will be a presumption on my part as a practical man, to say very much; however, I shall do my very best. I have come a long ways to present a few thoughts on the science and art of cheese making.

I have prepared a manuscript, but I do not know as I will confine myself strictly to the words of the paper, but will endeavor to make myself as clear as possible. I ask the cheese makers to follow me closely, criticise, and ask questions. If there is anything I remark which is not clear, recall the thought, and ask to have it made as clear as possible. I feel that in the field of cheese making there are so many hidden powers at work, that it is fully essential that the cheese makers of today, to compete with these difficulties, must be men of practical experience, men of observation, men of thought, and equal to the requirements of their profession.

There are many branches of science which are intricate and very difficult to acquire and understand, and if there is one more difficult than another the manufacture of cheese seems to me to excel them all. When we consider the hidden power of rennet

action, the active effect of fermentation and bacterial influences, the varied unknown conditions of milk as received at cheese factories and the intricate combinations which any or all of these form to effect the final result, clearly demonstrates the many difficulties which the cheese maker has to understand and control.

My attempting to fully describe and attach the proper importance to all the facts and principles which underlie cheese making is an undertaking which I fear will not be successful; however, after a practical experience and study of cheese making in many varied forms and circumstances for the past thirty years, I may be able to disclose some few facts and hints in a discussion of this subject which will be of practical advantage to the cheese makers of Wisconsin so as to enable them to take advantage of and assist in avoiding mistakes and adding to an improved character of their cheese. Before going over the details of practical cheese making, I beg leave to intimate that it will not be my purpose to mention every minute detail of the art, but will confirm my remarks to such details as are of vital importance, and have the greatest influence over the result obtained whether for benefit or injury. The varied tastes of cheese consumers call for many different characters of cheese; this is largely due to the formation of habit acquired by the use of cheese in country, climate, and environment; while some like a mild new cheese, others like it old and sharp to the taste, others prefer it close and firm, while many like a cheese which is rich and buttery, others prefer a cheese which is open and rank in flavor, while many prefer a sweet, nutty flavor with close, rich texture. These recognized peculiar tastes of cheese consumers being so varied and opposite make it a difficult matter for a cheese maker to know which to please. It is quite evident therefore that a cheese maker must know, and have a clear conception of what kind of cheese he is required to make and then know how to produce it, under all conditions and circumstances. I shall, therefore, first describe an ideal export cheese for the English market and an ideal cheese for the home market, and then proceed to describe in detail how each can be best produced. 1st. Export cheese, which commands the highest price in the English market, is one that is close in texture, having no round or angular holes, of a clean nutty flavor, firm, solid body and yet breaks down, rich and buttery, having a flinty texture. Such a character of cheese will keep a long time in prime condition and under the most favorable temperature will improve in quality up to twelve or more months.

This kind of cheese you had today is a sample, and I think you have done very well. I think it is a good idea to have it cut up

and distributed so you will have an idea of the flavor that it is necessary to produce.

2nd. Home cheese used for local consumption is very much similar to export in all its parts, except richer and softer in body, and not disposed to keep so long in prime condition.

Composition of fancy export cheese is approximately one-third butter fat, one-third casein, and one-third moisture. These three component parts must be so manufactured as to be completely blended and form a compound of a consistence and nature which make it pleasant to the taste and nourishing to the human body when eaten.

The active agents, under the control of the maker, which are mainly used to convert milk into cheese are: Rennet, heat, lactic fermentation and salt. Rennet is that agent which coagulates the casein of milk, and is a powerful agent in the curd to expel superfluous moisture, and after the cheese is made, to again assist in curing it, in the breaking down of the solid hard casein into a mellow plastic state, it also holds the butter fat globules from becoming free to pass into the whey when the curd is being cut and broken fine.

There are about five pounds of butter fat lost in every thousand pounds of milk. This state alone perhaps loses $1,000,000 but this is merely guess work. Why should we continue this immense loss without some means being taken to retain and convert it into some valuable product, the same as we now have in the cheese or butter that we sell? I may here observe by the way of discussion that I have taken that matter up for the last ten or fifteen years and I believe now that I have devised a system whereby we can save this great loss and be the means of adding three to five cents a hundred to milk, and adding to the milk to increase the yielding quality of the milk therefrom.

Heat is an effective agent to stimulate the action of rennet and develop lactive fermentation at temperatures ranging from 80 to 100 degrees. An excessive amount of heat destroys all rennet action and also arrests lactic fermentation.

Lactic fermentation is caused by a portion of the milk sugar turning into an acid. This acid, when controlled and developed at certain stages of the curd in regard to firmness, tends, when developed in proper amounts, to preserve the flavor and general character of the cheese.

I can emphasize that paragraph, too. As the power of lactic fermentation is to preserve flavor and give a proper texture to cheese it would have a tendency to preserve cheese in keeping qualities and all requirements of excellence in character.

An excess of acid in soft, moist curd makes cheese mealy, crumbly, short, brittle texture, and often bad flavor with a leaky

tendency. An insufficient amount of acid developed in the curd, when firm, causes the cheese to be open, tough, weak and corky, and also permits the development of bad flavors in the cheese after being made and thereby destroys good keeping quality.

Perhaps some of the cheese makers in the hall have had this tough, corky cheese. When cheese is too dry, mealy in texture, and light in color, it is the effect of too much lactic acid fermentation in the curd.

The qualifications of a skillful cheese maker are as follows: He must be a good student of human nature, act at all times and circumstances in a way that will secure the good will and confidence of the patrons. A pleasant smile and a good word should be the reception given to all patrons, but should occasion require it, when a rebuke is necessary from any careless or indifferent condition of the milk as delivered, it should be done with peculiar gentleness but yet with a firm hand. All milk which is offered which would injure the product should be promptly rejected and no partiality in any form should be shown. He should be careful, correct, and honest in all milk weighing and milk testing; cleanliness and order must be his watchword; a time and place for everything and everything done in time, and everything in place; aim to have all the patrons deliver clean milk, have a clean factory, and the air, as far as possible, in and around the factory pure and sweet, and have ability when improved milk is received that he can make good marketable cheese therefrom. He must also be a diligent student to learn and improve to the highest excellence possible in all requirements of his profession. Such a cheese maker, with such an ideal, will certainly be successful, sooner or later, and find that his services will be in request at advanced remuneration from year to year.

Such is, I am glad to say, the ideal of the cheese makers of Wisconsin. You have here in Madison an ideal dairy school which, I am glad to find and know, the cheese makers and butter makers of the state are taking advantage of. I cannot too strongly recommend this idea of cheese makers and butter makers spending three or four months at the dairy school. It gives you correct ideas of practice, manipulation of the curd, correct ideas in regard to cleanliness, correct ideas as to the handling of the curd test, the acid test, the Babcock test, and butter fat test. Also it has a satisfactory result as demonstrated here in the convention today and this week. It is apparent that the ideal of the cheese makers of Wisconsin is rising high. You meet here. What for? I find, with interest, to learn to master your business, to master your profession, to learn your profes-

sion, and in so doing you are rising high in the scale, and there is no doubt that the result in Wisconsin with this ideal and the opportunities given by the school, and assistance by the legislature, will wield immense power in shaping a good quality of cheese in Wisconsin so that we in Canada must be careful or you will get ahead of us and take our laurels away.

It is pleasant to note the close attention to the questions and to the answers given. It shows that you are going in the right direction.

This stage of my article brings me to a point which calls forth the full details of cheese making which enables the cheese maker to produce a uniform good article of cheese from different conditions of milk as received from day to day. I would not for a moment wish to intimate that fancy cheese can be made from filthy sour milk, but I shall undertake to minutely explain how in my opinion the best result can be obtained under favorable conditions as well as unfavorable. In the handling of pure sweet milk many makers approve and insist on ripening the milk before setting with the rennet by letting it stand for a time at a warm temperature up to a point of having the acid develop two to two and a half hours after the rennet is applied. This practice I take strong grounds to oppose and is wrong on scientific principles, when and where milk is taken in once per day, and should it be found from abnormal causes, such as perfectly sweet milk, as received sometimes on Saturday night and very cold weather, then I approve of a pure "Culture Starter" to be used and that in a limited degree. The longer the rennet action is allowed to act on the sweet curd at a temperature of 96 to 98, the smoother and richer the cheese will be, and again, the longer the milk is kept in the factory standing, the greater will be the opportunity of objectionable odors coming in contact with the milk to effect an injury to the cheese, hence my advice is: expose the milk in the cheese factory as little as possible to the air and get the rennet in the milk quickly to thereby enable it to do its work properly.

You will understand that when I advise the immediate application of rennet, I would at the same time advise, only in certain exceptions, the same amount of rennet each day. If you want a certain class of cheese, a certain character of cheese, you must have a certain amount of rennet action. Now, if the amount of rennet is changed from day to day with the same amount of milk, it is evident that you have more rennet in some cheese than in others. Hence, I advise you in all cases, except abnormal or severe conditions, when I advise the addition of more rennet, but in all other cases the same amount of rennet should be used from day to day.

Sufficient rennet should be used to begin coagulation in fifteen to twenty minutes. Should the rennet action show an unusual hurried thickening this certainly indicates an acid condition of the milk, and if the first signs of coagulation are slow this indicates a sweet condition of the milk. Both these conditions are of the utmost importance and must be watched with the closest possible scrutiny, as this condition determines the after working of the curd. The temperature of setting the milk I much prefer 80 to 82 than 84 to 86. The benefits of setting low are, the curd can be cut more uniform and less cream globbers are lost in the whey. If the curd is set at higher temperatures it does not cut so easy; it tends to run in front of the knives and is thereby bruised and broken instead as it should be, cut clean and even.

That question came up today and I expressed myself on the matter and shall try to do so again. The idea of setting low and the benefits of it are these: The action of rennet at a low temperature is not so rapid, but is of a milder kind, and it is found that the curd cuts smoother,—you have a smoother surface,—and there are less butter globules lost by the action of cutting when the rennet is put in at a lower temperature to the milk.

After the curd is cut as uniformly as possible and allowed to stand a few minutes (about five) a gentle stirring of the curd must be started either by the hands or curd rake (the form of stirring which causes the curd lying at the bottom of the vat to come to the top is preferable). When a goodly amount of whey is formed the heating of the curd should begin, which combined with steady agitating and gradual increased heating, the mass should be kept in continual motion until a temperature of 96 to 97 is attained. The heat must be shut off a little before this so that all the heat is absorbed by the curd in the vat, and after a short while the continuous stirring can be discontinued and then a portion of the surface whey may be drawn off, and the curd occasionally stirred up so as to change its position.

Many of you practical cheese makers will wonder why the heat is shut off at 96 to 97. It is to get ahead of the situation. It is to hold the curd in check, not to become too firm, so that the lactic acid will have a certain action on the curd while it is comparatively moist. Then immediately on the first indication of lactic acid on moist curd we take means of hardening.

The hardening of the curd and formation of the lactic acid, the most critical stage of cheese making, is now taking place. The reason the heat at first is only advanced to 96 or 97 is to first promote and develop a slight acid change on the curd before it is too firm. In all cases, under all conditions of cheese making, the acid must be formed or started in comparatively a soft curd.

This amount of acid must be but slight and is indicated by a portion of the curd. After being pressed firmly with the hand it is touched to a hot iron and if the first sign of acid shows, the curd should then be rapidly heated up to 100 degrees in a small amount of whey. This should be done in less than five minutes, and a continuous stirring of the curd in a small amount of whey, to sufficiently firm it. When the curd strings one-eighth of an inch when touched to the hot iron the remaining whey must at once be drawn off, and then comes the most particular and difficult stage of the whole process of cheese making, which is, to accurately determine the right amount of firmness the curd should have when one-eighth of an inch of acid is shown on the hot iron.

But I hope I threw out the suggestion today that in the near future that the cheese makers of this continent will be enabled to determine very accurately the amount of moisture a curd has at different stages of its development in lactic fermentation. When we secure that, I believe we will have overcome one of the greatest difficulties experienced today in the manufacture of cheese. I hope the professors here of the dairy school will take the matter up and see if some simple means cannot be discovered. I have studied it for fifteen years and have come to the conclusion that there are two ways; one, by specific gravity, and one by consistency. Hence, I believe that in the near future we will have a means of testing the amount of moisture as we can the amount of acid today.

The curd at this particular stage should show a certain amount of firmness and elasticity. This firmness is difficult to explain in words and can only be accurately acquired by close observation, study, and thought. This firmness is indicated by a peculiar shotty elasticity and is more definitely indicated by a portion of the curd being chewed; it will indicate a creaky noise. This, perhaps, is the most reliable test that can be recommended. By frequent trials of chewing a small portion of curd a fairly correct judgment can be formed of the degree of firmness which the curd actually has. In the practice of this test the curd at first will indicate no creaky noise but gradually it develops, and when it is clear and decided no more stirring of the curd should be performed. There are two methods of rapidly hardening the curd when the whey is being drawn off; one is vigorous hand stirring at a temperature of 97 or 98, the other is heating the curd to 100 or over. This heating to a reasonable extent is preferable to vigorous hand stirring. The objections to hand stirring of the curd are the tendency to bruise it and thereby liberate the cream or butter fat and at the same time tends to cool the curd too much, which is very injurious to the after effect of

the curd. But the extra heating of the curd is a far superior method, as the action of the rennet on the curd is stimulated, which drives off superfluous whey without any or much hand stirring, and at the same time breaks down the casein and thereby retains a proper heat in the curd afterwards. When extra heat is applied just at the proper stage of the acid, the curd is thereby rapidly hardened to the proper degree without loss of cream, and when the last whey is all drawn off the curd should be sufficiently firm, but for safety purposes it is always better to give the curd one good hand stirring after the whey is drained entirely off. When the acid is a good one-eighth inch, and the moisture is right and the temperature is right, which is 99 to 100, the curd should be heaped up and covered over with a curd blanket, which is made from light cotton duck or white linen salt sacks. When this stage is attained the main difficulty of making cheese is over. It is only a question of time, and the clock or watch is the best guide afterwards. The curd should be kept warm at 98 to 100 for 2 1-2 to 3 hours. It should be cut into large pieces and turned over every half hour, and these large pieces should not be piled at any time over two deep, indeed, in many cases when the curd is kept warm with a blanket it is better not to pile these pieces at all.

I always like to give the reason why and wherefore. Why the curd is piled one on top of the other is merely to preserve the temperature, and in many cases it has the effect of retaining the moisture, "does not freely expel it," and it develops too much lactic acid, and you do not get a fine texture that you would have if you did not pile it so high, but yet covered it to retain the temperature. Temperature controls this fermentation law. The action of the rennet and flavor are determined largely by temperature. If there is one thing that varies more than any other in determining the temperature it is the thermometers of this country. If you want to make a fancy cheese you must have a thermometer that is perfect, and tested to be accurate to a fraction of a degree. If you have an imperfect thermometer, you don't know what you are doing, and the result will be very unsatisfactory.

