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Sixteenth annual meeting. (Held January 25-26-27, 1888.).

Wisconsin Dairymen's Association

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OFFICE OF THE SECRETARY,
Wisconsin Dairymen's Association.

FORT ATKINSON, APRIL 10, 1888.

To His Excellency J. M. RUSK,

Governor of the State of Wisconsin:

I have the honor to submit the Sixteenth Annual Report of the Wisconsin Dairymen's Association, showing the receipts and disbursements the past year, also papers relating to the dairy interest, read at the Annual Convention held at Ripon, Fond du Lac county.

Respectfully submitted,

D. W. CURTIS,

Secretary.

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OFFICERS, 1888.

PRESIDENT.

HON. H. C. ADAMS,
MADISON, DANE COUNTY.

VICE-PRESIDENTS.

- CHESTER HAZEN, LADOGA, FOND DU LAC COUNTY.
President Wisconsin Dairymen's Association from 1872-4.
- HIRAM SMITH, SHEBOYGAN FALLS, SHEBOYGAN COUNTY.
President Wisconsin Dairymen's Association from 1875-6.
- A. D. DELAND, SHEBOYGAN FALLS, SHEBOYGAN COUNTY.
President Wisconsin Dairymen's Association, 1877.
- H. F. DOUSMAN, WATERVILLE, WAUKESHA COUNTY.
President Wisconsin Dairymen's Association, 1878.
- Z. G. SIMMONS, KENOSHA, KENOSHA COUNTY.
President Wisconsin Dairymen's Association, 1879.
- STEPHEN FAVILL, DELAVAN, WALWORTH COUNTY.
President Wisconsin Dairymen's Association, 1880.
- C. R. BEACH, WHITEWATER, WALWORTH COUNTY.
President Wisconsin Dairymen's Association from 1881-2.
- W. H. MORRISON, MADISON, DANE COUNTY.
President Wisconsin Dairymen's Association from 1883-6.

SECRETARY.

D. W. CURTIS,
FORT ATKINSON, JEFFERSON COUNTY.

TREASURER.

H. K. LOOMIS,
SHEBOYGAN FALLS, SHEBOYGAN COUNTY.

ARTICLES OF ASSOCIATION.

[Adopted February 15, 1872.]

ARTICLE I. The name of the organization shall be the Wisconsin Dairy-men's Association.

ARTICLE II. The officers of this association shall consist of a president, secretary and treasurer.

ARTICLE III. The vice-presidents of the association shall consist of all past presidents.

ARTICLE IV. The presidents, vice-presidents, secretary and treasurer shall constitute the executive board of the association.

ARTICLE V. The officers of the association shall be elected at the annual meeting, and shall retain their office until their successors are chosen.

ARTICLE VI. The regular annual meeting of the association shall occur on the second Tuesday of April in each year, at such place as the executive board shall designate.

ARTICLE VII. Any person may become a member of this association and be entitled to all its benefits, by the annual payment of one dollar.

ARTICLE VIII. The executive board shall have power to call special meetings whenever and at such places as in their judgment its interests so demand.]

ARTICLE IX. The officers of the association shall perform such other duties as usually devolve upon the officers of like associations.

ARTICLE X. The treasurer shall have the custody of all moneys belonging to the association, and authority to pay out the same whenever an order is presented, signed by the president and secretary.

NAMES AND POSTOFFICE ADDRESS OF MEMBERS FOR 1888.

- | | |
|---|---|
| <p>Allen, N. E., Beaver Dam, Wis.
 Austin, A., Neillsville, Wis.
 Adams, Hon. H. C., Madison, Wis.</p> <p>Boerner, Ferdinan, Bigfoot Prairie,
 Ill.
 Bragg, Mrs. A. M., Viola, Wis.
 Burch, F. S., Chicago, Ill.
 Bowen, Frank, Richland Center,
 Wis.
 Boyd, John, Elmhurst, Ill.
 Bonnell, J. M., Ripon, Wis.
 Babcock, E., Ripon, Wis.
 Burlingame, H. H., Ripon, Wis.
 Babcock, Dr. S. M., Madison, Wis.
 Beach, C. R., Whitewater, Wis.
 Burnside, E. J., Ripon, Wis.</p> <p>Crosfield, F. O., Fort Atkinson, Wis.
 Clapp, I. J., Kenosha, Wis.
 Church, M. H., Walworth, Wis.
 Clark, Q. P., Ripon, Wis.
 Clark, J. J., Berlin, Wis.
 Crowther, W. S., Ripon, Wis.
 Curtis, D. W., Fort Atkinson, Wis.
 Chittenden, T. S., Ripon, Wis.
 Camp, Roswell, Ripon, Wis.
 Chisholm, A., Ripon, Wis.
 Chuchyard, Miss Mabel, Ripon, Wis.
 Churchyard, Mrs. H., Ripon, Wis.
 Cooley, C. M., Ripon, Wis.
 Crane, B. J., Ripon, Wis.</p> <p>Dedrich, A. D., Bear Valley, Wis.
 Davies, W. B., 200 La Salle St., Chi-
 cago, Ill.
 Daniels, E. W., Auroraville, Ill.
 Darrow, A. H., Brandon, Wis.
 Dawes, H., Ripon, Wis.
 Dusenbery, Wm. A., Rosendale, Wis.
 De Le Barron, Mrs., Ripon, Wis.</p> <p>Everson, Wm., Lake Mills, Wis.
 Eastman, E. L., Saukville, Wis.
 Elsworth, J. M., Elkhorn, Wis.</p> | <p>Fish, H. Z., Richland Center, Wis.
 Fuller, E. G., Brillion, Wis.
 Floyd, C. E., Eureka, Wis.
 Fargo, E. B., Lake Mills, Wis.
 Fargo, F. B., Lake Mills, Wis.
 Fort Atkinson Creamery Co., Fort
 Atkinson, Wis.
 Favill, Stephen, Delavan, Wis.</p> <p>Goodrich, C. P., Fort Atkinson, Wis.
 Gillett, T. K., Rosendale, Wis.
 Grange, Prof. A. W., Lansing, Mich.
 Gould, John, Aurora, Ohio.
 George, F. A., Hale, Wis.</p> <p>Hill, G. C., Rosendale, Wis.
 Hazen, Chester, Brandon, Wis.
 Hamilton, W. I., Fond du Lac, Wis.
 Howard, L. S., Friendship, N. Y.
 Howard, John, Waupun, Wis.
 Haight, Stephen, Rockdale, Wis.
 Hill, Geo., Ripon, Wis.
 Hurwood, A. P., Ripon, Wis.
 Hargrave, W. O., Ripon, Wis.
 Hoard, W. D., Ft. Atkinson, Wis.
 Holtzborn, H. H., Ripon, Wis.</p> <p>Iverson, C. W., Angelica, Wis.</p> <p>Jewell, C. D., Eldorado, Wis.
 Johnson, Lovejoy, Stillman, Valley,
 Ill.
 Jackson, Thos., Ripon, Wis.
 Jelleff, A. C., Ripon, Wis.
 Jelleff, Mrs. Belle, Ripon Wis.</p> <p>Kingsbury, Wm. B., Ripon, Wis.
 Kellogg, Mrs. H. W., Ripon, Wis.</p> <p>Lyman, G. N., Ripon, Wis.
 Loomis, H. K., Sheboygan Falls, Wis.
 Little J. M., Ripon, Wis.</p> |
|---|---|

- Louis, Theodore, Louisville, Wis.
 Luther, F. D., Ripon, Wis.
 Lyle, W. R., Ripon, Wis.
 Lawson, Chas., Ripon, Wis.
- McConnell, Wm., Ripon, Wis.
 Monrad, G. H., 17 Dearborn St., Chicago, Ill.
 Mayhew, G. C., Greenbush, Wis.
 McCanna, C. B., Burlington, Wis.
 Martin, John R., Ripon, Wis.
 Mason, Norman, Ripon, Wis.
 Miller, N. A., Ripon, Wis.
 Merrill, Rev. E. H., Pres. Ripon College, Ripon, Wis.
 Maudlin, A., Ripon, Wis.
 Morey, Abbie, Ripon, Wis.
 Morrow, Prof. G. E., Champaign, Ill.
 Mead, H. H., Ripon, Wis.
 Mason, S. E., Ripon, Wis.
- Osborn, P. M., Ripon, Wis.
- Pallister, A., Ladoga, Wis.
 Pratt, A. B., Ripon, Wis.
 Prichard, J. H., Ripon, Wis.
 Pedrich, Marcellus, Ripon, Wis.
 Poole, Mrs. N. E., Ripon, Wis.
 Pinkerton, Geo. E., Ripon, Wis.
 Pride, P. C., Ripon, Wis.
- Runals, E. L., Ripon, Wis.
 Rider, W. J., Lodi, Wis.
 Rice, Albert, Waterloo, Wis.
 Rawson, G. H., Oak Creek, Wis.
 Roe, D. H., 255 Kinzie St., Chicago, Ill.
 Reed, H. B., Ripon, Wis.
 Robertson, Prof. J. W., Guelph, Canada.
- Swauker, John, Ripon, Wis.
 Smith, J. A., Cedarburg, Wis.
 Soller, J. G., Ripon, Wis.
 Sherwood, S., Ripon, Wis.
 Searls, W., Ripon, Wis.
 Sheldon, R., Ripon, Wis.
 St. John, Phrony, Ironton, Wis.
 Smith, Hiram, Sheboygan Falls, Wis.
 Stockwell, F. S., Belvidere, Ill.
 Scribner, F. H., Rosendale, Wis.
 Sargent, S. W., Brandon, Wis.
 Smith, Allen, Brandon, Wis.
 Shane, Daniels, Burnes, Wis.
 Scribner, Jos., Ripon, Wis.
 Sharp, Chas. S., Ripon, Wis.
 Schaefer, W. E., Ripon, Wis.
 Simmons, C. F., Rosendale, Wis.
- Tinkham, C. W., Fairwater, Wis.
 Tracy, Mrs. C. T., Ripon, Wis.
 Thomas, James H., Mondovi, Wis.
 Tratt, F. W., Whitewater, Wis.
 Tubbs, Peter, Seymour, Wis.
 Tripp, F. A., Produce Exchange, Chicago, Ill.
- VanKirk & Sons, Rush Lake, Wis.
- Werner, Herman, Brillion, Wis.
 Wyman, D. A., Lake Mills, Wis.
 Wilsie, R. M., Brandon, Wis.
 Wicks, P., Ripon, Wis.
 Willard, John, Ripon, Wis.
 Weeks, H. S., Oconomowoc, Wis.
- Yunker, P. L., Hampton, Iowa.

SIXTEENTH ANNUAL MEETING.

(Held January 25-26-27, 1888.)

PROGRAMME.

- 9 A. M. Entry of Butter and Cheese and Articles for Exhibition.
11 A. M. Organization of Convention.
Welcome, by Rev. E. H. Merrill, President Ripon College.
Response, by W. D. Hoard, Fort Atkinson.
President's address.
Appointment of Committees.
Reports of Secretary and Treasurer.
"Modern Facts in Dairying — When Known and Utilized Bring Profit —
When Disregarded, Bring Loss." — Hon. Hiram Smith, Sheboygan Falls.
"Fodder Corn vs. Timothy, for the Dairy Cow." — A Discussion led by
W. D. Hoard, Fort Atkinson, Wis.
"Recent Investigations Concerning Milk." — Dr. S. M. Babcock, Prof.
Agricultural Chemistry, University Wisconsin.
"Farm Life for Children." — Mr. C. T. Tracy, Ripon, Wis.
The Care and Preparation of Milk for Cheese Making." — Prof. J. W.
Robertson, Montreal, Canada.
"The Delivery of Pregnant Animals." — Illustrated by Charts, Prof. A.
W. Grange, State Veterinary of Michigan, Lansing.
"The Kind of Dairying Demanded by the Times." — John Gould, Aurora,
Ohio.
"Co-operative Dairying." — John Boyd, Chicago, Ills.
"How to Get a Practical Result from Dairy Experiments." — G. H. Mon-
rad, Chicago, Ill.
"The Pig as an Adjunct to the Dairy." — Theodore Louis, Louisville, Wis.
The Cow as an Economical Food Consumer." — Chas. R. Beach, White-
water, Wisconsin.
A Search for Pearls. — Mrs. H. W. Kellogg, Ripon, Wis.
"Clover for the Cow and Pig." — Stephen Favill, Delavan, Wis.
Report of J. A. Smith.
Life on the Farm. — Mrs. N. Poole, Ripon, Wis.
"How to Make Creamery Butter on the Farm." — E. G. Fuller, Brillion,
Wis.
"Improved Stock — What It is and How to Get It." — Prof. G. E. Morrow,
of the University of Illinois.
"The Silo, From the Cream Standpoint." — H. S. Weeks, Oconomowoc,
Wis.