The whole and main question at this period is to preserve a uniform temperature of 98 to 100 for 2 1-2 hours. After this the curd should be cooled off down to 85 before grinding. This is usually done by removing the blanket, cutting the blocks of curd into small strips by a sharp knife and spreading it thin over the vat or sink from a 1-2 to 3-4 of an hour. The curd should be ground with the least possible amount of handling or stirring. All extra handling and stirring of the curd at this particular

stage tends to bruise it and thereby liberate the butter fat and tends to make butter sacks in the cheese as well as loss of flavor and yield from the milk. After the curd is coarsely ground I strongly recommend coarse grinding and should not be less than 3-4 to one inch cubes. I prefer one inch. The only advantage which grinding accomplishes is preparation for an even incorporation of the salt in the curd, and salt finds no difficulty in penetrating one inch or more cubes. After grinding, the curd should be spread as thinly as possible on the bottom of the vat or sink and should remain there without any stirring for one half hour. Then the salt should be evenly applied and the curd gently stirred to evenly mix it. After the salt is evenly mixed the curd should be heaped up preparatory to hooping, and remain heaped for say fifteen to twenty minutes. As to amount of salt: this varies as to richness of the milk and season of the year. My plan is to use 2 pounds of salt to 1,000 pounds of milk in the month of May, 2 1-2 pounds in June, 2 3-4 in July and August, 3 in September and October, and 3 1-4 in November. In hooping the curd it is very important to make an even weight of cheese, which will fill the cheese boxes evenly. It is far better to make the cheese fit the box full and even than to make the box fit the cheese full and even. To accomplish the making of a uniform weight of cheese it is proper to weigh all the curd put into each hoop; if not, the next best method is to weigh a pail full of each vat of curd the first one taken out and thereby get an accurate idea of the weight of the curd in each vat each day. Twenty-one pounds of curd unpressed will usually make 20 pounds of pressed cheese, or about 5 per cent. of weight is pressed out of the curd. This amount will vary somewhat, but the above is a fair guide to a cheese maker. The whey that passes from the cheese (if the curd is not bruised and is properly cooled) should not be white and creamy, but should be clear and transparent. The pressure should be light at first. It is very important to press down the cheese first only enough to start the first whey. The cheese should then stand for one-half hour so as to take up the salt and fix the creamy particles in the curd. After this more pressure can be gradually and often applied, until the last act at night and first in the morning the pressure can be put on to the cheese all it will stand. The following forenoon the pressure must be followed up to the fullest extent. Great care must be exercised that all cheese are pressed down square and even, and should a cheese press down more on one side than another, it should be taken out and turned in the hoop. All cheese should be taken out of the hoop two or three hours after being pressed, the bandage evenly and carefully pulled up over the edges, and every care should be exercised to have the

bandage pulled up square and even. This makes the cheese look well and handsome on the shelves. When the cheese is finally taken out of the press all edges and rough parts should be pared off so as to look smooth, square, clean and tidy. The care of cheese in the curing room, such as turning over every day, washing off any soiled spots, and preserving a handsome appearance continuously until boxed and marketed are details which are important. It is very important to maintain an even temperature of about 65 degrees in the curing room. I shall refrain from spending any more time just now on care and marketing.

I shall now go back and intimate some special changes required in the manipulation of milk and curd when the milk is slightly sour and tainted. Sour milk or milk advanced in acidity requires to be set with 10 per cent. more rennet at lower temperature, say 79 to 80. The milk should not be heated in any form until just before the rennet is applied. The curd should be cut on the soft side much finer than usual; heat up rapidly to 100 or 102 degrees, and more if a very severe condition of acid exists, and then drain off the whey as soon as possible down to the surface of the curd. Watch the acid and when it first begins to show on the hot iron, if the curd is still soft and full of whey, drain off all the remaining whey.

Now, this is an important part, this question of cooking the curd. A great many cheese makers leave the whey on the curd until the cheese is spoiled. The acid comes on the curd, and the cheese is spoiled. If it is hand stirred, to act on the rennet to expel the moisture, you can easily see five minutes of hand stirring and a high heat will do as much effective work at that stage as fifty minutes, allowing the whey to stand in the curd itself. The whey should be drawn off close to the curd, and one part weighing on the other, forcing out and assisting the rennet to do its work and getting advance of the acid action. When you get a curd nice and firm, they you have the condition for making a nice cheese.

Continue a vigorous hand stirring until the curd attains the usual firmness, when the acid is an eighth of an inch. Should the acid be more advanced than 1-8 before the curd is firm and creaks under the teeth, continue this vigorous hand stirring until an increased firmness is obtained. Then treat the curd in the usual way. Should the acid be too far advanced when the curd is firm it is proper to reduce the time of keeping the curd warm. In this case two hours is sufficient. The tendency of gassy milk is to hasten the firming of the curd and thereby retard the acid formation in it to a sufficient degree, hence the importance of using slightly less rennet and heat in the first stages. Before the addition of the rennet to the milk, the addition of a

reasonable amount of pure culture starter is strongly recommended so as to promote the development of true lactic acidity in the curd. Cut the curd as usual but only heat it up at first to 96 and hold back its too rapid firming and thereby favor the proper acid development. When it shows 1-8 inch of acid drain off the whole of the whey and if the curd is sufficiently firm no hand stirring is necessary, unless one good breaking up to liberate the excessive moisture, which is in a few large blocks, as sometimes occurs. It is invariably safe to give all curd this one breaking up after draining off the whey. When the acid is 1-8 (good), and the curd begins to creak under the teeth and the temperature raised to 99, the difficulties are over, and inside of three hours the true lactic ferment will overcome the gassy ferment, and the curd can then be treated in the usual way.

Cheese for Home Use:—All the manipulations should be precisely the same as for an export cheese, with the exception of keeping the high temperature of the curd; while maturing a shorter time, allowing the curd to cool off down to 90 or 95 will make a soft, rich cheese, and keeping it at this temperature for 2 hours instead of 2 1-2 to 3. I have gone minutely into details of the most particular part of the process of cheese making. Several minor parts I have purposely omitted so as to confine myself to a reasonable length of time.

In conclusion let me again refer to the most critical stage of cheese making, and try to emphasize its importance. I refer to the first formation of acid as shown by the hot iron. The curd at this particular stage must not be passed, the early creaky stage of firmness. Far better to have the curd on the soft side at first show of acid, hence the importance of two stages of heating, the first to say, 97, to encourage the true lactic ferment. Then when this ferment appears the cheese maker has two active methods at his disposal to firm the curd which are, additional heat and hand stirring. Sometimes heating to 100 or over is sufficient, but if not, then vigorous hand stirring along with the extra heat accomplishes the desired firmness in a few minutes. The extra heat prevents great loss in the whey over hand stirring at lower temperature. Then again the extra heat assists the true lactic ferment to overcome the gassy ferments, as it were. It burns the gassy ferments out of all harm's reach and promotes good flavors and keeping quality.

The correct amount of acid in a properly firmed curd gives a temper and condition similar to tempering steel. If the curd is soft and too much acid is allowed in the curd, it makes a brittle, crumbly cheese. If the curd is too firm when the acid forms at 1-8 inch, then the cheese will be weak, corky and rough, and

will go off in flavor rapidly. Hence the importance of tempering the curd with the right amount of acid and with right amount of moisture. At a right temperature the whole process of curing goes on evenly, properly, and the cheese improves from week to week in quality, flavor and texture, becomes attractive to purchase, pleasant to eat and commands the highest possible price.

It is my desire to see the cheese makers of Wisconsin produce such a high class of cheese as above stated, and hope some few points of manipulation, as above described, will be of service to promote and achieve this much coveted result.

DISCUSSION.

Mr. Aderhold: Now, I have listened to this paper with a good deal of interest. He has touched upon facts that we never went into detail enough here. Mr. MacPherson owns sixty cheese factories, and is the cheese king of the world. He has been very successful, and knows a good deal about cheese. He told us many things in his paper.

Mr. Decker: I would like to ask whether he uses the rennet test to determine the acidity of the milk, and the curd sinks and racks afterwards?

Mr. MacPherson: I don't use the rennet test to any extent because the action of the rennet in itself clearly determines the acid manipulation in the curd, and we always try to have the same amount of rennet each day, with the exception of acid milk. In regard to the sink question, we do not use racks either out of the vat or in the vat. There is a point that I would like to make clear,—that it is very difficult to make an even-colored cheese in a sink with racks.

When I was in Scotland some six or eight years ago, it was one of the great drawbacks in Scotland,—the mottled condition of their curd, and they could not trace the cause of that condition. I visited several dairies, and I at once discovered the cause of their mottled cheese. They were piling their curds on to linen-covered racks, and particles of the curd coming in contact with the linen and the weight of the curd on top, forced out an undue amount of moisture on the curd next the linen, and that turned over and exposed to the air also extracted more moisture, and repeatedly turning the curd over on the linen had the effect of putting different kinds of curd with different amounts

of moisture in the same cheese, and at once made different colors. I recommended that the curd should lie on the tin in the vat, or on smooth boards and where that was done the color, or unevenness in color immediately passed away. Then again, I advise the covering of the curd with a blanket, which you will see has a tendency to hold the moisture. Hence, when you have a uniform curd with a uniform moisture, you have a uniform color and uniform character of cheese. That is my reason, and yet I do not disapprove of the curd rack and the linen, if they are properly handled. If they are covered with a moist cheese, bandaged to keep the moisture from passing away, a very fine cheese can be made on the rack, as well as in the vat.

Mr. Aderhold: Why is it that you do not stir the curd until half an hour after it is milled?

Mr. MacPherson: To save the butter-fat. The curd does not require stirring if proper maturing is done while warm. The less the curd is handled afterwards when properly matured the more butter-fat you retain in the cheese.

Mr. Aderhold: Do you have that lying in the bottom of the vat?

Mr. MacPherson: Yes.

Mr. Aderhold: How deep is it?

Mr. MacPherson: Two or three inches. I am not particular about the moisture. It is not the whey on the outside, gentlemen; it is the whey on the inside of your particles of curd. It is the particles of moisture or whey inside, not the free whey. That has very little effect. Some twenty years ago I took an ordinary vat of curd under ordinary conditions, drawing the whey at 98 temperature, and when the curd was of the proper consistency I put it back and left it four hours. The whey was sharp and pungent, and the cheese was mild, clearly proving that it is the whey on the inside that develops the lactic acid, not the whey on the outside.

Mr. Powell: What kind of a mill do you use?

Mr. MacPherson: I use the MacPherson mill, but there are other good mills. All mills should have a clean cutting surface. I want to refer to the size of the cutting, as I think we are "killing" cheese in many cases by cutting the curd too fine. Any one can try it by not using a mill at all, but by cutting it in large bulks, and put salt on the curd and make a fancy cheese. That would be as extreme condition.

Mr. Dickson: Which do you prefer, a peg or knife mill?

Mr. MacPherson: A knife mill. Cut the curd in layers with the sharpest knife you can get to prevent a ragged surface, which liberates the butter. Cutting the curd is merely prepar-

ing it for the salt. There are cheese made in different parts of Europe where no salt is applied to the curd at all.

Mr. Decker: There are 15,000,000 pounds made in Wisconsin every year.

Mr. MacPherson: Yes; take the brick, and you merely rub it on the outside.

Mr. Monrad: That is not cheddar cheese?

Mr. MacPherson: I am simply giving a comparison. A great many cheese makers think they must cut the curd fine. The cheese is complete, and all you want is to get it salted.

Mr. Aderhold: Do you draw the whey down to the curd?

Mr. MacPherson: Yes, always. I never let the curd pass a certain stage without the whey is taken off. If the curd is soft, draw the whey early; if firm, leave the whey on a little longer.

Mr. Aderhold: When do you draw the whey?

Mr. MacPherson: Immediately after the heating. It is to control this acid and moisture.

Mr. Aderhold: Do you develop much acid?

Mr. MacPherson: The acid is determined largely by the temperature. If you draw the whey and you expose the curd to the influence of cold air, of course, you reduce the action of the acid. It is all a condition of control. Temperature is a condition of control.

Mr. Aderhold: Is cooling the curd before milling in general use in Canada?

Mr. MacPherson: Not outside of myself. I am the first one to discover that important factor. It gives a smoothness to the cheese, and a mellowness.

Mr. Aderhold: I believe you stated in your paper that whey in the curd caused the acid to develop too rapidly. It does not cause more moisture or a higher temperature?

Mr. MacPherson: No; it holds the moisture and develops acid. Why it develops acid is that it holds the moisture. There is always moisture running from the curd. If you pile on the curd there is a tendency to hold the moisture, and the more moisture you hold, the greater the lactic ferment development. The idea is to control the lactice ferments by temperature. This moisture question is one that should be considered by every cheese maker in the entire country. Ninety-six, ninety-seven, or ninety-eight to hold the moisture in the curd. In the gassy curd the lactic ferment seems to be retarded by putrefactive ferments, and you want to encourage lactive ferments. You favor the lactic ferments, and the moment lactic ferment begins, then harden your curd.

Mr. Schoenman: You heat up to 96 before drawing the whey, and afterwards to 100 or 102?

Mr. MacPherson: Yes, 102.

Mr. Schoenman: Under what conditions?

Mr. MacPherson: Nearly all conditions. Ninety-nine is the right temperature to break down the casein.

Mr. Schoenman: Not ninety-nine on the start?

Mr. MacPherson: No; unless the milk is overripe, heat it to 105 on the start in that case.

Mr. Schoenman: But under ordinary circumstances?

Mr. MacPherson: Under ordinary circumstances I would heat it to 96, I think. But you must be careful and put on the right amount of heat at the first indication. Have the curd firm at one-eighth inch acid.

The President: I am sorry to draw this interesting discussion to a close, but we have with us Mr. Pearson, who will address us at this time.

ADDRESS BY R. A. PEARSON,

Assistant Chief of Dairy Division, United States Department of Agriculture.

Mr. President, Ladies and Gentlemen:

I am glad it was possible for me to attend this meeting. Your association is a live, wide-awake body and I am sure the sessions of this convention will be helpful to me as well as the cheese makers of Wisconsin. During the past two years I have made visits to your state and have been in a good many of your factories, and I have found many of them modern, well conducted establishments; they compare favorably with those of other states. Of course there are defects, and some bad ones; the chief reason for holding this meeting is to discuss the defects and methods of overcoming them. I have been interested in the many practical points advanced, and wish they could be heard by every cheese maker in the state, yes, the country, for the big and little things discussed here have a big effect on the quality of cheese produced.

Let me congratulate you on what you are doing in an educational way. The Wisconsin Dairy School is one of the best in the world. It is known all over the country, and I am frequently asked in other states about what is being done along this or that line at the Madison school. The school is doing a great

work for the dairy interests and I hope it will receive the support it has earned.

You deserve credit for the system of traveling instruction which is followed every summer. By this means you are bringing about a uniformity of product which is necessary if your cheese is to go on the best markets.

All these kinds of progress are very necessary if it is proposed to hold a place near the front. Other states in this country are making rapid strides, and other countries are doing their utmost to secure the same markets that we want.

The enlargement of our present markets and the development of new ones are matters of great interest to cheese makers and are now claiming their attention. Secretary Wilson fully appreciates the needs along these lines, and under the direction of Major Alvord, chief of the dairy division, he has been studying old markets and looking for new. Of course England is the greatest foreign market and the one in which we want to be well rated.

You have probably heard of the export experiments the Department has been conducting the past two years. We sent butter to the English market every week through two seasons and the shipments are being continued this winter. When we began American butter was not in the best repute. We found on looking over the market quotations that Danish sold for the highest price and Irish and Canadian butters were ahead of the States. The Secretary of Agriculture is trying to change these relations, and I am glad to tell you that he has already met with some success. The dealers in London and Manchester are becoming convinced that Americans can make as good butter as anyone.

But there are possibilities of getting trade in other markets, and while we are working for English favor, we must not overlook the others.

Simultaneously with the rapid changes in dairy methods,—changes of the past fifteen years which are familiar to you,—there have been changes in methods of transportation and markets for dairy products have gradually been widening. People in distant countries who have not until recently known what good butter or cheese is, are now commencing to use these products. They are learning that some things of which they knew but little or nothing a few years ago, are now within their reach and are good things to have, and they are beginning to ask for them. It is said that until a few years ago Africans were content to sit in front of a fire with one end of a hollow piece of wood in the coals and the other end in the mouth, and draw the smoke into their lungs, and they were well satisfied with that

way of smoking until they got some good tobacco, and then they soon found that tobacco was something they had long wanted, and today they use quantities of it.

Fifteen years ago wheat flour was used but little in Japan; each ship carried six or eight sacks and that was enough to last till the next ship crossed a month later. Gradually the Japanese are learning to eat flour and using more of it each year; now a line of vessels is engaged in carrying flour from our western ports to Japan. It seems reasonable to believe that these people will in time learn to use butter and cheese as well as other American products. The Department of Agriculture has had an agent in the China seas for some time, and he writes he is convinced the Japanese will learn to eat dairy products and they will want large quantities of them. They now pay as high as fifty cents a pound for butter, so you see the field is inviting.

It is not proposed to omit cheese from the export experiments. Before I left Washington a week ago I was directed to find out what could be done toward getting some fine Wisconsin cheese for export.

Our foreign cheese trade and our home trade are both in need of development, and the principal things we want to assist toward this end are more cheese and better cheese. We well know there are many causes of poor cheese and it is hard to tell which cause is the greatest. I am reminded of a conversation with a street car conductor. I was returning to the city from a suburb on one of the two street car lines I might have taken. I asked the conductor, "What proportion of the people who visit this suburb does your line carry?" I knew that about one-half of them went out and back on bicycles. "Oh," he said, "I don't exactly know, but we carry at least seven-eighths and the other line carries about three-fourths, and the rest go on bicycles." So, poor milk is the cause of seven-eights of the bad cheese, poor curing rooms is the cause of three-fourths of the bad cheese, and slip-shod methods cause about one-half of the bad cheese. There are several important causes and it is *most* important to get rid of each one of them.