"Facts, Not Theories, Concerning the Dairy From a Farm Standpoint."—
 Geo. A. Austin, Neillsville, Wis.; F. A. George, Hale, Wis.; Mrs. Adele M.
 Bragg, Viola, Wis.; C. P. Goodrich, Fort Atkinson, Wis.

Banquet—Thursday evening.

RULES FOR BUTTER AND CHEESE EXHIBIT.

1. Every exhibitor must be a member of the Association. One dollar secures a membership and the annual Report.
2. Butter made at any time and packed in eight pound pails, or twenty pound tubs, except in classes 7 and 10.
3. Scale of points for judging butter. Flavor 45. Grain 30. Color 15. Salting 10. Total 100.
4. Scale of points for judging cheese. Flavor 40. Quality 40. Color 10. Salting 10. Total 100.
5. No package can compete for more than one premium.
6. Score cards will be tacked on every package, that each may see for himself how the record stands.
7. Butter and cheese may be shipped by express, charges must be pre-paid, with name and address on each package, to H. K. Loomis, Ripon, Wis. All entries must be there by Wednesday, Jan. 25th.
8. Manufacturers, Dealers and Inventors of Dairy Goods, are invited to make an exhibit. No reward or premiums will be given.
9. Entries can be mailed to the Secretary any time before January 21st.
10. Cheese and butter makers wanting situations for next season should leave their names with the Secretary.

H. C. ADAMS, President, Madison.

D. W. CURTIS, Secretary Fort Atkinson.

H. K. LOOMIS, Treasurer, Sheboygan Falls.

Class 1—Dairy Butter—Wisconsin.

1st Premium.....	\$7 00
2d Premium.....	5 00
F. S. Burch, Chicago, Editor <i>Dairy World</i> , adds to the above:	
1st Premium, Copy Willard's Practical Dairy Husbandry.....	\$3 00
2d Premium, Copy Arnold's American Dairying	1 50
W. D. Hoard, Fort Atkinson, Wis., adds:	
1st Premium, 3 Copies <i>Hoard's Dairyman</i> , 1 year.....	\$3 00
2d Premium, 2 Copies <i>Hoard's Dairyman</i> , 1 year	2 00

Class 2—Dairy Butter—Other States.

1st premium.....	\$7 00
2d premium.....	5 00
W. D. Hoard adds to the above:	
1st premium, 5 copies <i>Hoard's Dairyman</i> , 1 year.....	\$5 00
F. S. Burch, " <i>Dairy World</i> ," offers:	
2d premium, 1 copy Willard's Practical Butter Book.....	\$1 00

Class 3—Cooley System—Dairy Butter.

John Boyd, 199 Lake St., Chicago, offers the following special premium:

For the best package dairy butter, made by the Cooley system, one
No. 1, Cooley Creamer. Value..... \$30 00

Class 4—Gold Watch Premium.

The Business Men's Association, of Ripon, Wis., offers a gold watch for the best package of dairy butter made and exhibited from Fond du Lac, Green Lake, or Winnebago counties.

Class 5—Lady's Gold Ring.

Special by Chr. Hansen's Laboratory, No. 17 Dearborn St., Chicago, Ill.

For the best package dairy butter, by young lady under 20—solid
gold ring. Value..... \$10 00

Cornish, Curtis & Greene, Fort Atkinson, Wis., offer for 2d premium:

1 No. 2 Rectangular Churn \$7 00
1 No. 0 Lever Butter Worker..... 5 00

W. D. Hoard adds to the above premiums:

1 Copy *Hoard's Dairyman*, 1 year, to each exhibitor in this class.

F. S. Burch, Editor *Dairy World*:

1 Copy *Dairy World*, 1 year to each exhibitor in this class.

Class 6—Moseley's Creamery.

Special, by Moseley & Pritchard M'f'g Co. Manufacturers of Improved
Dairying Apparatus, Clinton, Ia.

For the best package butter, made from cream raised in any style of
Moseley's Creamery. 1 No. 4 Prichard Churn..... \$12 00
Second Best, 1 Hawkeye Butter Worker..... 6 50
Third Best, 1 Monitor Pail..... 1 00

Class 7—Print Butter.

For best specimen or plate of butter made into prints, or fancy de-
signs..... \$5 00

For second best..... 3 00

Class 8—Creamery Butter—Open to All.

1st premium..... \$7 00
2d premium..... 5 00

W. D. Hoard, Fort Atkinson, Wis., adds to the above:

1st premium, 20 copies *Hoard's Dairyman*, 1 year..... \$20 00
2d premium, 15 copies *Hoard's Dairyman*, 1 year..... 15 00

To be distributed among the patrons of the creamery.

F. S. Burch, editor *Dairy World*, adds to the above:

1st premium, 20 copies <i>Dairy World</i> , 1 year.....	\$10 00
2d premium, 15 copies <i>Dairy World</i> , 1 year.....	7 50

Cornish, Curtis & Greene, Fort Atkinson, Wis., adds to the above;

1st premium, No. 1 shipping box for print butter.....	5 50
2d premium, 1 No. 00 shipping box for print butter.....	4 50

Class 9.—Creamery Butter, Gathered Cream—Open to All.

1st premium.....	\$7 00
2d premium.....	5 00

W. D. Hoard adds to the above:

1st premium, 20 copies <i>Hoard's Dairyman</i> , 1 year.....	\$20 00
2d premium, 15 copies <i>Hoard's Dairyman</i> , 1 year.....	15 00

F. S. Burch, editor *Dairy World*, adds to the above:

1st premium, 20 copies <i>Dairy World</i> , 1 year.....	\$10 00
2d premium, 15 copies <i>Dairy World</i> , 1 year.....	7 50

Class 10—Danish-Weston Separator Butter—Open to All.

W. H. Hintz, general western agent for the Danish-Weston Separator, Elgin, Ill., offers the following special cash premiums for the best tub of butter, not less than 60 lbs., made by the Danish-Weston Separator:

1st premium.....	\$25 00
2d premium.....	15 00
3d premium.....	10 00

To this premium W. D. Hoard adds the following special premiums, to be distributed among the patrons of the creamery:

1st premium, 25 copies <i>Hoard's Dairyman</i> , 1 year.....	\$25 00
2d premium, 15 copies <i>Hoard's Dairyman</i> , 1 year.....	15 00
3d premium, 10 copies <i>Hoard's Dairyman</i> , 1 year.....	10 00

Class 11—Cooley System.—Open to All.

Special by John Boyd, 199 Lake St., Chicago, Manufacturer Cooley Creamer and Cans:

For the best package of butter, made from gathered cream operated on the Cooley system—one pure bred registered Jersey bull calf—value..... \$50 00

Class 12—Gathered Cream—Open to All.

Special of Haney & Campbell, Bellevue, Ia:

For best package butter, from gathered cream, made in goods of our own manufacture, the exhibitor can select goods of our make, to the amount of..... \$20 00

Class 13—Perfect Dairy Salt.

Special of the Davies Warehouse Co., 200 La Salle St., Chicago, Ill.:

Best package of butter, salted with Perfect Dairy Salt, 5 sacks, 224 lbs., Perfect Dairy Salt.....	\$11 25
---	---------

Class 14—M. S. A. Salt.

Special class premiums, of Joy, Merton & Co., 13 Lake St., Chicago, Ill.,
Agents Michigan Salt Association:

For best package butter, salted with M. S. A. Salt.....	\$25 00
---	---------

Class 15—High Grade Salt.

Special cash premium, Warsaw Salt Co., Warsaw, N. Y.:

Best package butter salted with their "High Grade Dairy Salt."	\$5 00
--	--------

Genesee Salt Co.'s Sweepstakes—Creamery.

Special of Genesee Salt Co., of Piffard, N. Y., and Chicago; F. A. Tripp,
western manager:

Best package creamery butter, 5 224-lb. sacks Genesee salt.....	\$12 00
Second best, 3 224-lb. sacks Genesee salt.....	7 20

Warsaw Salt Co.'s Sweepstakes—Wisconsin Creamery.

Special, Warsaw Salt Co., Warsaw, N. Y., Cornish, Curtis & Greene, Fort
Atkinson, Wis., agents:

Best package creamery butter, made in Wisconsin, 5 sacks "high grade" dairy salt, 224 lbs., each, \$2 50 per sack.....	\$12 50
---	---------

Warsaw Salt Co.'s Sweepstakes—Dairy.

Special, Warsaw Salt Co., Warsaw, N. Y.:

Best package dairy butter made in Wisconsin, 5 sacks, 56 lbs. each, "High Grade" dairy salt, 65 cents per sack.....	\$3 25
--	--------

Chr. Hansen's Laboratory Sweepstakes—Dairy.

Best package dairy butter, 1 dozen 50-cent bottles Hansen's Butter Color	\$6 00
---	--------

Genesee Salt Co.'s Sweepstakes—Dairy.

Special of Genesee Salt Co., Genesee, N. Y.:

For best package of dairy butter, 10 56-lb. sacks Genesee Dairy Salt	\$6 50
For 2d best, 5 56-lb. sacks Genesee Dairy Salt.....	3 20

Warsaw Salt Co.'s Grand Sweepstakes.

The package of butter scoring the highest number of points, if salted with
"High Grade" dairy salt, will be awarded:

10 sacks, 224 lbs. each, "High Grade" dairy salt.....	\$25 00
---	---------

Haney & Campbell's Sweepstakes—Creamery.

Special by Haney & Campbell, Bellevue, Ia., manufacturers Haney's Patent Milk Can and Jacketed Cream Carrier:

For best package butter from gathered cream, two of Haney's Jacketed Transportation Cans, 20 gallons.....\$17 00

Hansen's Laboratory Sweepstakes—Creamery.

Special by Chr. Hansen's Laboratory, 17 Dearborn St., Chicago, Ill.:

Best package creamery butter, 5 gallons Hansen's Butter Color...\$13 25

Creamery Package Co.'s Grand Sweepstakes.

Special of the Creamery Package Co., 29 and 31 River St., Chicago, Ill., manufacturers of butter tubs:

For the package of butter that scores the highest number of points, 50 60-lb. ash butter tubs.

J. H. Brown & Co.'s Exhibition Sweepstakes.

Special by J. H. Brown & Co., 172 Madison St., Chicago, Ill., for the largest exhibit of butter by one exhibitor:

1st premium, 8 calf feeders, \$4 00, 4 calf weaners, \$2 00.

2d premium, 4 calf feeders, \$2 00, 2 calf weaners, \$1 00.

Class 16—Cheese.—For Best Cheese Cheddar or Flat—Wisconsin.

1st premium..... \$15 00

2d premium..... 10 00

W. D. Hoard adds to the above for distribution among patrons:

1st premium, 15 copies *Hoard's Dairyman*, 1 year..... \$15 00

2d premium, 20 copies *Hoard's Dairyman*, 1 year..... 20 00

F. S. Burch, Chicago, adds to the above, for distribution among patrons:

1st premium, 10 copies *Dairy World*, 1 year..... \$5 00

2d premium, 15 copies *Dairy World*, 1 year..... 7 50

THE WARSAW SALT CO'S SPECIAL PREMIUM.

The Warsaw Salt Co., Warsaw, N. Y. Cornish, Curtis & Greene, Fort Atkinson, agents, offer the following special premiums:

For the cheese scoring the 3rd highest number of points: 3 sacks,

240 lbs. "high grade" cheese salt—\$2 20 each..... \$6 60

For the cheese scoring the 4th highest number of points: 2 sacks,

224 lbs., "high grade" cheese salt—\$2 20 each..... 4 40

CHR. HANSENS LABORATORY—SPECIAL PREMIUM.

Chr. Hansen's Laboratory—17 Dearborn St., Chicago, Ill., offer the following special premiums:

For the cheese scoring the 3rd highest number of points: 4 gallons

Hansen's Rennet extract..... \$6 00

For the cheese scoring the 4th highest number of points: 2 gallons
 Hansen's cheese color..... \$3 80
 The two premiums above, apply only to Class 16.

Class 17.

DAVIES WAREHOUSE CO. SPECIAL.

The Davies Warehouse Co., 200 La Salle St., Chicago, Ill., offer the following special premium:

5 sacks, 224 lbs. Perfect Dairy Salt, for the best cheese, salted
 with Perfect Dairy Salt..... \$11 25

Class 18.

Geo. S. Hart & Co., Produce Commission Merchants, 38 Pearl St., New York, offer a prize silver cup, valued at \$100, to the manufacturer of the finest quality of full cream cheese; prize to be retained by the winner one year, then to be returned to the Association for renewed competition; the maker who is awarded the cup for three successive seasons to retain the same permanently.

The prize cup is of Sterling silver, satin finish, with gold border and lining. Upon one side of it is engraved the figure of a cow, and upon the reverse side an appropriate inscription.

It has been won by A. H. Wheaton, Auroraville, 1878; Olin & Clinton, Waukesha, 1879; W. S. Baker, Cold Spring, 1880; H. A. Congar & Son, Whitewater, 1881; August Klessing, Centreville, 1882; Marr & Dyer, Whitewater, 1883; E. P. Ingalls, Milford, 1884; H. Z. Fish, Richland Center, 1885; T. P. Fish, Richland Center, 1886. Burns Cheese Association, Burns, 1887.

LAWS OF WISCONSIN RELATING TO PROTECTION OF DAIRY INDUSTRIES.

SECTION 4607, REVISED STATUTES, 1878.

Any person who shall knowingly sell, furnish, supply or bring to be manufactured to any butter or cheese factory, or to any person, to be used in the manufacture of butter or cheese, or to be used in any other manner, any milk drawn from a cow, not in a proper condition of health, or too near, either before or after the time of calving, or any milk which is adulterated by any deleterious, or contaminated by any filthy substance, or any milk which has been skimmed, or with the strippings left out of it, or that has been diluted with water, or colored by any substance, or which has become filthy by careless milking or handling, or tainted or partly sour for want of proper care in keeping pails, strainers, or any vessels in which said milk is kept, clean and sweet, after notice of such taint or carelessness or failure to keep vessels, pails and strainers clean, and sweet, shall be punished by imprisonment in the county jail, not more than thirty days, or by a fine not exceeding one hundred dollars.

CHAPTER 361, LAWS OF 1885.

Section 1. Whoever manufactures out of any oleaginous substances, or any compound of the same, other than that produced from unadulterated milk, or cream from the same, any article designed to take the place of butter or cheese, produced from pure, unadulterated milk, or cream of the same; or whoever shall knowingly sell, or offer for sale, the same as an article of food, shall, on conviction thereof, be confined in the county jail not exceeding one year or fined not exceeding one thousand dollars, or both.

Section 2. Sections 1 and 3, of chapter 40, of the laws of 1881, are hereby repealed.

CHAPTER 185, LAWS OF 1887.

Section 1. Any person who shall knowingly make, traffic and sell oleo-butter, butterine or any other imitation of butter or cheese, or who shall knowingly keep upon his table in any hotel, restaurant, or boarding house, any imitation butter, shall make the same fully known to the buyer, by posting up notices of the fact at, and in the place where such articles are for sale or consumption.

Section 2. Any person who shall omit posting up such notice, shall be punished by imprisonment in the county jail not more than thirty days, or by fine not to exceed twenty-five dollars.

Section 3. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

CHAPTER 157, LAWS 1887.

Section 1. Any person who shall, with attempt to defraud, sell, or bring to be manufactured, to any butter or cheese manufactory in this state, or sell for human food, any milk diluted with water or in any way adulterated, uncleanly and impure, or milk from which any cream has been taken, or whoever shall keep back any part of the milk known as strippings, or whoever shall knowingly bring or supply to any butter or cheese factory milk drawn within fifteen days before parturition or within five days after parturition, shall upon conviction forfeit the milk so delivered and pay a sum not less than twenty-five dollars nor more than one hundred dollars for each offense, to be sued for in any court of competent jurisdiction, one-fourth of said forfeitures to be paid into the county treasury of the county as other forfeitures are paid, in which the suit was prosecuted, and the remainder to the person or persons, firm, association or corporation upon whom such fraud or neglect shall have been committed.

Section 2. Proof of adulterations and skimming may be made by a disinterested competent person with such standard tests and lactometers as are used to determine the quality of milk, or by chemical analysis, and a certificate of such tests or analysis sworn to by the tester or analyst shall be admissible in evidence in all prosecutions under this chapter.

CHAPTER 240, LAWS 1887.

Section 1. Every person who shall, at any cheese factory in this state; manufacture any cheese, shall distinctly and durably stamp or mark upon each and every box, case or package of cheese manufactured and sold, the name and location of the cheese factory at which the same was made, together with the grade of the same, as "full cream," "half cream" or "skim milk," or as the case may be. And if any manufacturer of cheese shall sell or dispose of any cheese without such stamp or mark, or shall falsely stamp or mark the same, he shall forfeit and pay to any person who shall prosecute for the same the sum of twenty dollars for every box, case or package of cheese sold or disposed of without being marked as prescribed in this act, or with a false mark thereon, to be recovered in a civil action in any court having jurisdiction of the person and subject matter, one-half of such penalty to be paid into the county treasury of the county in which such action is brought, to be by said treasurer paid to the state treasurer for the benefit of the school fund.

CHAPTER 229, LAWS 1887.

Section 1. Every person who by any false pretence with intent to defraud shall obtain from any club, association, society or company for improving the breed of cattle, horses, sheep, swine, or other domestic animals, a certificate of registration of any animal in the herd register or other register of any such club, association, society or company, or a transfer of any such registration, and every person who shall knowingly with intent to defraud give a false pedigree of any animal, upon conviction thereof, shall be punished by imprisonment in a state prison for a term not exceeding one year, or in a county jail for a term not exceeding six months, or by a fine not exceeding five hundred dollars, or by both such fine and imprisonment.



TRANSACTIONS,
WITH
ACCOMPANYING PAPERS AND DISCUSSIONS,
OF THE
WISCONSIN DAIRYMEN'S ASSOCIATION
AT THEIR
SIXTEENTH ANNUAL CONVENTION,

*Held at Ripon, Wisconsin, January 25th, 26th and 27th, 1888.**

The sixteenth annual convention of the Wisconsin Dairymen's Association, convened at the Opera House, Ripon, Wisconsin, Wednesday, January 25th, 1888, at 11:30 A. M. President Adams in the Chair.

W. D. Hoard moved that the chair appoint a committee on Resolutions, on Dairy Utensils, on Dairy Exhibits and on Nominations.

Carried.

Convention adjourned until 2 P. M.

AFTERNOON SESSION.

The convention met at two o'clock P. M. pursuant to adjournment. Pres. Adams in the chair.

Music—"The River of Years"—Miss Maud Goodfellow

*Stenographic report by Mrs. R. Howard Kelley, Chicago, Ill.

APPOINTMENT OF COMMITTEES.

Prres. Adams announced the following committees.

Resolutions—W. D. Hoard, Ft. Atkinson, Wis.

J. G. Lombard, Chicago, Ill.

Hon. H. D. Hitt, Rosendale, Wis.

Dairy Utensils—Hon. Chester Hazen, Brandon, Wis.

Hon. A. D. De Land, Sheboygan Falls, Wis.

Edward Eastman, Cedarburg, Wis.

Dairy Exhibits—P. Moran, Chicago, Ill.

Nominations—C. R. Beach, Whitewater, Wis.

I. J. Clapp, Kenosha, Wis.

H. S. Weeks, Oconomowoc, Wis.

 ADDRESS OF WELCOME.

[BY PRES. E. H. MERRILL, OF RIPON COLLEGE, RIPON.

Mr. President, Members of the Wisconsin Dairymen's Association:—In performing this pleasant task, which has been assigned to me in behalf of the citizens of Ripon and vicinity, I am reminded of the time of my earlier manhood and gatherings, which this gathering suggests, in the state of Ohio. The object of those gatherings was the discussion of subjects generally of political and governmental consequence, rather than that which brings us here, and yet in very many particulars the outcome of the work done there was like that which we suppose will be accomplished here. We all remember that there were giants in those days. Those gatherings were led intellectually by such men as the Wades, as Salmon P. Chase, Garfield in his early manhood, and the one whom the boys used to call "Old Gid," and we always used to go when we knew he was to speak. Many of those gatherings used to continue during long hours. I remember certain ones of them at which I was present until late hours of the night, when enthusiasm ran high, when purposes were fixed, when we were so exhausted by the insistent effort to follow the great movements of the time that our physical energies were used up for days.

Now, those great conventions accomplished much, they threw into the midst of the people great quantities of knowledge by which their intellects were informed, they created enthusiasms in the line of moral conduct and in the line of political and wise conduct, that were of existing value for future days. They also set up before us ideals of importance to which we should aspire. I am of the opinion that no man could pass through one of those great discussions and not come out greatly superior to what he was before; his heart would beat more strongly and quickly in the line of every good thing, his thought would run into clearer lines of the best wisdom of the time, and his conduct would have something that belongs to the best citizenship. So the people are conducted by these great movements. They are of value vastly in this particular.

Now, the best type of intellectual achievement that the world has known, has not come universally from schools; we do not under-rate them. In Athens there were very few schools, and they were for the education of the children of the wealthy; but the whole body of the Athenian citizens constituted a school, and in conversations by the wayside, at the gymnasium, in their walks, and particularly in the great public assemblies where matters of consequence were discussed by the leading intellect of the people, the whole free Athenian people were a mass of educated men and women, and a power for that time and for all time from that day until this.

These conventions do this thing for the people, and while we are to make much of particular educational institutions, we are not to make little of these assemblies of the people when questions of importance are before us for consideration; nor are we to think little, Mr. President, of an assembly like this, because we have not some great political question before us, because the clouds in the horizon are not rising portentous of great civil strife as they were in the discussions that I refer to in Ohio.

My friends, it is greatly for our encouragement that matters of practical import like these before us, can be considered profitably in assemblies of the people. Power is not

always where great show and noise are, the power in the locomotive is not the rattle of its wheels and the shriek of its whistle, it is in the tuck and push of every little particle of steam that is still and out of sight in the boiler, there is the power that moves the train.

Up on Horeb our God was pleased to teach his prophet a remarkable object lesson. He caused that there should pass before him a mighty wind, which rent the mountains and broke the rocks in pieces, but the Lord was not in the wind; and after the wind an earthquake, but the Lord was not in the earthquake; after the earthquake, a fire; but the Lord was not in the fire; after the fire a sound of exceeding stillness, called the "still small voice," and in awe before the manifestation of omnipotence, the prophet wrapped his mantle about his face and bowed at the entering in of the cave.

We are here to consider questions not of warfare and strife, nevertheless, such as reach to the sources of power. This that we shall in these days, give our attention to, has reference to the bonds of power in all the households of this state where the homes are, where are the accumulated virtues, the intelligence and the thrift, which together constitute us a great republic, a great commonwealth and which together in accumulated forces, coming from these bonds, make us great if we shall be great at all.

Therefore, Mr. President, we welcome you, you are of our sort, we feel kindred when we look in your faces; you are pursuing the ends which we seek. These things which you do are for the making of men and women in the homes of Wisconsin better and happier, it increases their resources, their virtue and in every way their merit.

We welcome you, we welcome you to this city in which we think we feel a proper pride, this assemblage of beautiful and contented homes, to these fields, unsurpassed in beauty and fertility, to our intellectual institutions, and we proffer to you, sir, and this association, the freedom of them all.