It is strange how we can overlook the big things for the little ones. You remember the story of the beam and the mote. Sometimes we do worse than the man in the parable, when the beam and the mote are both in our own eye and we ignore the big obstruction or cause of trouble to look for the small. Cheese makers whom I have visited have sometimes complained that they were having this or that trouble and it seemed due to some cause they could not locate. Before I was with them ten minutes I might notice several things in plain sight which could be the cause of the trouble.

Mr. Monrad (interrupting): You could smell them, too?

Mr. Pearson: Yes, and smell them, detect them with all five of my senses.

I wish this association would form itself into a trust which would include every good cheese maker in the state of Wisconsin. I would have it be a monopoly that far. It should take such decided action on some of the things which are prominent hindrances to good cheese making that its members and others would be ashamed to countenance these troubles any longer. One of the big troubles easily reduced is poor milk. You have been told how successfully one can cope with this, if he uses the Wisconsin curd test. It is a splendid thing for the cheese maker and every one in this association should use it. If this were done, one of the greatest causes of poor cheese would be done away with.

The Dairy Division has issued about twenty-five bulletins and circulars, which are named on the printed lists I have placed on the secretary's table. If you wish any of our publications, check the names of them, write your name on the back of the slip and hand it to me; I will see that they are sent to you, if still available.

The President: Tonight the Michigan cheese makers are assembled in convention. A telegram has been sent them by Secretary Baer, which he will read to you.

"Madison, Wis., Feb. 2, 1899.

"To E. H. Haven, Pres. Michigan Dairymen's Association,
"Eagle Hotel, Grand Rapids, Michigan.

"The Wisconsin Cheese Makers' Association, assembled at Madison, send greetings. The Badger cheese makers predict the Wolverines a bountiful repast and rousing convention.

"Sec'y U. S. Baer."

A motion made and seconded to hold an afternoon session on Friday was carried.

Convention adjourned until 9 a. m., Friday.

SIXTH SESSION.

Friday a. m., February 3, 1899.

President Carswell in chair.

THE CONSTRUCTION OF CURING ROOMS FROM A PRACTICAL STANDPOINT.

Prof. F. H. King, Madison, Wis.

Gentlemen: I have had struck off on the papers being distributed some of the cuts that are prepared for the bulletin which we are just issuing on the subject of curing rooms. In order to understand the principles we shall try to set forth, which should govern the construction of curing rooms, it is quite important for us to have an intelligent notion of the temperature surroundings under which we are obliged to work.

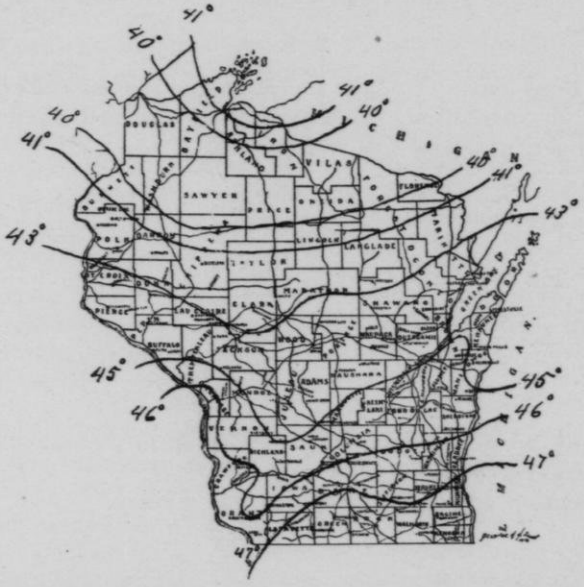

FIG. 1.—Showing mean annual temperature in Wisconsin for 1896. Heavy lines pass the places having the temperature designated by the numbers.

On one side of the paper you hold you will find four maps of Wisconsin. In the upper map are drawn lines across it, showing the mean annual temperature of Wisconsin, and you will notice that in the northern portion of the state we have a mean

temperature for the year of about 40 degrees, and in the southern part one of 47 degrees. That is the average of every day, including winter and summer. This mean temperature determines that of the ground and that of the ground-water. Now the temperature of the ground-water is usually in our state in the neighborhood of three or four degrees higher than the mean temperature of the place, so that for southern Wisconsin you add three or four degrees to the forty-seven degree line to get the temperature of the ground-water, that is to know what the lowest temperature is which you can depend upon as a cooling agency.

In the northern part of the state you add three or four degrees to the mean temperature to get the coldest temperature you are likely to find the ground at any depth in that region, and so the water at any depth in that region. In the northern part of the state the coldest water is about 45 degrees but may be lower or higher according to the depth and season. In the central part it is 47 degrees, and in the southern part the temperature of deep water is in the neighborhood of 50, or 51 or 52 degrees.

The lowest ground temperature.

You will readily understand that the water gets its temperature from the ground, and hence that as you pump it from the well it is an index of the temperature of the ground, provided you have pumped long enough so that the water is not warmed up by any part of the pump. The coldest ground temperature is found between the depths of twenty to eighty feet below the surface. Above twenty feet the ground grows warmer toward the surface in summer; as you go below the eighty feet, usually the ground grows warmer also, because of the heat from the interior of the earth, and hence to get the greatest cooling power the ground possesses, you must go down twenty feet.

Above twenty and below six feet you will have a temperature four or five degrees in some cases, and two or three degrees in others higher than the coldest temperature, hence between six and twenty feet you would have to depend upon temperatures that are three or four degrees higher than the coldest well water, or the coldest ground temperature of your locality. Of course, the nearer you approach the twenty foot level the nearer you are the maximum cooling effect, and the nearer you go to the surface of the ground, the further away from the maximum cooling or your lowest ground temperature available.

Now, look at the next map below, Fig. 2, giving the temperature for July. You will find that in the entire northern part of the state the mean temperature is 68 degrees, and in the south-

western part the temperature is 74 degrees. That is the average of the night and day temperatures, so it does not express the highest temperature you are to combat. But on the average, July will have a temperature in the southwestern part of the

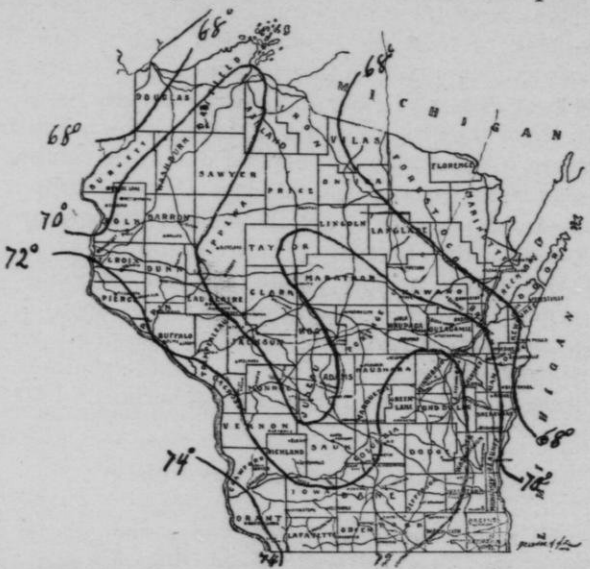

FIG. 2.—Showing the mean temperature in Wisconsin for July, 1898. Heavy lines pass through places having the temperature designated by the numbers.

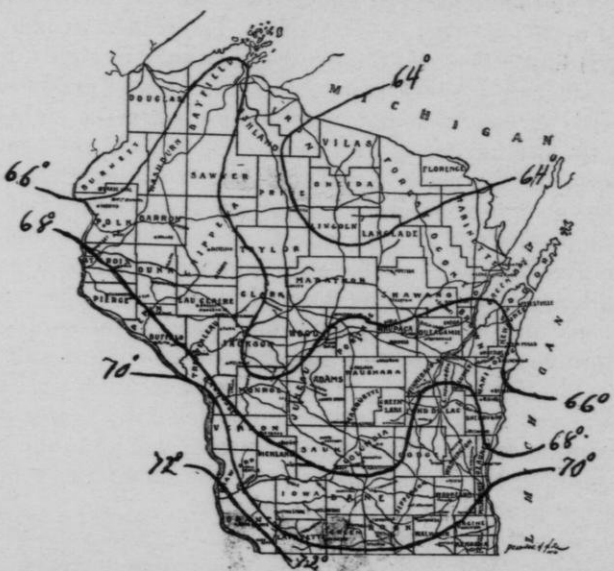

FIG. 3.—Showing the mean temperature in Wisconsin for August, 1898. Heavy lines pass through places having the temperature designated by the numbers.

state for night and day in the neighborhood of 74 degrees; while in the northern and northeastern part it will be about 68 degrees. In August, Fig. 3, in the southwestern part of the state, 72 degrees, and in the northeastern part of the state it gets down to 64 degrees. You have the difference in the two parts of the state between 64 and 72 degrees. In September, Fig. 4, the temperature in the southwestern part of the state is down to 66 degrees,

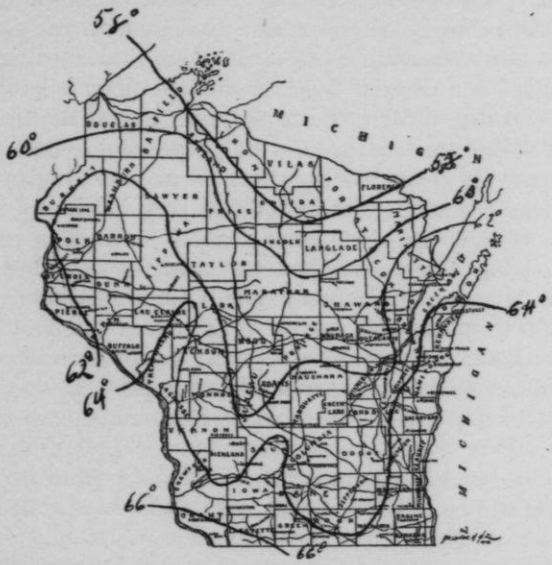

FIG. 4.—Showing the mean temperature in Wisconsin for September, 1898. Heavy lines pass through places having the temperature designated by the numbers.

and in the northeastern part to 58 degrees. You have there a temperature which you regard as fair if you could maintain it in the curing room. This is the average between the night and day, and does not express the temperature of the day, and since the temperature of the day must be considerably higher than the mean temperature, I think you can see plainly enough, that you have a number of degrees of heat to overcome when you attempt holding the temperature at a fixed point. If you propose to hold the temperature down by means of the cooling power of the earth or water, since the difference in temperature is so small, you must arrange the curing room in such a way that you place it under the very best of conditions. Speaking of the conditions easiest to be secured, I place first the basement curing room, or the cellar curing room, where you utilize the cooling power of the bottom and lower walls of the basement as a means of holding your air temperature down. If you want to hold the temp-

erature between 58 and 68 degrees in a basement curing room, it is, of course, necessary for you to have the basement at a reasonable depth in the ground, and it ought to be down not less than eight feet. It would be better if the floor could be twelve feet below the surface of the ground outside. Of course, in order to utilize the low temperature of the floor, it is plain that you must have the floor of the best conducting material you can get, so evidently, you would not cover it with wood, if there were no other objection to it. You cannot leave it with the naked dirt, and so you are obliged to use in order to get the cooling effect of the ground, — a cement floor. A cement floor is probably the best you can use so far as I can see, and if you are to construct this, you should get the ground in proper shape first and thoroughly firm. If there has been any extra loosening of the dirt, it is important that the dirt be tamped very hard, and it is quite necessary for you to use a good cement in such a case. The cheaper grades of cement will not answer for this kind of work. You must have one of the best cements for a good floor. A good cement floor would be about four inches thick of Portland cement with sharp sand and gravel in the proportion of one of cement to four or five of sharp sand and gravel. It should be put on in sections and divided into blocks four feet square to prevent cracking. This should be surfaced by one half inch to three-quarter inch good Portland cement and sharp sand in a proportion of one to two. Then if you want to make the floor so that it can be easily washed and scrubbed, it needs to be smooth. In order to make it smooth it is only necessary to wet the surface with a whitewash brush after it has begun to set and sprinkle over this a thin layer of pure cement, troweling this down until it is smooth and glossy.

Such a floor gives the best connection with the ground below. It gives you something you can keep clean and sweet, and something that will be durable.

The walls of the basement curing room should be made of stone or masonry or some cement, on account of durability and in order to take advantage of the cooling effect of the ground. The lower four feet of wall should be a solid masonry wall. But when you get above that level, in order to shut off the heat from the warmer soil above, the wall should be hollow. If you have large stones to use, it may be difficult to make the wall hollow, but, remember, it does not matter about the shape of the space or its width, so long as the two walls do not come together. One half inch is all you need, and it may be six, but it does not matter. It may be as irregular as any stones would make it; shape does not cut any figure; simply that the walls do not come in contact. So if your stones are too large, one way that would be

easy would be to make a shoulder back in the wall, and then face it up with brick on the inside and get a hollow space in that way; or, if you want to make it still better, use hollow building tile instead of brick. Ordinary stones with one air chamber would give fair insulation, which would shut out the heat from the soil.

The ceiling of the basement curing room should be very close, because no curing room is absolutely perfect until it is air tight, except at the places where you want air to come in. The ceiling should be double boarded, with a very excellent quality of paper between. I mean by an excellent quality of paper, a paper that is acid and waterproof, which in that case, would be air tight. The function of the paper is to make it air tight more than to simply act as a non-conducter, and an excellent paper for this is three-ply Giant paper, manufactured by the Standard Paint Company. Other companies may make just as good paper, but that is excellent and is now quite generally used in the construction of refrigerator buildings and cars.

If you can choose a site for the placing of the factory, a north side hill is better than any other. The east is better than a west slope, but a north exposure for the curing room is the best, so that if you have windows they may be on the north side. The windows should be double, and as close and tight fitting as you can make them. These are the essential features for a basement curing room.

You cannot all have them. Some of you have curing rooms already built, and you must for a time use these. These curing rooms are wood and above ground. What can you do to improve their character? If they are built in the ordinary way without any special effort to make the walls air tight, you will have to face the wall on the inside with one or two layers of matched flooring with water- and acid-proof paper between; make double windows, and make them tight. If the windows are on the east or west, put blinds on the outside, rather than on the inside, for if you put blinds on the inside, the sun that comes through the windows warms the blinds, and so warms the air; that is, you have a heater on the inside of the house as long as you let sunshine come in. In my house I have a large number of windows on the south side living rooms, and in the sunny days of winter nearly heat enough comes in to warm the house. We actually use less fuel on cold days when the sun is bright than on other days when it is warm and cloudy. You must shut the sunshine out of the curing room. That is the one thing that you must do. If you do not wish blinds, then some other arrangement must be made, you may use the hoods, which are sometimes put over windows. The thing is to shut out the direct sunshine, not the reflected light from the sky. That is why the north side is the

best side, because then it is only in the longest days of summer that any sunshine can get into the curing room.

So in the curing room you have already, if it is made of wood and is exposed to the sun and becomes heated, — you must insulate the inside by an increased number of thicknesses, and you must cover the ceiling, walls, sides and floor. You must do that; you must use every precaution you can to keep the air from coming in, except at the places you want it. Remember, warm air drawn into the room by pressure is one of the greatest obstacles you have to contend with. You can fight against the direct conduction of the heat very much better than you can combat the tendency of warm air to come in and push the cold air out. The one thing you must have uppermost in mind is to have the room air tight. A very slight pressure of wind on the house is enough to push the air through the open walls. Wood is not air tight — a long ways from it. Wind can blow through wood easily, some wood more than others, but all wood when dry is porous and air draws through it rapidly, and that is why building paper is essential. Tar paper and ordinary building paper are too loose and open to secure what you need. The ordinary tar paper is simply a loose paper stained black. Air will draw through it readily. Brown building papers are not suitable. Use water-proof and acid-proof paper. The paper I refer to was tested with sulphuric acid. I put it in a strong solution and left it there for more than a month, and when I took it out you could scarcely see the difference between the part that was in and the part that was out.