But more than this, we want to treat you well. We would be glad if we should be able to treat you as well as you

deserve, and if our hospitality shall be made to match your merit, after you shall have gone, we shall take no inconsiderable satisfaction in what we have done.

But not to these outward things alone, or chiefly do we welcome you. We welcome you to that state of mind and heart which will give you intellectual response to those grand and noble ideas that we expect shall come from you. In these outward things indeed, we take pride, but we also take a greater satisfaction in that we can open our hearts and open our minds also to receive the best that you shall bring.

Accept, therefore, our congratulations for all that this association has accomplished, and accept our welcome in the midst of us, and our Godspeed in all the noble things which you attempt.

RESPONSE TO ADDRESS OF WELCOME.

BY W. D. HOARD, FORT ATKINSON, WIS.

Mr. President, President Merrill:—I certainly, sir, would be lacking in those common qualities of human nature that best befit us all, if I did not on this occasion feel proud of belonging to an institution, and of having belonged to it from its earliest inception, which could meet at the hands of so worthy a people, so eloquent and worthy a welcome. During the delivery of this most eloquent speech of welcome, I sat thinking of the dignity to which this occasion aspires; and I bethought me that this gentle animal which we so universally worship, the cow, she has not alone been worshipped by the modern intellect, but way back in the days of the Hindoo, amid the distinguishing thought of the broadest Orient, we hear expressions like this: "O, mother of the race," "O, beneficent giver of life," "O, thou grand thought, thou noble expression of Vishnu."

Now, we have gathered together here as men who must clearly appreciate the many virtues and the many benefits this gentle creature has conferred upon us. We do not belong to those people who cannot see the spirit beyond the

letter, who would worship the cow as so much bone and body. By no means, we do not worship in that way, but believing that the expression, "the purpose of being is greater than the being itself," is true, we come together to-day as the Wisconsin Dairymen's Association to confer upon questions that deeply interest us all, and I wish, President Merrill, that every farmer in Wisconsin, could have heard this address of welcome that you have given us.

If there is anything to-day that does stand most in the way of agricultural advancement in Wisconsin, it is the fact that the farmer himself has a cheap idea of his own business. We have here to-day this beautiful city, we have the gifted head of a noted institution of learning. We have scholarship, we have hospitality, we have wealth, culture and refinement, all laying at the feet of agriculture an oblation that it might be proud of, and sir, I wish that the farmer himself could see and realize the intellectual dignity to which he should aspire, that he could feel towards his avocation in life in such a way that he could express himself as did the Persian Courtier to his king, "Honor be to me, as I honor thee." In that case, we should see agriculture in Wisconsin advancing with tremendous strides, and I have a pride and hope for it in the future. And, sir, I feel no greater pride in my life than that I have, maybe in an humble way, done something to contribute to its advancement, and I hope when I am laid away at the last, that the final verdict will be of me "That he hath not lived in vain." And I hope, my friends, that in all that we do on this occasion, we shall have the dignity and the strength and the breadth of judgment to put our purposes high above ourselves, that though we may discuss questions of dollars and cents, that we shall consider that they shall reach farther than the Goddess of Liberty stamped in silver, that our discussions shall reach into the encouragement of children, that they reach into the hope of womanhood, that they reach deeply down into the prosperity of communities, and if we will but discuss these questions in that light, we will have given to ourselves a broader foundation for our purpose.

I thank you heartily, President Merrill, for this noble welcome, and through you I thank the people of Ripon for the occasion that surrounds us.

Hon. Hiram Smith was called to the chair.

ANNUAL ADDRESS.

PRES. H. C. ADAMS, MADISON, WIS.

Ladies and Gentlemen of the Wisconsin Dairymen's Association:— At the last annual meeting of this association I was elected its president. This action was taken without my knowledge. This is my first opportunity of saying to you that I am actively conscious of the fact that it is a privilege and a distinguished honor to serve you in any position, and especially so as your presiding officer. The compliment paid me has been accepted with an acute consciousness that it is no easy thing to follow fittingly in the footsteps of the talented, wise and experienced men who have in turn occupied this office.

We have assembled in this annual meeting to take an inventory of our dairy knowledge, to read and study the record of the past year, to plan our work as an association for the coming year, to compare the products of the dairy and the factory, to subject our methods and our ideas to the white light of discussion, to get that splendid inspiration in our business which comes in large bodies of men moved by one ambition and thinking to one point.

The Wisconsin dairymen have had a balanced ration of success and failure during the year 1887. The misfortune of unparalleled drouth in two-thirds of the state was mitigated largely by the better blood rapidly coming into our dairies, by the increased area of fodder crops, by the closer saving of all available products of the farm, by the introduction of the silo, by the marked extension of knowledge about handling, feeding, watering and housing dairy stock,

by the more extended use of good dairy implements, by the more general adoption of the best method of handling milk, and selling its products, and by the higher range of prices for the year.

This increase in prices has amounted to 2 cents per pound upon butter and has made the 40,000,000 pounds produced in Wisconsin worth \$800,000 more than the preceding year. The price of cheese has been higher than in 1886. The difference has raised the average price $1\frac{1}{2}$ cents per pound making a total gain in our receipts for cheese of about \$560,000. As a rule the losses caused by drouth have fallen most heavily upon that class of men known as mixed farmers, not being wholly dependent upon their cows they were not prepared to supplement their shriveled pasturage with grain or corn fodder and very generally permitted their cows to shrink in their yield, go dry or go to the butcher. The mixed farmer is always a dead weight on a dairy average. He has a superstitious terror of carrying all of his eggs in one basket. He is always long on baskets and short on eggs. He does not believe in specialities. His reasoning is as mixed as his farming. He generally claims that he is not smart enough to get a living out of one line of farming but is amply qualified to carry on all lines. His logic is — a fool may know everything — a wise man one thing. He is the man who is mainly responsible for the fact that Wisconsin cows average less than 125 pounds of butter per head each year.

In round numbers we have 600,000 cows in the state. If all of their milk was made into butter it would make less than 76,000,000 pounds. Under the average treatment of soils and animals it takes 4 acres to carry each cow a year, or 2,400,000 acres to carry all of our cows.

This is a yield of 31 pounds of butter per acre, conceding that the value of the skim milk and the calf and the manure produced by each cow is equal in value to her butter product, we would have a yield per acre equal to 62 pounds of butter. At 16 cents per pound, the average price for 1885, this would give an annual gross revenue per acre each year of \$9.92. And this upon an estimate more liberal than

the facts will warrant. When we recollect that the average man who makes a business of dairying gets from 175 to 200 pounds of butter per cow, and keeps her on three acres, and the good dairyman gets 250 pounds of butter per cow and keeps his on two acres, we can see that the mixed farmer will never break any eggs in his dairy basket for he never has any.

If our averages are discreditable and exasperating, the sum total which we would get, by adding to our cows, our land, our markets, our dairymen and dairywomen, the dairy sense and knowledge of to-day, would be bewildering. The silo and ensilage corn make it certain that two acres can carry a cow a year with average soils and average seasons. This would double our cows without increasing our acreage, and give 1,200,000 cows. Careful selection and breeding toward that type of the dairy cow made distinctive by the judgment and genius of W. D. Hoard, will give us an average butter yield of 250 pounds per cow. Our 1,200,000 cows will then give us 300,000,000 pounds, and estimating the by-products to have one-third the value of the butter in this case we have a total product equal to 400,000,000 pounds of butter. When we are smart enough to do this our butter will be good enough to bring the highest price in the market. With the sagging in prices certain to come with cheap production it will be worth eighteen cents per pound and have a total annual value of \$72,000,000, or three-fourths as much as all our dairy stock, implements and dairy farms are worth in Wisconsin to-day. These figures may be considered chimerical but they represent averages in food production and butter production less than those obtained this season upon scores of Wisconsin dairy farms. We sometimes become tired in these dairy meetings of reiterating the old truths that are fundamental and vital in our business. But as long as more than half the cows in the state are kept at a loss, and 30,000,000 pounds of our butter are sold for nine cents per pound less than it would be if properly made, there is plenty of primary work to do.

ADULTERATED BUTTER.

Efforts will be made in congress, at this session, to either repeal or amend the present oleomargarine law. The effect of the law has been to limit consumption and consequently production. The bogus butter men have been vigorously claiming that the law has helped this business. At the same time they are working shrewdly to destroy it. They have been making cat's paws of several live stock associations, notably the one which met at Kansas City.

Some of the live stock men have been fooled with the idea that a successful swindle in butter will help the price of steers. The men whose lard is being driven out of the market by cotton seed oil adulterations are turning grindstones for their natural enemies.

Of one thing we may be sure — dairy butter cannot compete with miscellaneous, nondescript fats masquerading under the name of butter and without governmental restriction.

The cattle and hog men who are trying to bolster up a fraud, will find if they are successful, that the enormous investment in the dairy interest in the United States amounting to over \$1,000,000,000 will be whirled into direct competition with them in meat production. Butterine can be made for nine or ten cents per pound. Butter cannot. The dairymen are not fools. If lard should be sold under the name of butter and without tax they would simply let their cows go dry and take up some other line of business. To keep up the farms they must raise stock. With the profit all out of dairy cattle, they would in a short time put enough pork and beef into the market to smash it. This would be pleasant for the butterine men, but would lack some attractions to the live stock associations which are trying so vigorously to bring down their temple upon their own heads.

In a contest over this question the dairymen are at a certain disadvantage. The metropolitan papers throughout the country are very generally under the influence of the fraud butter interest. They miss no opportunity of making the present law an object of ridicule.

Their spasms of sympathy for the poor people who cannot buy cheap lard under the name of butter are as effective as they are hypocritical. The surplus in the treasury gives no excuse for the oleomargarine tax. Legislation designed to reduce the surplus is certain to come. The friends of the great dairy interest of the nation must occupy tenable ground. Oleomargarine and similar adulterants must be taxed — first — that they may be sold for what they are, and second, because under its constitutional right to legislate for the general welfare congress should sustain an industry which has done more than any other to make fertile millions of impoverished acres, and has made it possible for poor men upon small farms to support well their families and so help the state. It is a broad question of public policy. The issue is — shall a few wealthy capitalists with unlimited capacity for working up cheap vegetable and animal fats of questionable healthfulness into imitations of pure butter be permitted to bring absolute ruin upon an industry which is more or less vital on each one of the 5,000,000 farms of the United States. Congress is very susceptible to an expressed public opinion. This association should see to it that the popular sentiment existing in this state in favor of the present law has a definite and adequate statement.

A COMMISSIONER OF FOOD AND DAIRY PRODUCTS.

There are upon the statute books of this state stringent laws relating to the sale and use of imitation butter, of adulterated cheese, of impure milk, of milk from cows improperly fed and housed, and the management of factories and creameries. These laws in the main are a dead letter. It is the special business of no particular officer of the state to enforce them, and there are no appropriations to carry them into effect. The laws relating to those matters should be amended and made more comprehensive. The extent to which various articles of food are adulterated is alarming and must soon demand the active interference of state governments. Flour, sugar, syrup, tea, coffee, lard, and almost every article used upon our tables are adulterated. The

people are cheated by wholesale and the public health affected. The time has come when this association will receive active help from all classes in urging the passage of a law establishing the office of Commissioner of Food and Dairy Products. An active and capable man in that position backed by the authority of well defined law and sustained by a reasonable appropriation, would soon clean out the swill milk establishments in the towns and cities, raise the standard of our dairy products and make it more unprofitable to make and sell adulterated foods than to buy.

EXPERIMENTAL WORK.

At the meeting of our executive board in May at Fort Atkinson \$1,500 was appropriated for the purpose of establishing by experiment, if possible a standard or process by which to measure the value of milk when used in the production of cheese. The fact that milk varies in its total solids from eleven and one-half per cent. to twenty-three per cent. made the inference strong that its total weight did not indicate its real value. The resolution adopted by the board at that time covered more ground than this, but the central purpose was to find out the cheese making value of different samples of milk. Under direction of the board J. A. Smith, of Cedarburg, took charge of this line of work.

His report, which is a record of conscientious and thoughtful labor, will be presented in the full at this meeting. It should receive careful consideration and be thoroughly discussed. If through the agency of this association an absolute measure shall be found of the value of milk in the manufacture of its various products a stimulus will be given to the development of good stock which will be worth a thousand times what we have received in appropriations.

Mr. W. D. Hoard moved that the chair appoint a committee to take into consideration the President's address.

Pres. Adams — Before that committee is appointed I would like to put in another suggestion with reference to the exhibit, which this association ought to make at the next

State Fair. As many of you know the exhibit at Milwaukee was not creditable to the dairymen of this state, and there was a sufficient reason for it. The dairyman who makes good butter and cheese is not obliged to show it in order to sell it. Now, the State Board of Agriculture desire to have an exhibit next fall which shall be a fair exhibit for this state, and it seems to me as long as those gentlemen are willing to give liberal premiums for butter and cheese, and are willing to spend money to put up the proper refrigerating machinery and other arrangements, it seems to me that this association ought to help them. We are aided in our work by the liberal appropriations of the state and we owe this to the state, and it is not a pleasant thing to have the newspapers spread the news that the dairy exhibit of Wisconsin at the State Fair was discreditable. The dairymen ought not to allow such a thing to happen. Secretary Newton tells me he is willing to do anything reasonable in this direction and we ought to do whatever we can.

The Chairman — The remarks of Mr. Adams will be considered a part of his address.

President Adams resumed the chair and called upon the Hon. Hiram Smith.

MODERN FACTS IN DAIRYING — WHEN KNOWN AND UTILIZED BRING PROFIT, WHEN DISRE- GARDED, BRING LOSS.

BY HON. HIRAM SMITH, SHEBOYGAN FALLS, WIS.

The proper consideration of this topic leads us entirely out of the realm of theory and sentiment, and brings us face to face with the essential elements of all investigations — facts.

Facts exist entirely independent of preconceived notions, belief or knowledge. The earth revolved as majestically on its axis when all the people believed it to be flat

and stood on a foundation, as it does to-day. In short, the belief of a thing does not constitute the fact of a thing. The human voice could have sent a message over a telephone wire, had there been one, a thousand years ago, as well as it can to-day. It was simply want of knowledge how best to send a message, that the people had to employ mail coaches or horseback couriers, a slow, laborious and expensive method of doing business, often taking days, weeks and months to do what can now be done with the telephone and telegraph in a few hours. Modern improvements in sending messages ought to lead to the inquiry, if there are not modern discoveries and improvements in the great dairy industry in which we are engaged? If we carefully examine the old laborious and expensive methods of conducting a dairy farm, with its small returns and no profit, with the present modern improved methods, with its lessened labor and largely increased products and profits, which repeated experiments have demonstrated to be actual facts, we shall be better prepared to reap the benefit of recent discoveries, if we contrast the old uncertain results with the facts of to-day.

The first fact I will call your attention to is so widespread and common that you will not demand an affidavit of its truth. I was in a country store a few days ago, in one of the best dairy counties of the state, and my attention was called to a quantity of farm butter, some in rolls, some packed in one and two gallon jars; it was without color, aroma or solidity; the best of it was "neutral," and graded down to odoriferous. There had been no color put into the cream before churning, and what is a thousand times worse there had been no color put into the cows' feed before milking. It was all freshly made, and as a recommendation the dealer mentioned the names of several large dairy farmers with whom I am acquainted, as being among the makers of the butter. The butter had been bought at the nominal price of sixteen cents per pound, payable in store goods, and if sent to any of the large markets and sold for cash, it would have brought from twelve to seven cents per pound. This class of butter makers constitute a very

large proportion of the dairy farmers of Wisconsin. But fortunately there is a growing class of dairymen that achieve better results, and I cannot describe them in fewer words than to read a postal card:

NEW YORK CITY, January 12, 1888.

DEAR SIR—Received and sold your eight tubs of butter to-day at thirty-three cents per pound.

Yours truly,

The existence of these two facts, the fact of sixteen cent butter, and of thirty-three cent butter, led sixteen years ago to the organization of the Wisconsin State Dairymen's Association, and it is to the continued existence of these two classes of dairymen that furnish one of the reasons why we are here to-day. I think every observing dairyman will endorse the statement that there is not a single cow in Wisconsin that can make enough twelve or fourteen cent butter in a year to pay for the feed she eats, and they will also endorse another statement, that a cow and her products so treated as to make butter that sells for thirty-three cents per pound, will produce more pounds of butter than a cow and her product so treated that her butter can only sell for twelve cents per pound.

We need not go far back in the history of the dairy industry of this state, before we learn that dairy farming was conducted, and is still conducted to a large extent in the same laborious and expensive methods, as in the case of transmitting messages by mail, coach and couriers instead of by the modern method of telegraph and telephone. Dairymen a few years ago, and many do so still, kept any kind of cows, whether for beef or for milk, fed any kind of feed they happened to have. The idea of a properly mixed ration of nitrogenous, with the carbonaceous feed was a "dude" expression that they had no business with, and belonged exclusively to the agricultural colleges, but it is just as necessary that a good dairyman should know the nature and difference between nitrogenous and carbonaceous food, as it is for a mason to know the nature and difference between sand and cement. The meaning of all words have to be learned be

fore they can be properly used or understood, and one kind of words are as easily learned as another. The meaning and significance of the words, protein, nitrogenous and carbonaceous, are as simple to learn as the words I pass, I order it up, I'll play it alone. Among the most important of modern dairy facts, is the discovery of how to raise and feed large crops of southern fodder corn, whether dried and put into shocks, or stacks, or what is still better, put into silos. Dairy-men that practice this method of raising cheap feed together with a knowledge of how to properly mix a ration of feed with partial soiling in summer and know the value of and practice having warm stables, and warm drink for milch cows, can make more money and keep more cows on one hundred and twenty acres of land, than another can with two hundred acres without the corn and other modern improvements.

Without wearying your patience with details, the modern improvements mentioned, and others known and easily accessible, the dairy farmer can add thirty-three per cent. to his income and profits over the old methods.

Now, this is a statement which I wish you to take home with you and think over. Every farmer knows the necessity of having sufficient funds to properly clothe and school his children, he needs to make all the money that the land will produce, and preserve its fertility, and it is only a question of intelligent labor that you may largely increase the production of your dairy farms. I do not speak as a preacher to others, I speak simply the experience I have gone through myself, that you may expend a great deal of labor unnecessarily for want of a little knowledge which you can easily obtain. The country is full of valuable papers stored with rich knowledge, reports are plenty, institutes are being held, and Wisconsin stands to-day in the very front rank of educators of the agricultural class, and it will be to our interest as well as our profit that we join the majority in these experiments.

Now the time has gone by when it is at all practicable or even sensible to call in question the great benefit derived from raising fodder corn which has been so strongly recommended in the institutes throughout the state.

I will admit, if you please, that a few professors of agriculture have shown as good results from well dried fodder corn, dried as a gentleman stated on the cars yesterday, like tobacco hung up in a shed, if you take the corn and dry it that way you can get very near as good results as in the silo, but it is impracticable. Fodder corn must be dried outside in the fields, and to my certain knowledge, not less than twenty-five per cent. of it is lost by the storms or by the heat or molding when too much is put together, but put it into a silo and you will avoid all waste, and it is in the best possible condition to suit the appetite of the cow and to produce the proper products which we are all after.

If the institutes that have been running through the state for two years, and the Wisconsin Dairymen's Association during the sixteen years of its existence, had never done anything else than to introduce to the farmers of Wisconsin the advantage of raising fodder corn, their names will be blessed by those who come after us.

DISCUSSION.

The Chairman — I would like to have Mr. Smith give us in detail his exact method of setting milk, raising cream, ripening it, making the butter, packing it, selling it and collecting the money?

Mr. Smith — It is as simple a process as any work can be. A lady who washes dishes for a large dinner party has a great deal more complicated and difficult a task than to make butter. Any bright boy that has never seen a pound of butter made, can be taught in one week to make as good butter as milk will make, and I would rather teach a carload of boys that have never seen any butter made, than one old Yankee that had been in the dairy business for twenty five or thirty years.

The process is about this: the milk comes from the barn, and it is immediately strained into the Cooley cans. I use the submerged system because the results are always cer-

tain, no matter what the weather is, you can make just as good, solid butter in dog days as you can this time of the year. You strain the milk into these cans and set them into a tank of ice water, the ice water is brought to forty-five degrees. If it is a little lower than that it does no harm. The milk is taken from the cow and got into these cans as soon as possible; if you let it stand around the barn half or three quarters of an hour, there is danger, not only of the milk taking on odors, but there is an actual change takes place in the milk so that you cannot get all the cream. It is the rapid cooling from blood heat, ninety-eight to forty-five degrees, that causes the cream to rise, and the quicker this is done the quicker the separation will be made. The cream will rise in six or eight or ten hours, but you leave it in the can about eleven hours because you just want to draw it off in time to use the same cans again to put in the night's milk. If you commenced this morning, about four o'clock by turning a faucet, you draw off off the skim milk. A gauge is set so you cannot draw any cream off nor leave any milk in. You can just set all your cans running and it will run off into the trough while you go on with your milking. Then, you take this cream and mix it with the previous cream and put it all into a room at about fifty-two degrees in cold weather, and if you commenced this morning, it is better to warm the whole mass to morrow morning up to about seventy degrees. It will then ripen the cream and there will be a little acidity on, the next morning. Twenty-four hours after you put the two creamings together, it should be in proper condition to churn, and if you fail to get a proper acidity, you can let it go on a little while longer, and you will soon get into the habit of having it about right to churn about eight or nine o'clock the next morning after mixing. It begins to thicken a very little, not much, there is a little acid taste, then we call it in just the right condition to churn.

We then temper to about sixty-four degrees in winter, and in summer about fifty eight; you see that after it has been in ice water it is precisely the same in summer as it is at the present time. This cream is put in the churn and it is care-

fully moved in the revolving churn without any paddles inside, it needs no inside fixtures to wash and bother with. After it has been churned, it should come in about thirty, forty or fifty minutes, if the motion is uniform and steady, it will come, the cream breaking, and the glass in the cover will be clear. It is then time to stop churning, the butter has all been separated from the buttermilk in little small pellets of butter about as big as pigeon shot. This is just in the right condition to wash. If the churning should go on until the whole mass should come together it is utterly useless to attempt to wash out the buttermilk, but if stopped while in the granular form the buttermilk is easily washed out with weak brine at a temperature of fifty degrees. The buttermilk in the churn at the close of the churning is usually about sixty to sixty-two degrees. Then is the time to put in the brine for the purpose of hardening the butter and washing out the buttermilk. If it is at a temperature of about fifty degrees, it makes those little pellets hard, and you can pack them with your paddle and they won't mar or become mashed, the perfect grain will be preserved and you can wash out all the buttermilk there is in it, it will run perfectly clear with the second washing, usually, if it is in the right condition. At that time it is in the very best possible condition to salt and then we sprinkle on salt. I don't weigh the salt, I used to weigh it and say I put in an ounce to the pound, but it is immaterial whether you put in an ounce or an ounce and a half or two ounces, there is sufficient dampness to absorb the salt and the excess not wanted runs off with the buttermilk and goes to the hogs where it is needed just about as much as in the butter.

After it has been in this condition ten or fifteen minutes, the churn is then revolved a few times, and the butter comes partially in a mass. It is then lifted out upon the butter worker, spread out and a little more salt sifted on it, you need not be afraid of over salting, the excess will run off, and the only salt you get in the butter at last is surrounding each little globule of butter, that is sufficient to give the taste that we desire when we eat butter, and the best butter has often been analyzed and less than half an

ounce of salt found remaining in it; the rest works off in the brine as it should. After it has been churned and this salt put upon it on the worker, it is gently worked together so the salt will go through the mass, it is doubled over and mixed up a little. Then it is set away to cool in a cool room in summer and a room not too cool, about like a living room, in winter. It is left that way until about two or three o'clock; after dinner usually, the man that makes the butter, works it slightly, because there being an additional amount of salt after it was taken from the churn, some portions will have a little larger amount of salt than others, therefore, it should be worked gently back and forth a few times with the lever, and that takes out any streaks which the salt may make if left undisturbed. Some recommend packing right from the churn, I never got any that I thought was in quite the right condition to pack until it had had a second working after standing two or three hours. It is then packed in sixty pound tubs and sent to market every week. If the price is low you may say it don't bring enough, you will lose money on it, but you will lose money on it if you hold it. Those that are willing to pay the highest price for butter must have butter not much over a week or ten days' old. I have heard people say that they had butter which was just as good six months after as when it was made, but I am sure they had not acquired that nice taste and perception of what good butter is.