Now, you have no duct, no means of cooling this room you already have, and you are not financially situated so that you can put in a duct yet. What can you do to better the conditions under which you are placed? The best thing you can do so far as I can see is to take advantage of the night air for cooling the room, and then close the room as tightly as possible through the day time. The night temperature on the average gets quite a little below the temperature you are willing to cure cheese at. In almost all parts of the state it drops below 60 degrees, and often to 50 toward morning, so that very many times — quite a good deal of the time — if you have arrangements so that you can quickly get the air out that is warmed up during the day and draw in other air during the night, keeping it running through during the night, you will so lower the temperature of the cheese and walls that you may shut it tightly during the daytime and prevent the temperature rising as it would, had you made no provision of this sort.

In order to change the air in a curing room of this sort, it is not sufficient to open two, three or four windows, because very

often the wind will not be strong and it will not be in the right direction, so the air will not change with sufficient rapidity to allow your curing room to take full advantage of the lowest temperature of the night air, so you need to make some provision in the curing room for driving air into it. This may be done by using a galvanized pipe running eight or ten feet above the roof, provided with a cowl arranged so it shall face the wind, and which will act as a funnel of a cold air duct would act to drive air into the curing room. The more night air you can drive in the better, so far as cooling your room is concerned. It is necessary in driving air in that you make some provision for air to go out. The best way is to have a ventilator through the roof through which the air may escape. If you depend upon opening windows the wind will often be in the wrong direction and, by blowing in, oppose the current coming down from the funnel and thus reduce its effectiveness.

But you can not depend on the night air to give you a temperature that is really safe all the time. You can better your condition, but you cannot make your condition the best. In the first place the temperature of the night air will not fall to the point at which you want it to come into the curing room until nine or ten o'clock or later. If your curing room is warmer than the night air, you want to let it in, but if cooler, you should keep it out. When the night temperature goes down to the desired point, you can let the air in, but frequently you have nights that are all the time above the 70 degrees point, and if you have three or four nights in succession above this point, and three or four days up to 80 or 90 degrees, then your curing room must reach a high point, and since four or five days constitute a large percentage of time you are holding cheese in the curing room, it, of course, goes through a large portion of its curing process and takes on characteristics that are bound to affect you in the market, and not only by the quality of the cheese you have in the curing room at that particular time, but it is going to affect the price of what comes after, although it is better cheese. Your reputation is made by the cheese you sell, and your quality is determined in part by the conditions you have had your cheese under. So you should not be satisfied with night ventilation. It may be the best you can afford at present, but it is not the best which is possible, nor that which is desirable.

As to the means of getting a lower temperature, I will speak first of some of the work which has been done. Fig. 5 is a view of Mr. Kasper's factory. He has a sub-earth duct which is 100 feet long, and placed about ten feet below the surface of the ground. In September I visited his factory and measured the rate at which the air traveled through it, measuring the

temperature of the air as it came into the factory and as it passed out of the duct, and measuring the temperature of the air at the bottom of the duct. He had at the time I was there a temperature

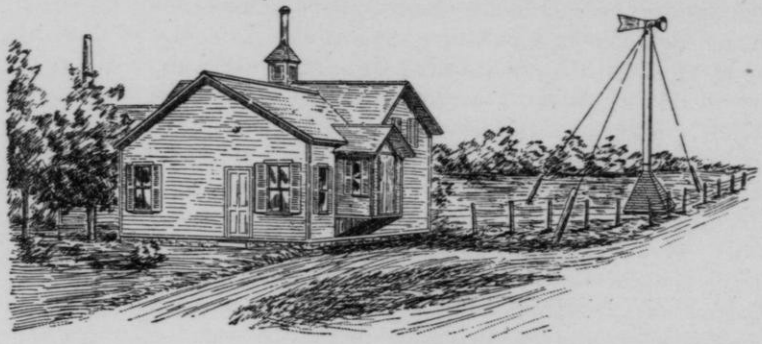

FIG. 5.—View of P. H. Kasper's cheese factory with funnel of sub-earth duct.

on the inside of 62 degrees, where the temperature of the air outside was 69; that is he lowered the temperature of the air about seven degrees. Figure 6 represents a cross section and vertical section, showing the general principles involved in the sub-earth duct. And it represents the conditions as they are at Mr. Werth's factory — a duct that was put in last year twelve feet below the surface of the ground and 100 feet long. At the time I was there the temperature outside was 68 degrees. A thermometer lying in the bottom of the duct registered 55½ degrees. That was the temperature of the ground. The temperature of the air in the curing room was 63½ degrees, and the humidity of the air in the curing room was 60 per cent.

At the Dale factory they have a single large duct made out of culvert tile 12x14 inches, with oval section. This is 100 feet long and the funnel was carried up 50 feet above ground. The funnel at the Werth factory is carried up 80 feet above the ground, and in the Dale factory the air outside was 69 degrees, and the air in the curing room was 62 degrees, and the temperature on the bottom of the duct was 58 degrees. This was a basement curing room. The air was coming into this room at the rate of 198 cubic feet per minute. It was coming into Mr. Werth's curing room at the rate of 68 cubic feet per minute. These figures bring into view one of the principles you must keep in mind in the construction of these ducts. The dividing of the duct so as to make it a multiple duct is in the right direction, if you do not carry it too far. Of course, dividing it up brings air into contact with a larger amount of surface to cool it, but every time you divide the stream you increase the friction necessary to drive it through the duct, and although the

wind was really stronger at the factory of Mr. Werth at the time I measured it, and the duct was higher and the capacity of it through the ground just the same, the air came into his curing room at the rate of only 68 cubic feet per minute, while it came into the other curing room at the rate of 198 cubic feet a minute. The only difference in the two cases was the longer funnel, stack, and the greater subdivision of the duct.

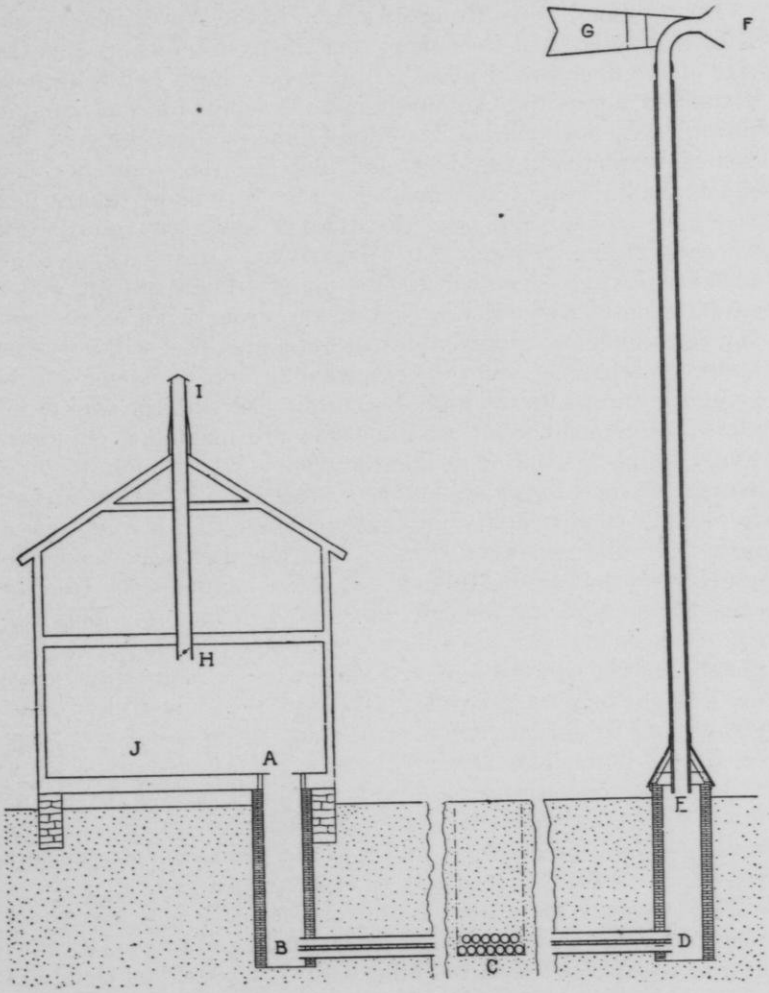

FIG. 6.—Section of cheese curing room and horizontal multiple sub-earth duct. A, inlet to curing room; B, end of sub-earth duct in bricked entrance to factory; C, cross-section of the multiple ducts as placed in the factory of A. C. Werth: D, E, bricked entrance under funnel at outer end of sub-earth duct; F, funnel with mouth 36 inches across; G, vane to hold funnel to the wind.

Mr. Aderhold: In this case with the basement the bottom of the curing room was on a level with the duct. The cold air did not have to be raised up as in the case of Mr. Werth's factory where it had to be raised twelve or fourteen feet. Wouldn't that cut some figure in the rapidity of the ventilation?

Prof. King: Yes, the difference in length of the column of cold and warm air would make a difference.

Mr. MacPherson: Was the size of the duct the same?

Prof. King: Yes; the cross section in the Werth factory was a little greater than the other; not much difference; but the size of the duct would make a difference. Each had a 36 inch funnel on top to drive air through, and each had a stack coming down, 12 inches square. They were alike in those respects. So you may subdivide the duct, and increase the resistance too much. Another thing to remember is that very many times when you have still air and need the draught much you must work toward getting conditions that will give you a draught under the weakest of winds. You will be sure to get draught enough under strong winds. And you can shut off the strong wind better than you can supplement weak winds, so get a duct that will not offer too much resistance. On the other hand, there is danger in carrying the funnel up too high, because in carrying the funnel up you must remember all the time you are making a chimney. Every funnel is a chimney, and the tendency of a stack standing is to get warmed in the sun and becoming warm it has a tendency to produce suction in the opposite direction, and if you have a light wind and a very tall funnel, you may get heat enough to entirely overpower the funnel. That was actually the case, or came almost to being the case, at the Werth factory. This tendency of the draught was almost great enough to overpower the pressure of the wind to force the air down. It really did reverse the draught some of the time. To carry the funnel high is the right thing to do, but like a good many other things you may spoil it by going too far.

The wind velocity increases as you go up from the surface of the ground, and when the velocity does increase you would be led to go there for the wind, and it would be the thing to do if it was not for this other tendency to work against you.

Mr. Decker: Of course the sub-division idea is to give more surface for the air to come in contact with, and to cool it off as near as possible to the surrounding soil. Of course, you could get a longer duct, but that would increase the friction also?

Prof. King: Yes.

Mr. Monrad: In case of a factory on open ground with no trees, what is the use of having the funnel higher than the edge of the building?

Prof. King: I think you ought to have the funnel nearly fifty feet above the ground. I should not want to leave it much less than that. I think if you go above fifty feet the danger is that in light winds the draught will over-power you, and you lose rather than gain.

Mr. Aderhold: Mr. L——— has overcome that objection. He has raised the outlet of his curing room a little higher than the funnel, so that would create a draught at the other end to help the thing along, and still be up where there is a breeze to catch it.

Prof. King: One word more in regard to multiple ducts. You must remember if you pile three or four layers of tile one above the other, it is only the bottom layer that is in contact with the coolest ground. So it is only this tile that is doing you the greatest service. The next row of tile has an air chamber between them and the cold ground, the air chamber being formed by layers of tile below. So necessarily the air will go through these tile, without being so much cooled, and if you put four layers of tile one above the other, you are evidently isolating those layers of tiling and not getting the best advantage. Look at it still further. Of course the tile in the middle are isolated from the sides and bottom, and while you have a large cooling surface there you have not all of the surface under equally good conditions, the warm air coming through the multiple ducts heats them and the more you pile up the layers the nearer you bring the air to the surface and the warm ground.

The question is a very complex one when you come to look it over on all sides, but I feel very sure if you were to substitute a larger tile for the many six inch ones, you would get a stronger draught in weak winds, and as good cooling effect as you get from a large number of small ones. Now, five eight-inch ducts, I think, would carry air better than 13 6-inch ducts, and they would not cost quite as much money, and if five lay side by side on the ground they would all be in contact with the coldest ground, and I feel very sure they would cool the air as much as you would be able to cool it with 13 6-inch ducts. And I am quite well satisfied that 3 10-inch ducts would answer the purpose quite satisfactorily. And 3 10-inch ducts would have as much cross section and be cheaper than 5 8-inch, and I feel quite sure you would get very good results, and these would be cheaper still than the 5 8-inch ducts. They would cost in the relation of about $39.00, $25.00 and $22.50 for 100 running feet of duct.

Mr. Aderhold: You are comparing 3 10-inch, 5 8-inch, and 13 6-inch lines of tile. Do you say 3 10-inch would have as much cross section as 5 8-inch?

Prof. King: They would nearly but would be in better cooling relations with the ground and you can afford to have less surface if you have it cooler.

There is another point. To put in 5 8-inch ducts or 3 10-inch ducts side by side, you must dig a wide trench, wide enough to lay them all down. Where the ground is dry I think it would be better to dig the ditch narrow, and put one tile above the other, but go deeper—that is, go below twelve feet with the bottom tile. Put the 10-inch tile down fourteen feet. You will not have more dirt to dig than if you dig wide and deep. You may say this is contrary to what has before been said. So it is in part, but if one tile is above another it is at the same time directly against the cold ground on two sides, and the bottom one is on cold ground on three sides. I feel quite sure that with really less digging and going enough deeper to get the tile down to where you know the soil is cold, you get better results.

Mr. Monrad: Would the tile ditching machines be practical to use?

Prof. King: No, I think not. It would have to be done by hand. The length you would have to dig would be too short.

One other point in regard to the tile, and in regard to the material out of which the duct is made. I am afraid for the ordinary drain tile on one account. For instance, if you put your tile into the ground and you allow the winter air to come through those ducts in the same way you allow the summer air to go through, it will be almost certain to freeze the ducts. Drain tiles are the right thing to get for the duct, if they will stand, but it is a question whether ordinary drain tile will stand that freezing. I think there is no question about it, in dry soil, but if it is put in where the ground is pretty wet then the tendency to freeze would flake them off and cause them to crumble, so be a little cautious about letting the winter air go through a long time at a time when the air is cold. I know from experience with ordinary drain tile on the farm where we have similar soils that in an exposed drain,—if you leave that uncovered,—although water may be running and the water may not freeze, the upper side of the tile will freeze, and we have had three cases wherein the tile have actually crumbled down in one winter so that we have been obliged to put in new tile. There is a tendency of the tile flaking off layer by layer, and lying there like a pile of chips. You will need to take precautions, for a time at least, until it can be shown that there is really no danger,—take the precautions of not allowing the cold air to run through too long in the winter. If you could have a duct perfectly safe from freezing, the right thing to do would be to drive as much winter air through as you could. Drive the air through and cool the

ground as rapidly as you can. By that arrangement you can store up a good deal of low temperature that would be available in the summer season, but there is that danger I want to caution you in regard to,—the danger of the tile crumbling down.

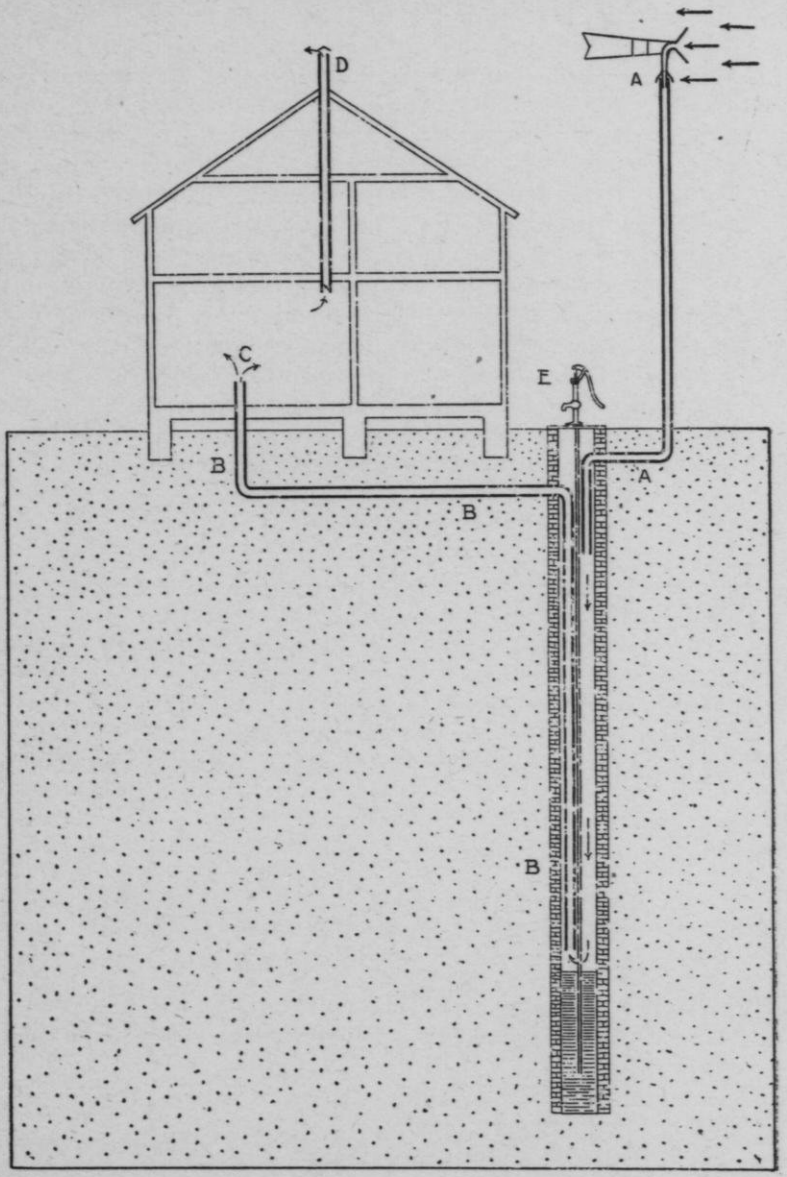

FIG. 7.—Showing vertical section of Mr. J. F. Steinwahn's factory and sub-earth duct in well. A, A, funnel taking air into well; B, B, B, duct leading air from well to curing room, C; D, ventilator.