It is all very simple, as I said, the rules are easily learned and there is no sort of excuse why farmers should not make good butter, except that they are not business men. They are not posted about the markets, they don't know the best place to send it, and the creamery man makes it his special business to find the best place to sell and thus succeeds in getting the trade.

The Chairman — Can an ordinary private dairyman make first class butter and send it to the Chicago market and get first class prices?

Mr. Smith — I have got as good prices in Chicago as I have had any where. I had an offer from St. Louis a few years ago for all the butter I made in the year, ship it every

week and draw for the pay at the highest price of the Elgin market. I always felt under some obligations to the Elgin market; it helped me to good customers and the price was as good as my family trade has been since. I sent it to a commission man that I did not see for over a year but he was an honest man and understood his business, the returns came promptly and I was entirely satisfied. I am happy to say that I have never been cheated by commission men.

Mr. Hoard— You spoke in your address about the average sixteen cent butter of the farmers of Wisconsin. Now, I want to bring out your judgment of whether in the nature of things, the butter made as the average farmer makes it in Fond du Lac county, we will say, does not cost absolutely more to make per pound, than your thirty cent butter?

Mr. Smith— I think it does, quite a good deal more work, and more actual expense.

Mr. Hoard— I think that almost universally among the farmers there is that idea that if they don't get much for their butter, it don't cost much, and I think it is a very great error.

Mr. Smith— I have gone through both processes, the old fashioned way of making butter, setting it in a six or ten quart pan on a rack in a room where it was impossible to keep the temperature right, and the consequence was some of it was too cold, and the cream never raised, some was too hot, and it soured too early, and we only got a small portion of the cream, and sometimes my wife and I went into the butter room and skimmed two hundred pans of milk in a day, and they had to be washed up and got ready for the next milking, and some had been standing twenty-four, some thirty-six and some forty-eight hours. Why, there was a big hard day's work that nobody paid for, and it is being done all over this state. There are hard working women getting along with no proper facilities for making butter, no proper room in which to keep their milk, and selling butter for a mere song. It is entirely useless and in almost any neighborhood there are plenty of enterprising creamery men ready to establish a creamery and take all the work away from the house in making butter. It is not the proper

business of a woman who has the care of the children and the family. I would just as soon ask my wife to go out and help me draw in hay or unload lumber, as to go into the dairy and make the butter. It needs a strong, healthy young man to handle the cans, to handle the milk and do the work, and no woman ought to be required to do it, there is no profit in it, she has cares enough and there's enough for her attention without being worried about the temperature of the room and the temperature of the milk, and whether the cream is ready to churn.

Mr. Monrad — How long a time do you leave your butter between the first and second working?

Mr. Smith — From about nine o'clock, sometimes ten o'clock, until after dinner, usually about three hours, that is about long enough; all the salt becomes dissolved and easily escapes with a little working that is done.

Mr. Monrad — There is one little criticism that I will mention on Mr. Smith's remarks about butter making not being a woman's work. I quite agree that it is not a woman's work when there is a lot of children in the house or there is no help; but I think there is no doubt that many of your women of Wisconsin and Illinois might do better in stopping at home and making butter with the modern appliances, than to go in town and become clerks in stores, type-writers, and so on.

Question — Mr. Smith recommends the cream gathering system to the average farmer. I would like to ask how he would adjust the returns between the patrons?

Mr. Smith — I should think the proper way would be as you pro-rata any other money, in proportion to what you contribute to produce. My idea is, that milk if treated the same will produce about the same results. If they take good cow's cream and set it according to the best known systems, if the conditions have been the same, the result will be so near that nobody will ever go to the poor house for the difference.

Mr. Johnson — How do you determine just exactly the point to set your gauge? Did you ever take a microscope and observe the cream globules floating around between

the cream and the milk? If you don't take more milk than is generally supposed to be proper, don't you waste some cream? And also why do you draw the milk out from under the cream instead of skimming off the cream in the old way?

Mr. Smith — I draw the milk out from under the cream because it is the easiest way. It does not disturb the cream, and I believe it is the most economical thing to do. I avoid the waste in this way; if I have three and one-half marks of milk, I set the skimmer at four, so as to leave a little more cream in than is essential. And it makes no difference if there is considerable more, as I make up my own milk. But Mr. Johnson asks the questions undoubtedly with a view of applying it to gathered cream. Of course it would not do to leave very much milk in. Therefore, it has to be learned by experience, by several trials, so that you learn to leave no milk in the cream and to waste no cream in the milk. It is a pretty nice point, but I suppose the experts that go around from the creamery know how to do it.

The Chairman — Why do you submerge your milk under water?

Mr. Smith — I do it in order to reduce the temperature of the mass in the can, and to do it evenly and all at the same time. If it is submerged four inches below the surface of the water, then the cold applies equally to every part of the can, and consequently the falling of the temperature is more uniform and rapid, and I reduce it to as near the freezing point as possible.

Question — How long must milk set which is submerged in water at a temperature of fifty degrees in order to get all the cream?

Mr. Smith — I think it can all be got between milkings. I did not use to think so, but I have tried it several times. I thought it should go to forty-five, without ice you can not get it to forty-five, but ice is as cheap as anything else we use, it costs but a little to fill up an ice-house, and every farmer, whether a dairyman or not, has sufficient use for ice for his family to use all summer, that we ought to have an ice-house by all means.

Question — Does it hurt the cream to freeze?

Mr. Smith — I never knew that it did. I don't think it would materially injure good cream to freeze, though I would rather not freeze it.

The Chairman — Mr. Boyd, do you think you can raise all the milk between milkings at a temperature of fifty degrees?

Mr. Boyd — I hardly think you can raise all the cream. We have been obliged to let the milk stand twenty-four hours in order to get the best results at a temperature of fifty. I would like to correct one little mistake of Mr. Smith's. It is a very great injury to freeze cream, it not only reduces the quantity of the butter but it spoils the butter; in submerging milk there is no danger whatever from freezing, there is no possibility of its freezing if the cans are submerged.

Mr. Smith — I mean to know in less than three weeks whether it injures the butter to freeze. I don't fully believe that it does.

Mr. Dexter — Does Mr. Boyd know of any precaution that can be taken to make frozen cream as good as it was before. If he does, it would be a boon to those creamery men who have to bring cream ten or twenty miles.

Mr. Boyd — I don't know of any way of rectifying an error of that kind, but there are several large creamery men here who must have had considerable experience with frozen cream.

Mr. Dexter — I have heard creamery men state that they have had trouble with frozen cream, but had a method of treating it that helped the matter a great deal.

Mr. Smith — I never had any experience, I never let my cream freeze, and I don't think it would be valuable time spent in discussing how to save losses from frozen cream except in the case that Mr. Dexter mentions.

Mr. Johnson — My advice would be to anyone that was interested in that matter, not to try that experience. I have had to work on it myself, and I found that it destroys that aroma which is worth from three to six cents a pound on any first class market, especially on the New York market

at this season of the year, and I know of no way, although I have had men say that they could make good butter out of frozen cream, but the way they finally did it was to send it to another man.

Mr. Hoard — Mr. Johnson, is there any way by which cream can be transported that you know of, practically, and avoid the risk of freezing?

Mr. Johnson — Yes; put it in a refrigerator can. My teams go out at half past six in the morning and come in when the thermometer is below zero all day, at four or five o'clock and there is no frozen cream. I use the tank which I consider a little better than the jacketed can.

Question — Did you ever use a lamp?

Mr. Johnson — No; because we have been in the habit of using kerosene, and I keep that as far from my cream as possible. I send my teams out in the morning and I have them put in from two to six pails of hot water as they start out, and they never come in with any frozen cream, and if they find any frozen in the cans, they have positive orders to put it back.

Mr. Smith — I think Mr. Johnson has spoken right to the point. We don't want to know how to make good butter from poor cream. We know that frozen cream is not in the right condition for making butter. There is no sort of necessity that it should ever freeze. He has told you how to prevent it from getting frozen. It is just about as much waste of time to talk about making good butter out of poor product as it used to be to discuss the making of good cheese out of floating curds. Cheese ought never to be made out of floating curds.

Question — I don't see how we are going to gather our cream all over the country with the thermometer forty degrees below zero without freezing, and the roads blocked as they are. I walked five miles to this meeting because I couldn't get here with a team, and that is the condition of our country.

Mr. Smith — Mr. Johnson has told you how you can preserve the cream; and about your roads, you have to open

your roads to go to mill and to meeting, and I can't see why you shouldn't open them for the cream.

Mr. Hoard — Let me give you a point. A year ago a man was going to take me twelve miles, and the thermometer was eighteen degrees below zero. He just put his large kerosene ordinary lantern in the cutter, and a buffalo skin over it, and we were as comfortable as could be. Now I saw the other day a little device on the same principle in Iowa. The man was carrying cream all this winter long he had some of these Haney's jacketed cans and he took a large piece of tarpaulin and threw over this whole thing and set a couple of lanterns under and they drove with the thermometer forty degrees below zero, as comfortable as possible. If you don't like the kerosene, get whale oil or anything else, but some little simple device of that kind I think is practical.

FODDER CORN VS. TIMOTHY FOR THE DAIRY COW.

By W. D. HOARD, FORT ATKINSON, WIS.

I hardly know where to start in on this thing. Fodder corn vs. Timothy, and they said I was to lead off; that simply means that I am to do the skirmishing and the heavy fighting is to come after.

I want to state that I have been somewhat of a student of this matter of subsistence. I have not been an extensive experimenter, not having a large stock of actual matter, but I have been a student of other men's work and tried to get at the principles. I am a very earnest advocate of the knowledge of principles. I never knew the boy to work worth one cent at arithmetic that did not master the principles that lay below the figures. A boy of mine once went to school. He was studying mental arithmetic, a little fellow, just started. One day I took up the book, and I said to him, "Thomas has five potatoes, and James eleven, and

William fifteen, how many have they all?" The little fellow scratched his head, and says he, "Papa, does it say potatoes." Don't it say apples?" "Yes." "Oh well, I can do it if it is apples, but I cannot if it is potatoes." That taught me a lesson. That boy was learning arithmetic like a parrot, and as a consequence had no knowledge of the principle of addition at all. How many farmers have learned their duty and their work from their fathers and mothers, and do it in an apple fashion and cannot do it potatoes.

Now, what is the reason that there is such a reluctance on the part of our farmers in Wisconsin to subsist their cattle properly. George P. Lord, of Elgin, as long ago as 1879, said in the North Western Dairymen's Association at Janesville, that he maintained one hundred cows on three hundred acres of land, and he had not grown a spoonful of hay in eight years, and the proposition was received contemptuously by the farmers present in that convention; many of them said to Mr. Lord, "How do you subsist your cattle?" He says, "I do it with corn fodder." Then he says, "Gentlemen, I am not rich enough to indulge in so expensive a luxury as hay in the subsistence of my cattle, and particularly timothy hay." Then, he said, further, which I think every practical dairyman who has ever tried it upon cows will agree with him, that timothy hay was the poorest milk and butter feed that there is in the category. Now, that man subsists one hundred cows upon three hundred acres of land, he says. Hiram Smith subsists one hundred cows on two hundred acres of land, goes him one hundred acres better.

Now, then, the question of a cheap ration is upon us in all its bigness, we must begin to face it, and face it squarely. The hay crop has become of a wonderfully uncertain character, at best, a hay crop is a poor one as a rule. That is, the average in Wisconsin is only about one ton per acre on upland lands and from one to one and a half tons is about the average.