In the factory of Mr. Steinwahn, a cut of which is represented in Fig. 7, a well has been used for cooling the air. He has a well sixty-four feet deep, and his funnel runs up, as represented in the cut, a little above the roof of his factory. A ten-inch pipe starts at the bottom of the well and rises to within five or six feet of the surface of the ground, and then is turned off horizontally and rises up into the curing room. At the time I was there in the first days of October, the 2nd or 3rd, the temperature of the air outside was 70 degrees, and the thermometer at the bend of the pipe right under the factory lying on the bottom of the duct, was 53 1-2 degrees. The temperature of the air as it came out of the duct into the curing room was 55 degrees, and you see you have the difference between 55 and 53½. You must remember the duct had not cooled the air down to the temperature of the duct. The curing room itself was 60 degrees. The air came into the curing room at 55 degrees. The temperature of the water in his well was 46 degrees. Now, he had the lowest temperature of any factory I visited; that is, he had a temperature of 60 degrees, but he had a very, very excellent curing room; that is, he had taken great pains to make the room tight, built it of the right boards, and he was utilizing to the greatest effect the cold air that was coming into the room. The air was coming in at the rate of 61 cubic feet a minute. He got that by having an air tight room with windows on the north side, double ceiling, double floor, double sides.

Mr. Faville: What is the relative cost of these two arrangements?

Prof. King: I have the figures for the different items of these ducts, and they are as follows:

	Above ground.	Below ground.	Funnel.	Digging and filling.
Dale factory	$2 50	$40 00	$5 00	$20 00
Steinwahn factory	8 40	15 60	2 50	.....
Kasper factory	10 00	35 00	6 00	50 00

Mr. Werth's factory cost him considerably over $200.00.

Mr. Decker: To get rid of the drainage cost him considerably more than that.

Prof. King: Yes. I have simply his figures on twelve feet deep and one hundred long.

Mr. Aderhold: Does the height of water in Mr. Steinwahn's well vary enough to make any trouble?

Prof. King: No, he placed it a foot above the high water mark and forty feet below the top.

Mr. Mason: What harm would there be if we had a galvanized iron pipe and ran it down into the water?

Prof. King: No harm, providing the moisture in the air did not condense and fill the bend.

Mr. Mason: Could you not use a small pump and pump the water out?

Prof. King: Yes, this could readily be done.

Mr. Aderhold: I was in the factory of Mr. Steinwahn on the 15th day of August. It was rather a warm day, and on that day the air entered the curing room at a temperature of 55 degrees, and he told me that up to that time the temperature had never been above 65, and I believe it.

Prof. King: He told me it was never above 70, and then the doors were open. They were taking out cheese. But remember he has an excellent curing room.

Mr. Monrad: How warm was the outside temperature?

Mr. Aderhold: I didn't take it, but not above 75, I should say.

Prof. King: Now, turning the page over, at the upper left hand corner, Fig. 8, I have shown a drawing that gives a good construction for a wood curing room, above ground. That is, you have two layers of matched stuff outside and inside of the studding, with paper between. The joists are laid on the sill and then the first floor is laid before anything else is done, covering the joists entirely over. Then a 2x4 is spiked to the floor to set the studding on. The object here is to get the space between the studding entirely closed up and sealed, so there can be no question of its being tight. This studding was cut in two at the first story, and a 2x4 is spiked down there, which closes the air space above and that is a very essential feature. Then boards ought to be laid so they break joints, and great care should be taken at the corners so that the air is thoroughly shut out. The ceiling must be as tight and close as the rest of the room. If you have a half story and radiation of the roof heats the floor, you can see you would lose the effect of the duct by having a warm ceiling to radiate the heat on to the floor below. So it is as important to have the ceiling insulated as the sides. Indeed, you should have a tight construction all around. In the center of this cut is represented a variation in the construction introducing another layer of boards and a dead air space. The second method is where excellent insulation is sought and it is the construction used in cold storage buildings. The space between the studding may be filled with saw dust. The one inch dead air space is made by nailing a layer of boards to one-inch butting, thus giving a second dead air space.

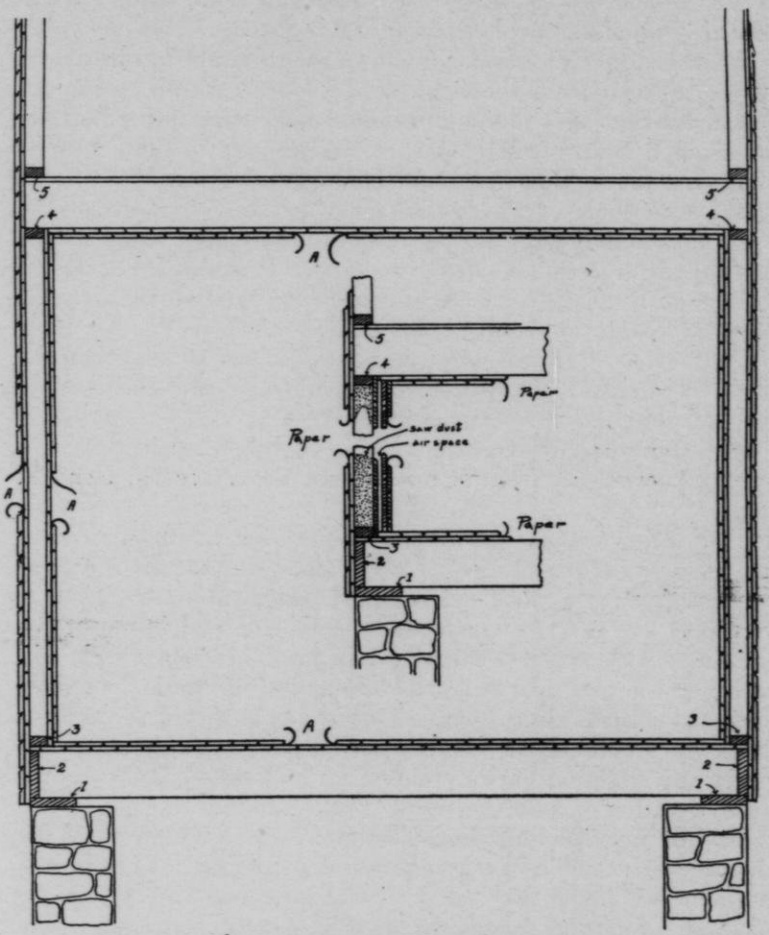

FIG. 8.—Showing the construction of wood curing room. 1, 1, 1, sill; 2, 2, 2, a two-by-ten spiked to ends of joist; 3, 3, 3, a two-by-four spiked down after first layer of floor is laid to toe-nail studs to; 4, 4, 4, a two-by-four spiked to upper ends of studding of first story; A, A, A, A, three-ply acid and water proof paper. The drawing in the center shows space between studding filled with saw dust and another dead-air space to be used when the best ducts cannot be provided.

On the top of the page, Fig. 9, in the right hand corner, I have represented a deep sub-earth duct,—a duct that instead of being put horizontal is vertical. In such a case as this you would dig an ordinary well of the diameter necessary to give you the size of the duct that you want. The circle on the right, in the center of which is the letter "C," represents a cast iron plate set on a brick foundation in the bottom of the well. The cast iron plate should be provided with collars, like that on a stove for the stovepipe, and you slip over the collars either drain tile or else

galvanized iron conductor pipe. The duct that brings the air down is represented in the drawing as coming from above the roof of the factory, the air going down through the center and going up through the sides. These ducts, of course, are in contact with the cold ground all around, and so are in the best possible condition for being cooled by the ground. I think I should have little hesitation in saying these ducts, twenty-five to thirty

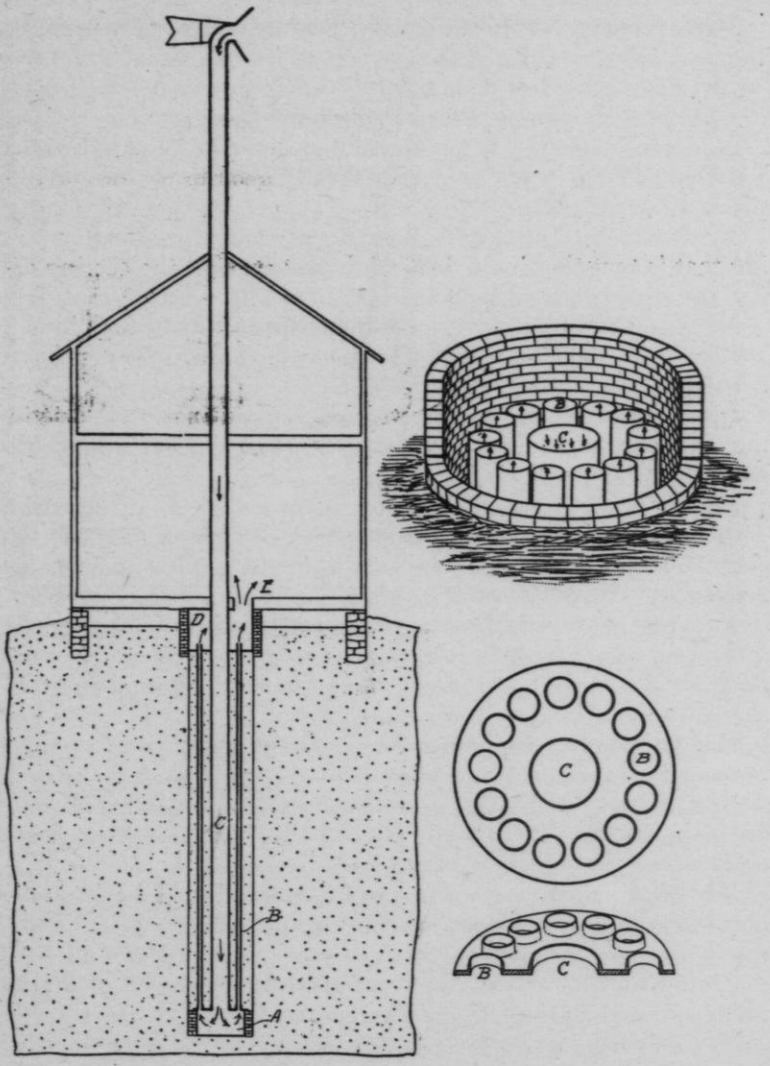

FIG. 9.—Showing vertical sub-earth duct. A, brick chamber 25 to 30 feet below surface and 40 inches inside diameter: B, tile or conductor pipe of galvanized iron; C, main shaft of funnel; D, brick chamber at upper end of duct.

feet long, would give you just as good satisfaction as a horizontal duct 12 feet deep and 100 feet long. You have less dirt to move in digging it. You can bring the duct close to the factory or place it under it. I think the best place would be under the curing room. This arrangement permits the factory to be used as a part of the support or stay for your ventilating stack.

Mr. Monrad: Do you figure on having these ducts water tight at the bottom?

Prof. King: Not in this case. I have in mind places where the ground water is forty or fifty feet below the surface.

Mr. Faville: How deep would you dig that well?

Prof. King: Twenty-five to thirty-five feet.

Mr. MacPherson: Instead of the several pipes and apparatus represented here, would it not be equally good to use the principle illustrated in Fig. 7?

Prof. King: The only thing I am afraid of in recommending that is that the single duct might not give all the cooling effect the factory would need.

Mr. MacPherson: You have the entire volume of air in the well and it would be entirely on the same principles you have here in the Steinwahn factory.

Prof. King: I see you are thinking of an open well, but in that case you would have to curb up the well; but this would cost more than the pipe.

Mr. Faville: After you get the pipes in you would fill it in with dirt?

Prof. King: Yes, it is just brick at the bottom and this chamber is covered by the cast iron plate.

Mr. Aderhold: Supposing you got some water in the well?

Prof. King: If there is a chance for that, of course it is not the place for this kind of duct. It is where the ground water is thirty-five or more feet below the surface.

Mr. Aderhold: Suppose it was above the water line, wouldn't water gather in there?

Prof. King: It would do no harm, except just as in the case of the horizontal duct, the air might be very much saturated by evaporating the water from the duct.

Mr. MacPherson: I was going to observe by way of suggestion that the idea could be carried out, providing you curb the whole up with stone?

Prof. King: Certainly you can make an open well as Steinwahn has, and follow the plan he has used.

Now, it may happen that the ground water is so near the surface that you cannot get one of these ducts more than 10 or 20 feet deep. I believe it is possible in such cases to put in a shorter duct, making them of conductor pipe, and then to fill

in around them with sand, or fine sandy soil, having it arranged so that periodically you can pump water on the sand and let the cold water run through the sand and keep the sand cool. If you are four feet above standing water, there would be sufficient drainage. Of course, the same method could be applied to the horizontal duct, but you would have to carry the water over a greater surface.

In some places, as was the case with Mr. Werth, you cannot get down twelve feet below the surface of the ground without getting into water, or where the ground is cold enough without a good deal of expense. Mr. Werth found the water filling up the ducts and was forced to dig a drain away from them. Since he succeeded in doing this he has an excellent duct where the drainage water tends to keep it cool, but the expense to drain the water away was heavy. That is the only objection as it now stands. I have provided one other method to meet that sort of condition, which is represented in the lower Fig. 10 at the right hand corner. It is intended to represent a deep cistern or well. If you are within twelve feet of water and can dig a deep cistern six feet in diameter and brick that up, or stone or plaster it so as to make it water tight, and fill it with cold water from the well, a duct like this model should be placed in it. It would be possible, if the water is still closer to the surface, to dig an open well, and set such a duct down into it to be cooled by the water of the well itself. One question would be as to whether these flues are long enough and of sufficient number to cool the air enough when coming in.

The air ought to travel through the flues slower than through the pipe; and hence the cross section of the flues ought to be greater in the aggregate than the cross section of the main pipe, so as to reduce the velocity through the cooling duct. If the wind is strong and the air is coming through too fast, there should be a damper provided which will permit a regulation of the amount of air entering the duct at any time.

Mr. Aderhold: Would there be danger of precipitation or water gathering inside?

Prof. King: I think there might, but I doubt if there would be much trouble of this kind. It could be easily pumped out, besides the air would tend to evaporate it during dry times.

Mr. Monrad: Don't you think Prof. Henry needs a good thing of that kind at the Dairy School?

Prof. King: I think he has tried to get it.

Fig. 11 represents one method of mounting a funnel. I have made several trials in regard to the best shape of the funnel and the size of it. The effectiveness of the funnel increases with its size, but it does not seem to make very much difference how

it flares. The size, however, makes a great difference. The larger it is, the more air comes in, but I think a 36-inch funnel leading into a 12-inch down pipe will probably in most cases give all of the air really needed.

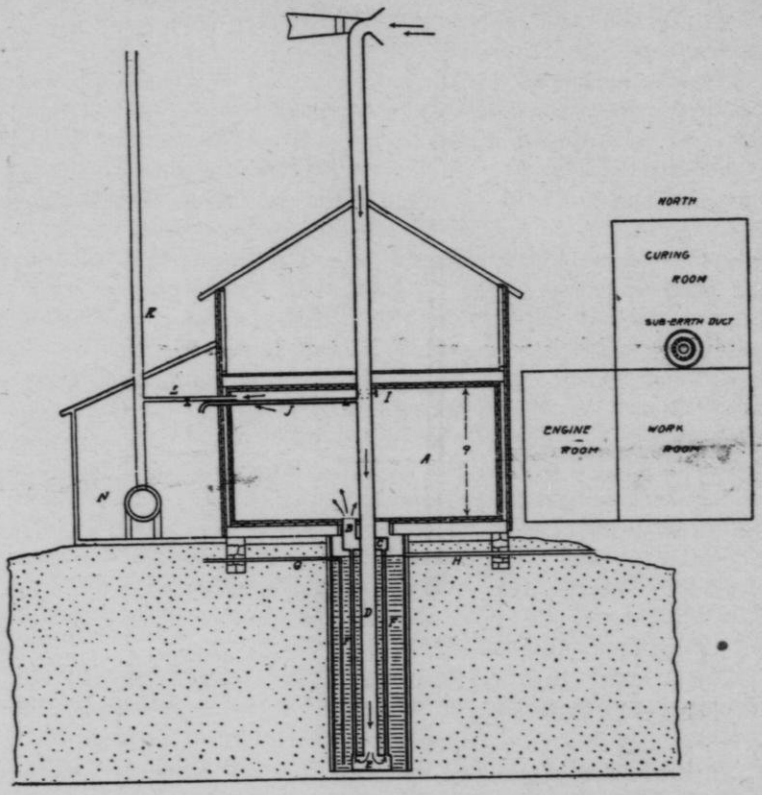

FIG. 10.—Showing method of cooling air with cold water. A, curing room; B, duct leading into curing room; C, E, galvanized iron drums, air and water tight; F, thirteen or more 5-inch flues of galvanized iron, 10 ft. long, soldered water tight to drums to cool air; D, main air duct from funnel; G, water pipe from pump; H, over-flow pipe; I, damper in main shaft; J, 4-inch pipe leading from blower to use when there is no wind; K, smoke stack of boiler; L, ventilator from curing room to smoke stack; N, boiler.

Mr. Faville: There is one thing I want to know. It is very likely that few of our factorymen will go to work and get a duct or any of these things, but the question is whether it is not practical for every one to improve their curing rooms by making them air tight inside and outside?

Prof. King: That is the very first thing which should be done.

Mr. Faville: That is all they can and will do, and it is certain to help a great deal.

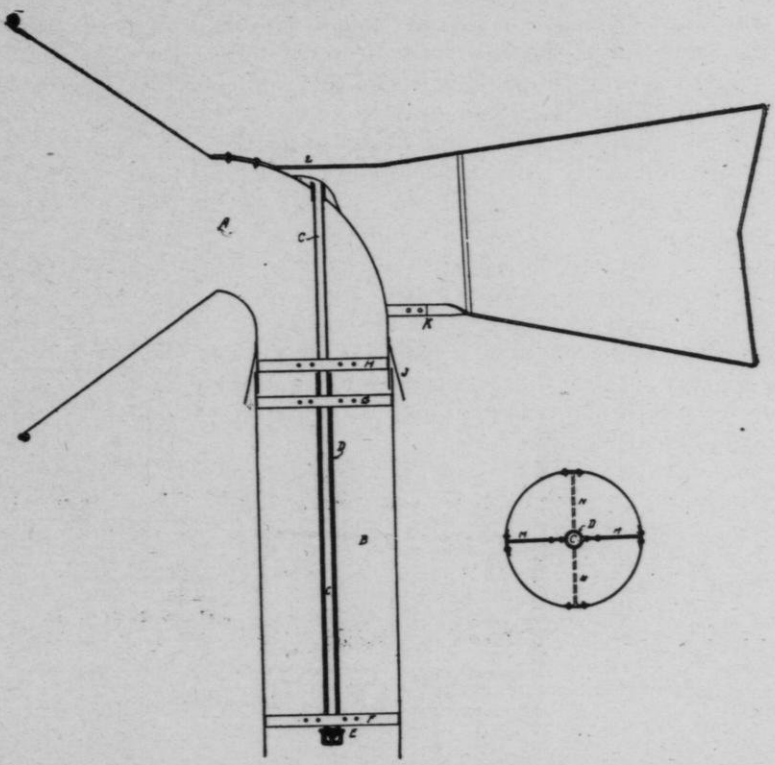

FIG. 11.—Showing how funnel and vane may be mounted. A, funnel; B, shaft of funnel; C, C, C, 1-inch gas pipe; D, D, 1¼-inch gas pipe; E, cap for support of 1-inch gas pipe; F, G, H, and M M and N N are stays of band iron bolted together and to the sides of the shaft to support the axis of the funnel; J, weather collar to turn rain out of shaft. K, L, band-iron to stiffen vane and attach it to funnel.

Prof. King: It is the first thing to do. There is no use in doing the other things if they have not got that. The curing room must be built right first.

Mr. Decker: There has been some difficulty in the mechanical means for raising the funnel and inlet to the duct. Some have gotten these parts way up and have let them fall and broke them all to pieces. Could they not be raised with a rope and pulley?

Prof. King: Yes, it is easy to raise the duct from the ground with ropes and pulley, just as windmills are so often raised. (Illustrating.)

Mr. Decker: This piece of apparatus you have in your hand, you suggest could be put into a well. Of course there would be difficulty in putting it down. You could provide a valve, to be opened and closed when putting it down?

Prof. King: I should be afraid of the valve bothering after-

wards and leaking, and I would rather take the trouble to pump the water out of the well before introducing the duct.

Mr. Decker: Suppose it was so that you couldn't?

Prof. King: It would then be necessary to weight it. Do not put a valve in, as it would be apt to leak.

Mr. Aderhold: We have certainly got a good many valuable points from Prof. King. I believe the point he makes of having one layer of tile and horizontal ducts is a good one, but in regard to the friction he speaks of, I think we need not be afraid of that as long as we have a good wind cowl. We have a duct now of 4-inch tile, some of 5 and some of 6, and in all cases we have no trouble in getting splendid ventilation. It depends a good deal on the funnel and cowl. The room is cool, every cheese is cool, and if there is no ventilation for a few hours, there is no difficulty to speak of.

Prof. King: We have had in Madison no wind for seven consecutive days strong enough to turn a windmill. That is a wind of only two-thirds the velocity of the wind when I visited the Werth factory when the air was coming through his duct too slowly. We do have such cases to meet. If you have four days of still air or nearly still air, that is too long a time, is it not, to risk cheese?

Mr. Johnson: Run a small steam pipe in there. That is what I used in my factory, and you can fetch wind there with that as fast as you want it.

Mr. Decker: That is, you use it sometimes?

Mr. Johnson: Yes, when the air is still and quiet.

Prof. King: There is a fundamental difficulty in trying to draw in cold air by putting the warm air out. You cannot build your curing room so that it will be absolutely air tight, unless you get a tinner with a soldering iron. With open walls, if you attempt to suck the air out, the air is going to enter the curing room through openings offering the least resistance, and so the warm air would be sucked into the curing room without going first through the duct. You should get behind the air, if possible. Then, if you have an engine in the factory, the simplest device is to use a small blower, which costs little, and you can drive the air right through the duct and into the curing room. This gives you complete control of the situation so far as managing still air is concerned.

One other point I forgot to mention in regard to the basement and cellar curing room. The fundamental difficulty with them appears to be, so far as we are able to get at the facts, that you are liable to have three, four or five days of still air, which is very damp, causing the cheese to begin to mould in the curing room. The reason for this is the refrigeration is done in the

curing room itself. You bring in the moist and warm air and bring it in contact with the cold surface in the curing room, and so throw down the moisture there. When you bring air through the sub-earth duct, part of the moisture is left in the duct and the air comes into the curing room dryer, and as the temperature rises after entering the room, this makes it still dryer, so the sub-earth duct is different in principle from the basement. You can control moisture conditions easier, so far as too much moisture is concerned, in the curing room provided with a sub-earth duct. If you have a basement curing room or a cellar curing room, you need in connection with it a cowl or funnel which may be used at times to drive some dryer air into the room. What you want to do is to raise the temperature a little so as to prevent moisture from being condensed. So, too, with a blower connected. This would give you complete control of the too damp condition of the curing room.

Mr. Aderhold: In regard to the moulding of cheese,—that is an important point. In some of our sub-earth ducts there has not been any trouble with moulding. Mr. Hamm is here, and he tells me he has not had any trouble with moulding since he had had a sub-earth duct, and in disinfecting his curing room. In some other factories where we have ducts we have no trouble with moulding; in one or two others there has been. One especially,—there was a little water in the lower layer,—not enough to obstruct the passage of air,—but there was considerable mould there, and disinfecting the curing room did not help, and I have an idea that the moisture in the duct set up the mouldy condition, and I think it is better for us to try to keep the ducts dry, if we can.

Mr. Van Leeuwin: I would like to ask Prof. King a question. I have a half cellar. I live in northeastern Kansas where the climate is warmer than it is here. My idea is now to draw air from the well. You just now said not to use air from a well, or in the sub-earth duct, if you have a cellar. You understand I have a half cellar and we have a warm climate, and last summer my temperature got as high as 72 degrees, and I didn't have enough ventilation. Now, if I draw air from the outside I am going to have it too warm. Now, if I draw air from the well and let it come in through the bottom of the cellar (I have a principal room above and have the ventilator there) will I have too moist air in my lower room.

Prof. King: No, you have the right idea there. I am speaking for Wisconsin. You would use your well, if available, and with your much dryer air you would probably find no difficulty. You need, in using your well, to be careful in closing the top up. You want a tight cover on the well.

Mr. Van Leeuwin: I have a connection now to the well, and simply open the top of the well. I have some ventilation now, but not enough. Of course, my water stands within thirty feet of the top of the well,—yes, twenty-five or twenty feet,—so I cannot go down far for the air, but of course I get better results than if I used outside air, which in the summer is 90 to 95 degrees, and I think that with my half cellar I will be able to get the air down. I have a sixteen inch stone wall. I spoke about it last year to Mr. Aderhold and others and they thought it might not work, but I am going to put more work on it now. I have 4 1-2 inches of dirt and a 16-inch stone wall. Would you advise me to brick in the inside?

Prof. King: Brick is all right if you plaster it. A brick wall is one of the most open walls you can make.

Mr. Van Leeuwin: This basement I have above ground. After I dug the room I left a four and a half foot space around the building, but have filled it in solid. I put in a 16-inch stone wall and four and a half inches of dirt and board wall inside. I put it up as cheap as possible, because I did not know whether it would work. I am satisfied now it will be all right, and want to put in a permanent wall and floor, and get my ventilation from the well, and have the upper room right above it, which I use for the first three or four days as a curing room. My cheese sold very close this summer, so I could not try my curing room.

Mr. Aderhold: We will give him credit for trying to get a good curing room, even if he does not cure his cheese there.

Mr. Monrad: I want to thank Prof. King for the instruction he has given us, and will say that they can listen to Mr. Aderhold when he talks about making cheese; but when he commences to talk about factories you listen to Prof. King and don't take Mr. Aderhold's words.

The President: This chair decides that Mr. Monrad's remarks are eminently in order.

Mr. MacPherson: I don't think it would be proper for me to take up time with casual remarks, no more than to say that the last address we have heard in regard to curing rooms deserves the attention of cheese makers, and should stir them to that extent that they must put it into force. It is not only the requirement of knowing, but of doing. If you can keep the temperature of the curing room down to 60 or 65, you will get from one-half to one cent a pound more for cheese. You will not only do that, but you will save your cheese and you will improve the quality and increase the yield of cheese. These are very impor-

tant questions. They are economic questions, which bear on the case,—the increased profit on agricultural products of the country, which is the important question of today. This question this morning is very important and should be considered.

In connection with my remarks yesterday in regard to cheese making, I wish to say this: Any observation I made is derived largely from practical observation and experience, and I would not like any one here, because of any remarks I made, to make any change in the manipulation of the curd, as it is only my private opinion. It is proper to weigh other men's views, try them carefully, and if you find them an improvement, adopt them; but they should be investigated. It is proper that you consider other men's views, and if you find them correct, you can adopt them. What you desire is to see the quality of your cheese improved and put you on a line where you can bring that about. If there is one thing more than another which I wish to repeat, as I did yesterday (but you know truth must be repeated and repeated to make it forcible and impress it on the mind), is the correct deciding in regard to moisture. You should apply yourselves as cheese makers to know the amount of moisture in the curd at different stages, to know when there is 40 per cent. of moisture in the curd.

If there are any questions I should be only too glad to explain any remarks I made last night or yesterday.

I am very thankful, indeed, for the splendid attention you gave last night, and the encouragement. I am glad to be present here, and have enjoyed my visit extremely well and have received courteous treatment, and if I get around in this section of the country again, I would be glad to spend several days visiting your institutions.

Mr. Decker: As far as I am concerned personally the address given by Mr. MacPherson has set me to thinking as no other address has before in the history of this association. I think he arrives at the same results we are aiming at by perhaps a little different route. I do not know whether the conditions under which he is working are the same as ours, or not. I know in some parts of Canada they are not. There is one point, however, that I have been thinking about, and perhaps Mr. MacPherson can help us out on it. We have trouble with cheese cracking, caused by the fat collecting on the outside of the curd, and to get around that we have been obliged to throw a pail of warm water on the curd, and wash off that fat which creates a waste.

Mr. MacPherson: This butter fat is largely freed from the effect of the casein which holds it mechanically, by too much hand stirring and too much manipulation of the curd at the

time of milling and at the time of salting. If you noticed, I advised cooling the curd previous to milling. After the curd is properly matured and brought to that state or condition which makes it travel on the right road to perfection, what do you do? You cool it down to fix the butter fat, to retain the butter fat in its proper position, and in the after manipulations of the grinding and mixing of the salt a low temperature has the great effect of retaining this butter fat, which is found from experience to pass out. I have had the same experience as stated, and I have completely remedied it by cooling the curd before milling. Cool it to 85.

Mr. Aderhold: Doesn't that get greasy on the outside before salting?

Mr. MacPherson: Yes, that is the proper condition, except that if you keep the curd too long before you mill, it would have a tendency to free the butter fat cells and it passes to the outside. To overcome that this higher temperature has the effect of ripening the curd and holding the butter fat in and not allowing it to escape, and then encouraging a more rapid development of lactic acid to overcome the putrefactive acid. It is usual with a tainted curd to keep it at a temperature of 97, and keep the curd four or five or six hours to destroy the gassy ferment. At a temperature of 99 or 100, you will have the same effect on the curd in two and one-half to three hours.

Mr. Powell: Doesn't the manner of milling have a good deal to do with the butter fat?

Mr. MacPherson: Not as much as the previous conditions. The relation of the butter fat to the casein, and this temperature, as I wished to impress upon you last night, is a great point. Overcome the putrefactive ferment which creates pin holes. The lactic ferment will overcome it, and when that is overcome that is all you want. Then your cheese will remain close and firm, and the proper working and curing of your cheese will afterward be effected. For quick developing, keep it at 99 or 100, and not too dry. I think you will find the gentleman who took the first prize yesterday made his cheese that way. He raises the temperature to a far higher temperature and holds it that way. He holds it after the whey is drawn, and in that condition you overcome the loss of butter fat, and the consequence is your cheese will press close. The curd should press completely into the fibers of the bandage, and then you will have a perfect rind. But if the butter fat once starts the curd becomes dry and unyielding and you cannot press it, and the consequence is that you will have a coarse, open surface, and the sides of the cheese and the surface of the cheese will be cracked. On the other hand, if you burn out the gas at a high tempera-

ture, with a proper amount of moisture and lactic acid, the curd of the cheese will be light and mellow. When we came to this cheese of yesterday the outside was mellow. These points of temperature and moisture and acid, I repeat, are the most important features of cheese making.

Mr. Decker: Some of our makers have been using an oil cloth. You suggested a cloth. What do you think of that?

Mr. MacPherson: It is excellent, I think. It is a little difficult to wash, but it is very good if you can scald and wash it. I have had no experience with oil cloth, but I believe it is very good. It prevents evaporation, and hence you have a very uniform color. Get all the curd uniform in moisture and don't expose it to the air to dry. If it dries out, it will be mottled. If you cover it with a damp cloth, it will keep the curd nice and damp and moist, and it will have a uniform color. My cheese out of sixty factories can all be put in one lot as to color. I attribute it to the fact that I do not expose the surface to evaporation, and if you have a uniform temperature and uniform moisture, you have uniform cheese.