Suppose there are hundreds of farmers casting about for something in the way of cheap fodder for the winter. Is it

not possible for those men to produce that fodder more cheaply than they generally do? If it takes one and a half tons upon the average of timothy hay, the cow will consume the product of about one and a half acres of land to properly subsist on in the winter, and say nothing about the product.

Now, this year, upon seventy square rods of ground, I grew four tons of cured corn fodder. I saw the hay crop go down in Jefferson county, to this extent, that on the uplands four loads of hay were obtained where twenty grew the year before. I had seen these things worked out and worked them out myself to my satisfaction, though I could not convince my neighbors many times, but I have seen these problems worked out to my satisfaction, that if we lay aside the question of the silo entirely, that no dairy farmer that wants to keep his stock economically can afford to produce hay; that he can produce upon an acre planted as you ought to plant it, for the purpose of growing fodder, say the rows three and a half feet apart, and a kernel every six inches in the row, a man will take off from such land from six to eight tons of cured corn fodder per acre, and you have done that at a very much less cost than the same value in timothy hay.

I will go farther. This corn fodder when put up alongside of the timothy hay, by actual analysis and experiment, is proved to have butter value in excess of timothy hay, ton for ton.

Now, have we been looking at this question in its proper light? Dr. Grossman of the Massachusetts Agricultural College and Experimental Station, went through a long series of experiments with it, and found that a ton of good cured corn fodder was the equal and in most instances the superior of a ton of timothy hay for the making of butter. But, say a great many men, I don't believe it, there is such a vast amount of stalks, etc., coarse matter, that it cannot be possible. I think that my friend Hiram Smith, who has made a very extensive use of corn fodder, has arrived at very nearly the same conclusions as to the value of corn fodder in making butter.

You are familiar, most of you, no doubt, with the experiments of Prof. Henry. Prof. Henry took an acre of corn and found that an acre of corn fodder was worth five hundred pounds of butter when it was balanced, by selling a portion of the corn, and buying a ration of bran, that an acre of corn in this way, with the ration procured from the portion of corn sold and bran bought with it, was equal to the production of 500 pounds of butter? Does any man believe that an acre of hay will produce 500 pounds of butter? Now, if we have this corn plant so easily and cheaply raised and the question upon us every day, how shall we produce a more abundant fodder for our cattle, is it not time, gentlemen, that we began to look into it? Is it not time that practical farmers begin to press the question with resolution and courage. I believe it. I think the day of timothy hay has passed by. I think the silo is sweeping over this country with a rapidity that is going to leave slow coaches way in the rear, but the man that cannot put in a silo need not despair. If he can raise corn fodder, he has an advantage next to the silo, and the only advantage of the silo may be stated about as follows: it preserves the food, it is also the handiest way of handling the stuff, and it does not cost much, but the fact that a man can grow corn fodder and do it more cheaply than he can timothy hay, ought to be put before us squarely and fairly and looked at. Many years ago I noticed that cows feeding on corn even where it was largely stalks, gave more milk than when feeding on timothy hay, and that there was more butter in the milk.

This question is an important one with Wisconsin farmers. We are all of us anxious to make every dollar we can. If we make no money, we must subsist the stock and we have other things to look at. The disease of heaves has come to your horses upon the introduction of timothy hay. I remember thirty years ago when it was an impossibility to find a heaving horse, and to day you can find any quantity of them that can heave only in one way.

Now, about timothy hay. The more I look at it, the less do I see any reason for its existence. I think it is the poorest hay that stands to-day, and yet we find our

farmers so attached to timothy that they don't seem to think that they have any right to grow anything else, and yet I will appeal to the experienced men if they have not found the corn plant a cheaper fodder by at least twenty per cent., when properly handled.

If a man was growing for fodder purposes I would not advise him to grow the large kind. I would take the smaller kind, the sweet kind if he is not growing it for the silo. If he is going to feed dry, I would advise him to grow the small kinds, sweet corn. Now, I have seen eight tons of good evergreen sweet corn fodder weighed from a single acre I have seen ten tons of good dry fodder corn produced on an acre. Gentlemen, the amount of fodder that this acre will produce is remarkable, but we will state that the average is five or six tons and we then see that we produce at a very small cost a large amount of very excellent food, and I submit that with the present influx of judgment we are getting on these questions, with the appliances and arrangements for the production of this cheap fodder, I submit whether it is not time for us to look squarely at this question, and see whether we have not in this corn plant, a cheaper and better substitute for timothy hay than we are aware of.

DISCUSSION.

Question — I would like to ask Mr. Hoard, the difference in the cost in growing and curing corn fodder and putting it in the barn or in the stalk, between that and the cost of the timothy hay?

Mr. Hoard — You cannot figure the cost per acre, you must figure it per ton. I found that corn fodder, if you cure it properly, is not a profitable thing to put in the barn, only profitable to put in the stack. The cheapest, and I think the best way that I have ever seen corn fodder handled, is to put it in stooks, or to do it as Mr. Smith did, set up large posts in the field and on top of those posts lay plank

and put up two rows against it until it is wilted, then two more rows, then draw your fodder as you want it during the winter. Your corn is cured perfectly and will not mold as it will if you pack it too much.

Question — We can not do it, you see the deep snow prevents.

Mr. Hoard — Sheboygan is just as snowy as you are; there isn't a single thing that you haven't got as good as Smith has. The difference in the cost, as I have figured, taking the average cost of timothy hay, the interest, taxes, rent of the land, it makes the timothy hay about thirty cents more per ton than the corn fodder.

A Member — I can't see it. I grow timothy hay and I know the cost.

Mr. Hoard — How much does it cost you?

The Member — In ordinary weather not over fifty cents a ton.

Mr. Hoard — Why, Lord bless you, the land you grow it on is worth more than that; you have got so much money invested in that land, if it don't pay the interest on the land you are behind. Putting the land at \$50 an acre, your taxes and ten per cent. depreciation in the board fences annually, and a man will have to renew his fences once in ten years, it will amount to \$3.50. Now, then, can you grow it at fifty cents a ton, counting the labor and all these things? When you take six or seven tons of corn fodder off the same acre, you will find the labor is a small item, because you will draw this corn fodder to your cows in the winter, but you will have to care for them anyway, you will need that labor there, you will have the teams there and you have to support them. How much do you average per acre with your timothy hay?

The Member — A ton or a ton and a half.

Mr. Hoard — Now, just look at it in this light; see the cost of putting in an acre of corn fodder and cultivating it. You take a check rower and plant it fast. The moment it comes up you drag it, and you will kill the weeds, then you cultivate it by team and if it is a small variety, you can put your reaper in and cut it by reaper, set it up in your stooks,

and it isn't a long job. Now, then, if you cut that corn fodder by machinery in your barn, you have added to the value of it, and got your pay thereby. I think you will find that timothy hay costs more per ton, and I am certain it is not its equal for the production of milk or butter.

Question — What stage of its growth or ripeness is the best time to cut corn fodder?

Mr. Hoard — I can only answer that in two ways. In the first place the object of the life of the corn is the production of the ear, if you do not produce an ear, the life is not put into the stock, it is a question of motherhood, maternity. You do not put the sugar in the stock until the ear calls for it, therefore, you want to produce an ear. The best time to cut corn fodder is when the ears are passing out of the roasting stage, when they begin to glaze. Then, you have the best condition of the corn stalk, they are not heavy and woody. It is at the pinnacle of excellence. Then you cut this corn and put it into little stooks, although I would make them larger stooks than I did, mine were damaged somewhat, on account of too much exposure to the weather. Cutting at that stage in my opinion secures the largest nutritive value in the stalk. From that time on the stalks grow harder, and the ear does not grow any better, particularly for milk purposes. It takes in more oil but no more nutrition.

The Chairman — I fed during the past summer an acre of fodder corn, and it lasted twenty-four cows eighteen days. The butter product had a value of above \$100 from that acre, and the rations per cow per day cost about two and a half cents. I have fed corn in the way Mr. Hoard has indicated, directly from the field, and I have found by using ensilage corn that I could raise a product upon one acre which would carry two cows six months during the winter. We get a result with dry fodder corn four times as good as that which we get from timothy hay. As far as the labor of taking it to the barn is concerned, most every dairy farmer has help about his farm during the winter, and their time isn't worth very much, so the labor is not very costly.

Mr. Briggs — We, in Iowa, like yourselves, have been af-

flicted with great drouth. We were compelled this fall to look around for something besides timothy hay. I have three acres of fodder corn; there were some ears in it, but perhaps not one in ten stalks. I took my old straw cutter; there were just one hundred shocks on three acres; I hauled it to my stable and we cut two shocks at a time until it was gone, beginning on the 15th of October. I fed thirty animals; I gave each of them in the morning a bushel of the cut fodder and then another in the evening. We cut it into half inch lengths and cut stalk and all. Besides that, I gave them three quarts, consisting of one-third cornmeal, one-third oatmeal and one-third bran.

My neighbor across the way was milking twelve cows; I was milking about eight cows, and he was feeding them hay and fodder thrown to them just as it came. He was getting about seven or eight pounds of butter a week; my cows run up to nearly thirty pounds a week on this feed, and continued it as long as the fodder lasted, and I never saw cattle better satisfied. My three acres of corn fodder cost me \$36, \$12 an acre. When that was gone, I immediately laid in ten tons of timothy hay that I paid \$11 a ton for, and it has vanished in less time than the three acres of corn that I paid \$36 for. As soon as I began feeding the timothy hay, my cattle began to fall back in their milk, and it is only by special feeding that I brought them up to their regular flow. We cut it up, all of it, and they ate every bit.

Mr. Hitt — I want to ask Mr. Hoard if these large varieties of corn will ever get to the roasting ear stage with us.

Mr. Hoard — It may force the farmers to plant it earlier. I think that we must adapt our corn to our latitude.

Mr. Hitt — That is my idea exactly, when you talk about planting these large varieties of corn that won't mature, it seems to me we should plant something that will mature.

The Chairman — It seems to me that we should understand that point distinctly, as to whether it is a fact that these varieties will not mature up to the roasting stage and beyond it or not. I have not found a community in this state yet, where they could not mature that southern ensilage corn so it would dent if it is planted early enough.

Mr. Briggs — We in Iowa, have found that as green fodder it was very profitable even if it never reached the roasting ear.

Mr. Hoard — I raised seed a year ago from that southern ensilage corn and planted the seed. You know that on some farms there would be two or three weeks difference on the different parts of the farm on account of location.

Mr. Martin — I have tried the large corn for a number of years and I have uniformly found it come to the right stage so it would dent. There is one question I would like to ask. How are you going to keep the soil up if you run it to corn?

Mr. Hoard — This leads me out into another subject. Last fall I had six cattle and one horse in a small stable, and they were crowded, too closely crowded for their health, but I wanted to keep the stable warm and that is the only way we do warm stables in this country, by the heat of the bodies, so I fell to reflecting upon the situation there. I knew of the ammonical gases, that arise, particularly from the urine. Those gases are not healthy, they are very volatile, they float in the air, and I said to myself, I must stop that for the sake of my animals. I knew further that sulphate of ammonia, common gypsum, was the most common absorbent of gases that we can find anywhere. So I bought a barrel of land plaster that cost \$1.60, and kept it on tap in my shed, and my man was instructed every night when he shut up the stable to take a wash basin and put some of the land plaster behind the horse and cattle and at their beds, and you could go out to my stable in the morning and you would not discover any stable smell any more than in my house. I did not know how wisely I was building, but after a while I found out the answer to your question. How we are going to keep up the fertility of our soil? In this way, gentlemen, we will more than double the value of the several fertilizers that we make. Ammonia is nitrogen, nitrogen is the most important element that we have for fertilizing.