Mr. Zwicky: Is there any danger in cooling the curd down to 85 in closing, and leave it lay after you cut it?

Mr. MacPherson: The gentleman asks if there is any injury done in cooling the curd to 85 in regard to pressing. There is no injury whatever. You will understand in cooling the curd it has a tendency to retain the moisture. It assimilates by the action of the rennet, and presses actually better at 85 than at a higher temperature

Mr. Aderhold: If there is any loose fat on the outside of the curd when it goes to press, is that fat lost?

Mr. MacPherson: Yes. A great part of it is lost and some is retained in the angular holes first formed in the press.

Mr. Aderhold: Then it would be better to rinse it out.

Mr. MacPherson: I think it would be better not to have it there.

Prof. Henry: Do you rinse it off?

Mr. MacPherson: I don't advise water at all. If you want to put warm water on the curd it is far better to use warm whey. The whey is the natural blanket for pressing the curd. Use warm whey instead of putting on warm water. The lactic acid is a preservative to the cheese, and if you put on water you reduce the keeping quality of the cheese.

Mr. Monrad: Then you wouldn't let us cool the curd with cold water?

Mr. MacPherson: Only under extreme conditions. On a

very hot day I would rather do it and save the butter fat. When you grind the curd and stir in the salt, you are bound to start the butter fat.

Mr. Aderhold: You cool it before grinding?

Mr. MacPherson: By all means. Cool the curd before grinding.

Mr. Aderhold: Do you use cold water?

Mr. MacPherson: From the well?

Mr. Aderhold: Yes.

Mr. MacPherson: I don't recommend the use of water except in extreme cases.

Mr. Van Leeuwin: I would like to know if he finds it necessary to wash his cheese after it closes up firm and smooth in the press?

Mr. MacPherson: I don't think it necessary. If the curd is not right warm water, of course, would do it good,—help to close it. If it is a very cold day and the surface of the curd gets down to 60 or 70, and has not closed properly, then I advise putting on hot cloths. That will help close up the surface of the cheese.

Mr. Van Leeuwin: Damp, hot cloths?

Mr. MacPherson: Damp cloths put on quite hot. There is one question that I wish to refer to, and that is this rennet test. I stated that we do not depend on the rennet test in regard to the amount of rennet, but we depend on the rennet test to give us an idea of the condition of the milk, and to know how much lactic ferment to add. That is the only thing we use the rennet test for,—to determine the amount of ferment or the condition of the milk.

Mr. Faville: What do you mean by lactic ferment? What the boys here call starter?

Mr. MacPherson: Yes.

Mr. Monrad: Mr. MacPherson used the term, in speaking of home cheese and comparing it with export, that it was richer. I want to know why he uses that term? He don't really mean it contains more butter fat.

Mr. MacPherson: The taste of home consumers is such that they require a softer cheese. They are not practically richer cheese, but you are selling a pound of water for seven or eight cents, which is a very cheap commodity in this country. Where you can do that and please a customer, it is proper to do so. How to accomplish that is to reduce the temperature a little in curing the curd. Why this is done is to let more moisture in the curd, and then cooling the curd previous to grinding, and it goes on and creates an apparently richer cheese, which we like to sell.

The President: I will now call on Prof. Henry to say a word to us before we go to dinner.

Prof. W. A. Henry: I have been away from the city attending farmers' meetings upon appointments made previous to the knowledge of your coming to the city. That explains my absence. My heart is with you, and I assure you that I am doing everything I can to advance the interests you represent.

You will find if you study commercial matters closely, that the cheese industry is dying out at some points in the east. A large portion of the state of New York is shipping milk to New York city for direct consumption, and that is throwing the manufacture of cheese out there, and allowing us to take it up, if we like, or some other district. Now, I feel that this is a vital and critical time in the history of the cheese industry of this state. If we will we can take the trade New York is giving up and make it Wisconsin trade. We can relieve the overcrowded butter business.

I believe there is a great field for the large production of splendid dairy products in the north. There is room up there for from five hundred to one thousand good cheese factories. Shall we put them there? That depends upon the action of this commonwealth in the next few years. We cannot produce cotton and fat hogs as cheaply as they can further south in this great country; but we can produce fine cheese, mutton and bacon.

We must intellectualize our business, and have proper legislative help. We need more room at the university in our Dairy School building. I believe that the students will back me up that this is the thing needed. The Board of Regents have asked the legislature for money. It now remains to see whether the legislature will give it. I am sure they will if they realize that it is of importance. Whether we get it or not depends upon your action as individuals. If you wish it, perhaps we will get it. I want to enlarge the present dairy building, and put in rooms for making Swiss and brick cheese instruction. We also need a central heating plant, over which we will build rooms for instruction in the management of the steam engine. I don't believe when the legislature understands that they will hesitate in giving us what we need.

I want to say another thing. As you meet here in session, do not forget for a moment where you came from as an association. The State Dairymen's Association has been a power in this state for good. No one can tell what it has accomplished. Now, the outgrowth of that association was the Hiram Smith hall, our Dairy School. In that Dairy School we follow a sys-

tem of dairying which is the first of its kind in the world. Mr. Monrad will bear me out in saying it was different from that of the old school. Dr. Babcock and myself in a consultation concluded we must bring students, apparatus, and milk together, and not have professors lecturing with no milk or dairy apparatus in sight. Now, this is an expensive form of instruction, but when properly backed up, the best. The State Dairymen's Association is the parent of the Dairy School. I can say without boasting that this association is the outgrowth of the Dairy School.

Those here who belonged to the Dairy School in former years, please raise your hands. (23)

Those who belong to the Dairy School at the present time, raise your hands. (12)

The association should have good men every year and pay them for coming, and by united effort you will become one of the most powerful organizations in the state.

On word further and I am through. There is a tremendous struggle going on among the enlightened nations of the earth for commercial supremacy. The acquisition of territory in the far east, in the islands of the sea, and in Africa, are not for mere ownership of territory, but for control with reference to commerce. These nations care nothing about the lands they are struggling for, excepting that they may push their trade and find larger markets. How is our country to stand in this struggle for commercial supremacy? Only through education, intelligence and training can we hold our own in the conflict. In the recent war we conquered a second-rate nation. Our victories were won because of educated, trained men behind the guns. If we are to win, or even rank with our competitive neighbors, we can only do so by carefully and very completely educating the man behind the plow, at the lathe, and at the cheese vat. I believe that Wisconsin in her wisdom will do her part toward educating her people in the trades and vocations, which Nature has marked out for us in this great commonwealth, and that whatever occurs we will not be found lagging.

DISCUSSION.

Mr. Monrad: I am very sorry, but I will have to "jack" up Prof. Henry a little. First of all, he is quite right in claiming the supremacy of the school. I found in visiting the various schools that he had taken the right course between the manual and theoretical. In bragging about it, my Danish blood came to

the boiling point. He had the benefit of Danish instruction, and the chance to improve upon it.

Professor Henry, I have a question to ask. I was told that the time, energy, and splendid work done by Prof. Russell was to be exclusively for the Dairy Division, and it is now the desire to have him give a part of his time to other branches. I want to find out it it is so, and if so, enter a protest on behalf of the dairymen. I think we can use him ourselves.

Prof. Henry: I think Dr. Russell gives practically all his time to agricultural matters. He has an assistant who is paid for and who has charge of the laboratory work. The dairymen and other agricultural interests have all of his time.

Mr. Monrad: I think it is the feeling in dairy school and agricultural department that we should have the bacteriologist all to ourselves.

Mr. Aderhold: I would like to refer to the appropriation Prof. Henry would like to have for extending the dairy school, and would like to ask him if he ever failed to get an appropriation he asked for?

Prof. Henry: The legislature has never failed me in giving me what I asked for, but the trouble has been I have asked too little. The last three legislatures of Minnesota have given two dollars to our one. The last three legislatures have given their agricultural department two dollars every time we got one. The present legislature of Minnesota has been asked to give $80,000, and we have asked for $35,000. Minnesota has used up two dollars to our one. The state of Michigan today has an agricultural department that is worth $1,600,000. What is our assessed value? They carry insurance on over eighty buildings at that college. Now don't let the members of the legislature and newspapers fool you by saying Prof. Henry has had a good deal of money. Out in Iowa the other day, a man was given $800 to buy a couple of cattle. If I should do that here they would pull the hair off my head. They have $1,500 worth of cattle. They got ten dollars to my one alone. Other states are away ahead of us in appropriation. Wisconsin is doing well, but don't think we are at the top.

Mr. Monrad: And one thing is this: they don't use the money nearly half as well as you do.

Mr. MacPherson: I would observe that this question is one of the most important, and you cannot have thorough education without some public expense, and the whole question to the public is what will be the result. Now, if you measure the result, the money spent in educating the many here and in educating the farmers all through this country, if you can enable a man to receive an increase in profit of ten cents a day, you increase

the wealth of your state. What does it mean to this state? It means millions. What does it mean to the value of your real estate? It means millions. You add ten cents to one person's pay and you at once add five or ten dollars to the value of land. You multiply five or ten dollars by the agricultural lands of this state and it means a $100,000,000, and you can illy afford to keep back appropriations.

So when you have men of intelligence and power, you must put up your hands and arms to strengthen them, when it has so much bearing on the results in this country.

Convention adjourned to 1:30 P. M.

SEVENTH (FINAL) SESSION.

Convention met pursuant to adjournment at 1:30 P. M. President Carswell in chair.

The President: We will now listen to Mr. Kasper's paper on "The Ideal Cheese Factory."

AN IDEAL CHEESE FACTORY.

P. H. Kasper, Nicholson, Wis.

I have not much of a paper prepared, because I did not know whether I could come or not; but I will touch on a few points that I think necessary to have in a cheese factory, and how a cheese factory ought to be.

A typical and up-to-date cheese factory should be so constructed that the proprietor should be able, if necessary, to make a first-class article three hundred and sixty-five days in the year. The building must have a neat and attractive appearance from the outside, as well as the interior of the factory, that will not only be a credit to the proprietor or maker, but also the pride and admiration of the patrons. The more the patrons talk and comment upon the neatness of things, the more business will come to the enterprise, and the goal which we are all desirous of is a successful business.

A majority of the factories in Wisconsin are too small, poorly constructed, and undesirable apparatus in the factory, such as

vats, presses, boilers, etc., and in many cases if the cheese is not ruined in the process of making, it is spoiled in the curing room.

In the ideal cheese factory of today, there is a receiving room, make room, test room, curing room, and boiler room. The receiving room, which is a small room about 5x8 feet, has a floor elevated about three feet above that of the make room. In this room we find a good, accurate set of scales, weigh can, and on one side of the room there are narrow shelves suitable for the composite sample jars, arranged as neatly and evenly as a druggist's show bottles.

The make room should be finished as neatly and tastily as an ordinary dwelling,—the best of floors,—around the walls wainscoting about three feet high, the balance of the walls and ceiling lathed and plastered. The finishing of the room is excellent, vats, press, curd knives, one horizontal and also one perpendicular knife, curd rack, curd mill, and, in fact, everything that is necessary to manufacture a first class article.

In the test room, we find the indispensable and familiar Babcock tester to determine the relative value of each patron's milk; curd tests, wash sink, with steam and water connections, water tank and towels. The one object to keep in view is neatness. The maker should also be neat in appearance, for we must remember that cheese is a diet consumed by the human race, and the utmost cleanliness should prevail.

The boiler room is provided with a twelve or fifteen horse power horizontal boiler set in brick. A great many makers may say, "What is the need of such a large boiler?" but experience has taught me that a twelve or fifteen horse power horizontal boiler is the most economical. It requires less fuel and less attention, while you are busy at work in your make room. When once heated up a large boiler will hold the heat far longer in proportion to a smaller one.

The curing room is the most important factor in the manufacture of good cheese. Thousands of pounds of good cheese are ruined annually in ill-constructed and ill-ventilated curing rooms. A well-constructed, above-ground curing room, provided with a sub-earth duct will enable a maker to hold the temperature from 60 to 68 degrees, no matter what the temperature is outside.

The great improvements that have been going on in the construction of better factories, better curing rooms, and the finer quality of Wisconsin cheese, is largely brought about through the good work and superior instruction given by the Wisconsin dairy school at Madison, and by our state cheese instructors, sent out by the Wisconsin Dairymen's Association, and our Wiscon-

sin Cheese Makers' Association; but don't let us rest now and depend on our reputation already gained, like the cheese manufactures of this state did several years ago, but let us keep on with our good work and further perfect our methods, and adopt the latest improved and practical methods for still further improving this product of the state of Wisconsin.

DISCUSSION.

Mr. Mason: I would like to ask Mr. Kasper if he does not think an ideal cheese factory should have sealed walls and sides?

Mr. Kasper: It depends on how it is constructed on the outside. It should be lathed and plastered. We have four thicknesses of paper and four thicknesses of boards on the outside, and the inside is lathed and plastered.

Mr. Baer: Then you can whitewash it?

Mr. Kasper: Yes.

Mr. Mason: In the making room?

Mr. Kasper: Nothing is nicer than a nice lathed and plastered room. You can whitewash it once or twice a year.

Mr. Mason: All the factories I ever saw that were lathed and plastered overhead, the plastering would commence to crack and tumble into the milk vat.

Mr. Kasper: They are poorly constructed when they do that. Mine has been plastered for seven or eight years, and no plaster has broken off.

Mr. Powell: I would like to ask Mr. Baer if it is his idea to whitewash the whole factory?

Mr. Baer: Yes, if the walls and ceiling are lathed and plastered, I would certainly whitewash it. I do not think I would use it in the whey tanks or down on the floors.

Mr. Schoenman: Do you think, Mr. Kasper, if a curing room is whitewashed and plastered, that in getting the cool air in the night, it has a better effect upon the curing room in the day? That the plaster draws more cool air than wood-work? In having a curing room like Prof. King was telling us about, you have to get the cool air of the night.

Mr. Kasper: I know that a lathed and plastered room is cooler. If you want to make it tight, you can seal that lath and plaster and make it all the better.

Mr. Schoenman: I have a sealed room, and I thought I would like to plaster it on that account and keep it clean and cool.

Mr. Kasper: There is one thing about a factory that is lathed and plastered, you can keep it nice and clean, and you cannot purify any better than by whitewashing.

The President: Any more questions? Keep them coming. This is an important matter. Good curing rooms are half the battle.

Mr. Schoenman: How have you got the shelves arranged?

Mr. Kasper: The shelves of my curing room are 2x4. I have it the same as you have on board shelves, but instead of shelves it is 2x4. They lay about 12 inches apart. I use a cover to set the cheese on. I put the cover on the box and so always have clean shelves, and the cheese are not ruined in turning.

Mr. Van Leeuwin: Do you prefer an upper curing room with a sub-earth duct to a cellar curing room?

Mr. Kasper: I never had a basement curing room. My curing room is above ground. I do not know anything about a cellar or basement.

Mr. Schoenman: Have you any trouble with cheese moulding?

Mr. Kasper: Sometimes when I keep it open in the night, because there is nothing to absorb the moisture.

Mr. Schoenman: At what temperature do you keep it in the summer?

Mr. Kasper: Last summer about 68, when we had hot weather.

Mr. Waterstreet: What lumber do you prefer for curing shelves?

Mr. Kasper: 2x4.

Mr. Schoenman: Isn't it very unhandy to turn your cheese?

Mr. Kasper: No, we lay a cover on top and have an extra cover.

Mr. Waterstreet: You have two covers for every cheese?

Mr. Kasper: No.

Mr. Van Leeuwin: You have the smooth side of your cover in, and you lay the cheese on the smooth side of the board?

Mr. Kasper: Inside of the cover.

Mr. Van Leeuwin: Do you keep covers for that use?

Mr. Kasper: No, I use the same cover for the box.

Mr. Van Leeuwin: Then you have a clean cover every time for the cheese without the necesity of cleaning the shelves?

Mr. Kasper: Yes.

Mr. Van Leeuwin: Then you take the new covers and use the covers as fast as you ship the cheese?

Mr. Kasper: Yes.

Mr. Baer: I would like to ask Mr. Kasper where he gets his boxes made?

Mr. Kasper: Down at Black Creek.

Mr. Baer: The boxes that are being made in southwestern Wisconsin would not stand the racket. They hardly stand it long enough to get the goods on the market. One trouble with the cheese that is being put up in the southwestern counties is the poor packages and poor boxes they have to ship the cheese in.

Mr. Kasper: We are getting very good boxes up there. I always order the boxes planed, inside and outside.

Mr. Baer: How much do you pay for your boxes?

Mr. Kasper: Nine cents at the factory.

Mr. Monrad: What size?

Mr. Kasper: 14 1-2x10—12 inches.

Mr. Schoenman: Do you use those for daisies?

Mr. Kasper: No, I use a small daisy box.

Mr. Schoenman: The boxes we have here are not planed on the inside.

Mr. Kasper: They do not plane them unless you give special orders. They do not cost any more. They will do all they can at a good factory for you.

Mr. Baer: Do you have an elevated whey tank?

Mr. Kasper: Not elevated, but it stands above the ground so I can drain the whey off.

Mr. Baer: How often do you clean it?

Mr. Kasper: Every day in the week, unless we do not have the time.

Mr. Baer: That is you scald it with hot water?

Mr. Kasper: We used to. If I had an elevated hot water tank, I should prefer to scald it. The way we have to do now is take water from the pump.

Mr. Decker: He gets it clean though. Every time I have dropped in on him, I found it clean.

Mr. Aderhold: I think there is room for a good deal of improvement in the way that whey tanks are kept. Whey tanks are sometimes in a filthy condition. This can best be illustrated by telling a story of two Jews, who decided to take a bath. I can not state how they came to make this agreement, but they did. They got a room together with separate tubs standing side by side, and bathed themselves. After they got through one of them looked down at the water in the other tub and said, "Jakey, how is it that the water you have bathed in is so much dirtier than mine?" Jakey answered: "I think that is a simple question. Aint I five years older than you are?"

Mr. Van Leeuwin: I would like to know if any one has ever tried scalding the whey for their patrons by heating it to a temp-

erature of 160 or 170 to 200 degrees, and returning it to the patrons sweet?

Mr. Kasper: Four years ago I scalded it in that way at my factory, and told my patrons to bring me a cord of wood each for so doing. They liked it too, but most of them forgot to bring the wood.

Mr. Aderhold: I would like to try to get some expression from the convention here as to the value of clean-scalded whey over the common whey we get. I know that in most of our whey tanks great big starters are left there. The whey comes in warm and fermentation is very rapid. I found a man in Wood county who had a hundred barrel whey-tank that was cleaned every day. He took out every bit of the whey and cooked it, and turned the steam on and heated it to 150 degrees. You cannot go higher or there will be a separation. There was no fat on the whey—just a trace—and it was nice and clean and sweet. I believe that that whey was worth enough more than the ordinary whey to make about three cents for each hundred pounds of milk.

Mr. Van Leeuwin: I would like to ask Mr. Aderhold—do you know whether any patrons used it for feeding cattle?

Mr. Aderhold: Most of them did, and liked it.

Mr. Van Leeuwin: I would like to hear from others about feeding whey to cows.

Mr. Aderhold: Most patrons use it to feed calves with, and they all have good calves, better than the ordinary.

Mr. Kasper: I would like to ask whether we should use live steam or exhaust steam?

Mr. Aderhold: Live steam.

Mr. Kasper: It is a great benefit to the patrons when the cheese makers scald the whey, but he will find it takes more wood to scald the whey than to do all the work of the factory. If the patrons will not furnish the wood, I think it is money out of his pocket to do it.

Mr. Aderhold: I want to make a suggestion. Would it not be a good stroke of business for the patrons to say to the cheese makers, "Here, I will give you one eighth of a cent more for making cheese if you will clean the whey tank every day and scald the whey." Wouldn't he be making money by it?

Mr. Johnson: I think Mr. Aderhold has been in the cheese business long enough to know that such offers are not made. I scalded the whey in my factory, and as Mr. Kasper says, it cost lots of money. I talked to my patrons about it and some thought it the best thing to do, and others thought it was not a bit better than the other.

Mr. Aderhold: You didn't show them how much money they were losing?

Mr. Johnson: No, but I could show them how much I was losing.

Mr. Berg: Prof. Dean of Canada has made some experiments in feeding sweet and sour whey to pigs. Sweet whey was taken and fed to the pigs, and a second lot was fed the next morning, under factory conditions, and he found there was practically no difference in sweet whey and sour whey, and I think Prof. Henry has made experiments along that line lately, and although he has not published it, he thinks, I believe, that there is no difference in feeding sweet and sour whey.

Mr. Aderhold: There is a difference between sour and rotten whey. This whey is taken home in the same cans the milk is hauled in. The farmers do not understand about germs. There is no doubt but that the milk is being injured from that source. I do not think we ought to overlook that thing.

Mr. Van Leeuwin: I think that is true in feeding whey to pigs. You get good results in feeding whey the second day. Some patrons will take enough interest in and care for such things enough to see what results they are getting. My patrons found that they could get good results by feeding clean sour whey the next day. But I think pasteurized whey should be fed to calves. If we could have two separate tanks, we could use one of them for pasteurized whey for those of our patrons who wanted it for calf feeding.

Mr. Berg: I would like to hear from Mr. MacPherson what they do with the whey in Canada.

Mr. MacPherson: I think the whole ground has been gone over. For pigs, sour whey is as good as sweet. Indeed, some experiments have demonstrated that sour whey gives more pork, but it is so small that it is not worth consideration. But for calves sweet whey is far superior. Sour whey is poison to calves, and they are of very little value. In all cases whey should be scalded for calves. In two years I raised over ninety calves on whey, forty odd each year, and I had the most excellent results. Never had better results than by feeding them whey. The way I did it was to mix a little linseed meal with shorts, boiled it and mixed it with the whey, which was fairly sweet and taken from the factory each day, and all of my calves were worth from fifteen to twenty dollars apiece in ten or twelve months. They grew well, and matured and developed in fine shape, and they were tied up the entire time.

Mr. Van Leeuwin: About what weight were they?

Mr. MacPherson: Between 600 and 700 pounds. They were as well attended to in the winter as in the summer. It was

a special test and it turned out first-class. You will have no trouble in raising calves on sweet milk with a little linseed meal and shorts, about half and half, boiled, and then a little green feed or dry hay. Clover hay is far superior when nicely dried. They can be made to grow about a pound and a half a day.

Mr. Williams: Isn't it good to give grass oats?

Mr. MacPherson: Very good; for a change it is excellent, but these are the general principles.

Mr. Bolchen: How much whey do you feed?

Mr. MacPherson: Probably three gallons a day, between two and three.

Mr. Van Leeuwin: Did you start them off on whey at once or gradually?

Mr. MacPherson: Gradually; the change from home milk to whey was gradual. It took from ten days to two weeks. I lost no calves. They did very well. I have some of the cows now, and they are doing excellent work.

Mr. Williams: Have you a clover pasture for the calves to run in?

Mr. MacPherson: No, I had them tied up by the neck the whole twelve months. I believe that with good care and management that a farmer can make from ten to fifteen cents a hundred out of whey, and fifteen to twenty-five cents out of milk by proper handling. You must have it balanced right. Have the proper constituents to promote the greatest growth, and the feeding of whey and milk should be supplemented with a heavy feed to balance the two. Take whey and shorts and you have an excellent balance. Skimmed milk with shorts is very excellent.

REMARKS BY HON. H. C. ADAMS.

Mr. President. When the present oleomargarine law was first presented to congress, it provided for a tax of ten cents, which tax was afterwards reduced to two cents, which is the present law. J. H. Davidson, who is a member of congress, has introduced a bill providing for a ten cent tax on oleomargarine throughout the United States. The law in the state prohibits the sale of oleomargarine when colored in imitation of yellow butter. The purpose of this legislation is to wipe out, if possible, the butterine industry of the state, when that industry is carried on in such a manner as to put upon the market a counterfeit product. The bill may not pass congress at all, but there is no

question but that it is within the power of congress to place a tax upon it and wipe it from the face of the earth. Friends of the oleomargarine industry claim that congress has no such authority, but the opinion of the supreme court is to the effect that it is within the power of congress to tax any industry out of existence.

I wish to say that as great organizations grow stronger, jealousy sometimes exists between them. I hope no jealousy will ever exist between the Wisconsin Cheese Makers' Association and the Dairymen's Association. The Dairy school and the Dairy Association and the Agricultural Society of the different organizations which have been built up, and which have built up a material industry in Wisconsin, have stood together without any personal bitterness, and that is the only reason why Wisconsin has made such splendid advancement. Now, you have been growing the last two years and will grow more. The time will come when you will see in these meetings five or six hundred men all interested in the cheese making business, and when that time comes I want you to have the same kindly feeling as you have had in the past for the Dairymen's Association, and want the dairymen to have the same feeling toward you.

The President: We will now receive the report of our committee on Resolutions.

REPORT OF COMMITTEE ON RESOLUTIONS.

E. L. Aderhold, Chairman.

Resolved, That we hereby tender our thanks to the Mayor and citizens of Madison for their cordial welcome and interest in our deliberations.

Resolved, That we appreciate that the growth of this association and the success of our meetings are largely due to the persistent and tireless efforts of our capable secretary, and we are glad to record this fact and to express to him our sincere thanks for his unselfish work, which has been given without recompense.

Resolved, That we hereby extend to the Wisconsin Dairymen's Association, which holds its annual meeting at Green Bay, February 16th, fraternal greeting. This association is organized as a helper and not as a competitor of that association. The Dairymen's Association has scattered a great wealth of dairy knowledge all over Wisconsin. As a child of that association

we honor our mother and will do the best we can to be an honor to her.

Resolved, That the Davidson bill now pending in congress, which places a government tax of ten cents per pound upon oleomargarine or imitation butter, has the hearty approval of this association. We commend the action of Mr. Davidson in introducing the measure designed for the protection of consumers and producers of dairy products, and promise him our active support in securing the passage.

Resolved, That the thanks of this association is hereby extended to our dairy and food commissioner and his assistants for the prompt and efficient manner in enforcing the laws designed to suppress the sale of imitation dairy products in this state.

Resolved, That this association heartily commends the effort of the Hon. James Wilson, secretary of agriculture, to increase the foreign markets for American dairy products and hopes that Wisconsin cheese will have a place in some of the trial shipments of cheese to England. And that the Department will send an agent to England, who shall see that the retailers and consumers are made aware that the cheese are made in the United States.

Resolved, That this association endorses the recommendation of the secretary of agriculture in his message to the president that steps be taken to protect the honest producers and shippers of dairy products from competition of fraudulent or imitation dairy products.

Resolved, That our thanks are hereby extended to the secretary of agriculture for sending to this meeting representatives of the dairy division, Mr. R. A. Pearson, assistant chief, and Mr. J. H. Monrad, special agent, whose assistance in the meetings is fully appreciated. We believe that a permanent field agent of the dairy division in Wisconsin and neighboring states would be a material assistance to the dairy interests of this section.

Whereas, the Wisconsin Dairy School has never been able to accommodate all who have applied to take the courses offered them, and that this year the school is in a very crowded condition, and when we remember that the Swiss, Brick and Limburger industry needs recognition by proper courses of instruction, and that this instruction is not possible till the facilities for instruction are enlarged, be it,

Resolved, That we petition our legislature to make such appropriation as the regents of the University may deem necessary to procure the needed enlargement to the Dairy School building and provide for the increased expenses of the school under the increased instruction.

Whereas, the Wisconsin Cheese Makers' Association now for six years has shown the value of its work we confidently hope a bill will be passed appropriating at least $600.00 to enable us to secure prominent speakers and to publish a stenographic report of our proceedings, as well as to encourage a large exhibit.

Whereas, we highly appreciate the educational value of the assistance given by Mr. J. H. Monrad at all our meetings during the past six years, we desire to express our appreciation of his aid, and

Whereas, the Hon. D. M. MacPherson of Lancaster, Ontario, has so kindly assisted us in making this the most successful meeting in the history of this association, therefore be it

Resolved, That we extend our most heartfelt thanks to him for the assistance he has so kindly rendered us, and be it further

Resolved, That the thanks of this Association are extended to F. A. Tripp and C. A. White for their valuable and timely financial aid in times of need.

Resolved, That this Association protests against the unjust freight rates on our dairy products made by the railroads, said rates being fully double those charged by railroads in the east.

Be it Resolved, That these resolutions be printed and placed in the hands of every member of the legislature, and other persons herein named.

Resolved, That the thanks of this association are hereby tendered to the members of the legislature for their courtesy in granting us the use of the Assembly Chamber for our sessions.

E. L. Aderhold,
Chairman.
W. C. Dickson,
A. Schoenman.

Motion made by Mr. Decker that a copy of the resolutions be sent to the Department of Agriculture and Secretary of the Dairymen's Association, which motion was amended on motion of Mr. Baer that a copy of the resolutions be sent to every person mentioned in them, which motion was seconded by Mr. Dickson, a vote being taken thereon, and duly adopted.

The President: The next thing in order is to proceed to election of officers. I appoint as tellers Mr. J. K. Powell and Mr. E. L. Aderhold. I will state to you that under the Articles of Incorporation we have just filed, we shall be under the necessity of electing three directors: one for three years, one for two years, and one for one year. Then after this convention we will elect one director each year to replace the outgoing member. You will prepare the ballots for the director for three years.

Thereupon the convention proceeded to the election of officers, with the result that J. K. Powell was elected director for three years; J. W. Decker, director for two years; Thomas Johnson, director for one year; J. A. Carswell, president; E. L. Aderhold, vice president; U. S. Baer, secretary; H. E. Austin, treasurer.

The President: We will now receive the treasurer's report.

TREASURER'S FINANCIAL REPORT.

February 1st, 1898, to February 1st, 1899.

Mr. President and Members of the Association:

The following itemized report is made, showing the source from which all moneys paid into the treasurer's hands were received, and the disbursements paid on orders from the Secretary, which I hold as vouchers:

Receipts.

1898.	
Feb. 3, Membership cards	$81 00
Feb. 3, Collection at Meeting	11 00
Feb. 27, Wisconsin Auxiliary of Nat'l Dairy Union	5 00
March 8, American Cheesemaker	25 00
Oct. 6, Membership cards (June 2 to Oct. 6)	5 00
Nov. 1, Crosby and Meyers	5 00
Nov. 2, John Muir	10 00
Nov. 7, Worcester Salt Co.	10 00
Dec. 4, Star Union Line	10 00
Dec. 5, E. J. Piggott & Co.	5 00
Dec. 5, Wisconsin Dairy Supply Co.	10 00
Dec. 6, Fond du Lac Cheese & Butter Co.	5 00
Dec. 6, Cornish, Curtis & Green	10 00
Dec. 7, A. H. Barber & Co.	10 00
Dec. 8, Amos Keyes & Co.	5 00
Dec. 9, David Muir and White	25 00
Dec. 12, Genesee Salt Co.	20 00
Dec. 16, A. J. Decker & Co.	5 00
Dec. 26, C. E. Udell & Co.	10 00
Dec. 28, Creamery Package Co.	10 00
Total receipts	$277 00

Disbursements.

Feb. 4, Amount of overdrawn order	$7 37
Feb. 4, Expenses of Madison meeting	10 00
Feb. 4, Traveling expenses of Hon. Geo. G. McAdams	52 00
Feb. 4, Larson & Son, engraving	75
Mar. 24, R. Morse, stenographic report	54 00
Apr. 13, C. A. Leicht, printing	1 75
May 1, C. A. Leicht, printing	6 00
Sept. 2, Juergens & Anderson, bronze medals	9 50
Nov. 10, Democrat Printing Co., 1898 Report	66 75
Nov. 13, Postage, mailing 1898 Report	15 30
Dec. 15, Western Passenger Association	6 00
Dec. 26, Temple & Wetherby, printing	3 00
Jan. 3, Walter Mayer, printing	5 50
Jan. 6, Osgood & Co., engravings	2 00
Jan. 14, Walter Mayer, printing programs	20 00
Jan. 20, Postage, mailing programs	5 00
Total disbursements	$264 92
Balance in hands of treasurer	12 08
	$277 00

Respectfully submitted,

H. E. Austin,

Treasurer.

The President: I would just state that the treasurer's report was submitted to the Executive committee and by them approved. This completes the business of this convention so far as the convention is concerned. The meeting of the directors can be held at any time. We will now close this convention until notice from the Board of Directors for our next annual meeting. Consider yourselves dismissed.