The state of New Jersey pays a million dollars for fertilizers every year, they pay seventeen cents a pound for that

ammonia, that is the commercial market value for these fertilizers, and yet we let it run to waste, we do not catch it and hold it, and you can't hold it so but that fermentation comes and throws it off in the air without an absorbent. The land plaster takes right hold of it, it then becomes sulphate of ammonia in a modified form, and it will hold it so that fermentation and heating will not throw it off. You remember that most of the ammonia is thrown off through the liquids and not through the solids of the body. This seventy rods that I spoke of was sandy, poor land, the year before it would scarcely produce a crop of potatoes. I put on that seventy rods a good liberal manuring, sixteen ordinary loads of green manure. You know as farmers that it won't take hold as a rule with your crop, but I had this barrel of land plaster worth \$1.60 in it. The corn was planted the 9th day of May and I never saw corn grow so in my days. It jumped out of the ground, away it went, and it seemed to me it never knew there was a drouth on hand, and that is what \$1.60 worth of land plaster has done to my land. On the seventy rods, I took by actual weight, a little over four tons of corn fodder, after it had stood from the 15th day of August until the 15th day of November.

Mr. Martin — That is one of the best points that has been made, I have tried that myself, but you left out one point, and that is that no pure milk can come out of a bad smelling stable.

The convention adjourned to meet at 7.30 P. M.

EVENING SESSION.

Convention met pursuant to adjournment at 7.30 P. M.

President Adams in the chair.

Music — "Come with Me" — Duett — Miss Maud Goodfellow and Mrs. E. Woodruff.

FARM LIFE FOR CHILDREN.

BY MRS. C. T. TRACY, RIPON COLLEGE, RIPON, WIS.

I recently listened to a speaker who eloquently portrayed the present and prospective condition of our country in view of the incoming hordes from the old world, with their ignorance, their vices, their false ideas of a free government, which, already in Socialism and Anarchy has wrought terrible effects, and threaten the destruction of the Sabbath, moral purity, and all the evils which would be the legitimate result. He then asked the questions: "Who are to mould, educate, to Christianize and to uplift these masses? where are they?"

His answer was, "They are the boys and girls now on the farms all over the country."

His reply to me was wonderfully, hopefully, significant. I believe he was right; and it is my purpose in this paper, to give some facts of observation, experience and history, and the philosophy of them to prove it, with the hope that I may give encouragement and stimulus to all who have children on farms in process of training for such grand possibilities of work in the future. One fact, and to me a blessed and significant fact, is that the average number of children in the homes of farmers is greater than in villages and cities. The qualities of mind and heart can nowhere be so fully and fitly developed, as in large families. The necessity for patience and forbearance on the part of parents and children towards each other is a good education, of itself, and the farm is the best place to cultivate these. The close relation of all in work, the common interest, in plans and results, also most of the evenings are spent together in reading or useful employments, whereas, in the city, the members are likely to be separated in work, in a measure, and each goes his own way on evenings; the children often attend gatherings of an exciting, exhausting, and sometimes of a harmful nature. So they are unfitted for high moral improvement. It is a nice thing for a big brother to have a little sister to pet and care for, while she in

return gives him her confidence and devotion. He cannot so easily do a mean act when he knows that a loving older sister would be pained to hear of it, or that a little brother might imitate it.

There are a hundred things in the relations of fathers, mothers, brothers and sisters, wholesome cheering restraints that no other relations can give; and all these may be best exemplified in life on the farm. One important condition for effective work is good health, and the farm is the best place to secure this. Fresh air, pure water, and plain, wholesome diet conduce to make the children strong and well.

I often spend some weeks in summer where I cannot walk half a block on the main street without breathing air, contaminated by tobacco, whisky and beer:

Children born and living in such an atmosphere cannot be as healthy, as those who breathe pure air to say nothing of the moral influence. There are hundreds of children on this street and thousands on many of the streets in our large cities in just such an atmosphere. Then the sights and sounds on a farm, real things, uplift and refine. The singing of the birds, the care and companionship of animals. The crowing of the rooster suggests the virtue of early rising; watching and playing with lambs, begets gentleness. Caring for and using horses gives a boy an idea of strength, and value of power under control, so he will better control his own impetuosity and feverish excitement if he wishes to secure the best ends. Watching things grow in a garden and field is no small means of education. No matter if in juvenile years the children pull up the beans, peas, and corn to see what is connected with them under ground, they will learn what will be of vastly more value than the things lost.

One cause of the power, physical and intellectual, of the New Englander, is the contact with the rocks and hills around him. The very stone wall over which a boy walks to show his power of keeping his body in equilibrium adds somewhat to the stability of character. The western boy has a compensation for this lack in his broad outlook over

the prairies. There is a whole term of education in one season for a boy who plants sunflower seeds and watches their growth, till their broad golden disks begin their daily task of following the sun in his course from east to west.

He gets an idea of the power of silent forces, of stability, and utility which may help him to become stable and useful. His moral nature will have an uplift; he will be more likely to turn his own soul to the light and power of the sun of righteousness, till he feels its quickening and purifying power. Some one has said "to be happy one must be busy," and nowhere can children be so usefully busy as on a farm. One may be busy about worthless things, but he is not as likely to be on a farm. A boy who milks ten cows before breakfast or keeps up with his father and the hired man in cultivating corn is not likely to have a special hankering after cards and billiards, if his moral nature has been also cultivated. The young lady who is to receive the first prize from this Association for the best package of butter, I suspect, will experience a purer pleasure than she would on receiving the first prize in a game of progressive euchre. The first fifteen years of my life were spent on a farm in Pennsylvania. In my eager desire to study and learn from books, I thought I was deprived of great privileges while I washed dishes, scoured knives, tended the baby, learned to knit, sew, spin wool and flax, weave cloth and rag carpets, milk cows, make butter and cheese, boil sap and nurse the lambs, but in later time I have been profoundly thankful for these years of substantial education. There are many sources of amusement on the farm found nowhere else. Gathering the first wild flowers, riding on the load of hay, hunting eggs, watching the lambs at play, the colts as they scamper over the fields, feeding the chickens, pigs and calves, and curling dandelion stems. When a mature old hen determines in September to add to her honors and possessions, but has surreptitiously laid her plans for concealing her place of operation, only leaving her secret retreat when she feels the pang of hunger, the average boy can get more amusement in following up and thwarting the designs of that old hen, than he ever

did in playing poker, and the employment will be far more healthful and safe. Some of the marked characteristics which I have observed in farm boys are the following: he possesses bravery, scorns a lie or even concealment of a fact that if known would be construed as a lie. When the boy comes to college, his clothes may not be quite as fine or fit so perfectly as those of the city boys; he may not have quite all the hayseed combed out of his head; but he is prompt and ready in class, does not get on the back seat so that he may open his book and read answers to the teacher's questions without being seen. If he knows a thing, he knows it and proves it by his answers. If he does not, he says so, but is very sure to know it the next time he is asked about it. I have in a class now nearly a seat full of just such boys as practical illustrations so I know whereof I speak. He is not sentimental in speech or manners, he uses good Saxonisms. He does not say that "Luna is shedding the soft, sweet rays of her light on the landscape" but "the moon shines brightly;" nor that he is sorely fatigued by the labors and experiences of the day and must seek solace and refreshment in the arms of Morpheus," but says he is tired and must go to bed. When he goes a'wooing he does not quote lines by sentimental poets to his inamorata, but makes honest demonstrations of his love to the girl of his choice, and I assure you neither of them will be seeking a divorce in less than two years after they wed. I see that I have been writing mostly of boys. Well, I am free to confess I like the boys. I always have liked them and think I shall as long as I live.

A minister not many years since after addressing the brethren for some time, remarked that in speaking to the brethren he always included the sisters. So I have included the girls with the boys. The farm girl has corresponding traits as far as applicable. Nerves are not quite as fashionable in the country and they are not petted and nursed as assiduously as in the city. And the boys—they cultivate muscle instead of nerves. They have the latter all the same and often prove them to be remarkably vigorous, especially in emergencies. To sum up the characteristics of farm

children, they have sound bodies and minds, good sense, courage, manliness, not afraid of work, honest, earnest, industrious, helpful.

In making these statements of farmers' children I do not wish to be understood as saying or even thinking that there are no other children possessing similar characteristics. The next thing to being born and living on a farm is to have fathers, mothers or immediate ancestors who have been. Dr. Holmes, on being asked how early one should begin to train a child, answered, "a hundred years before he is born." Such a training is the heritage of many now in towns and cities so that they possess essentially the same characteristics.

But there is great danger the stock will degenerate unless the children return to the pursuits of their ancestors. Ruskin says, "it is better to get renown from our posterity than our ancestors." Some may not be able to get much from their ancestors, but all now living may from their posterity. It is worth while to strive for it. Many of the best poets of England, Scotland and America, received their purest, loftiest inspirations from the experience of farm life. The inimitable songs and ballads of Burns testify to this fact. The poems of Wadsworth and the whole school of the so-called lake poets would have missed half their charm if their authors had not roamed in the fields, sat in the shade of old trees, listened to the music of the birds and brooks and so come under the power of nature in her simplicity and purity. Thanatopsis, Bryant's immortal poem, had never been written but for his wanderings in the forests amid the "fresh green things" in contrast to the decaying trunks of gigantic trees covered with "gray green mosses," their requiem sung by the quietly flowing brook. In connection with this subject it seems fitting to quote his agricultural poem —

“Far back in the ages
The plow with wreaths was crowned,
The hand of kings and sages,
Entwined the chapter round,
Till men of spoil disdain to toil
By which the world was nourished,
And dews of blood enriched the soil
Where their green laurels flourished.

Now the world her fault repairs —
The guilt that stains her story;
And weeps her crimes amid the cares
That framed her earliest glory.
The proud throne shall crumble
The diadem shall wane
The tribes of earth shall humble
The pride of those who reign;

And war shall lay his pomp away;—
The fame that heroes cherish,
The glory earned in deadly fray
Shall fade, decay and perish.
Honor waits o'er all the earth,
Through endless generations,
The art that calls her harvest forth,
And feeds th' expectant nations.

Helen Hunt Jackson, though the daughter of a college Professor, was so fond of roaming over the fields and in the woods, she quite shocked some of the friends of the family, who forbade their daughters to go with such a romp. But for this early experience she might not have found her way to Mexico, Colorado and California where she received an inspiration for writing her best books. *A Century of Dishonor* and *Ramona* would not have moved so many hearts to seek redress for the Indian.

Sarah K. Bolton could make the best of butter and cheese at the same time that she wrote some of the most instructive and suggestive articles in papers and magazines, and she is still doing this helpful work. Mary Lyon, the founder of Mt. Holyoke Seminary, in Massachusetts, spent more than twenty of the first years of her life on a little farm aiding her widowed mother to support her family. This institution, Mt. Holyoke, has educated thousands of young ladies, and many of them farmers' daughters, whose influence for good is felt all over this and other lands.

Though dead, she still speaks through these women, and their influence is widening year by year. The poems of Alice and Phoebe Cary, which have so touched the hearts in this and other countries, had their inspiration at Clover Nook, a little farm in Ohio. Though their latter years were

spent in New York for the convenience of publishing their writings they never ceased to remember with loving interest their home life on the little farm. Of the more than one hundred graduates of our college about twenty have gone out to preach the Gospel. Nearly every one of these spent their childhood on the farm. I knew each one well, taught them in some classes and I have followed them with deep interest in their subsequent career; and by their ability and success in their work, they have proved the benefit of their early training on the farm. One of them, Myron W. Pinkerton, for more than nine years a missionary to the Zulus in Africa, where he laid down his life in his devotion to his chosen work, came to us at the age of fifteen, fresh from the farm and hard work. He possessed great ability to learn and was devoted to his school duties, but voluntarily sawing wood and doing other work to maintain his physical vigor. In his missionary life he found his farm experience of great value in educating and Christianizing the natives. His name is now a household word in hundreds of Christian families east and west, and with these prefixes that I see and hear in many places, "the lamented Pinkerton," "the beloved," "the devoted," "the sainted," it seems sad to us that his life work was so soon ended, but he accomplished more than many who live to four score years.

Six other graduates have gone as missionaries to the heathen. Their record is not yet closed, but it will be honorable — yea, glorious.

A person once asked me many years ago, where a large number of students, boys and girls, were assisting in the work of the college, if the other scholars did not look down on those who worked.

I thought of the question a moment, then answered that such a thing would be impossible, because the workers were so far above them that it would be necessary for the others to climb some time before they could even look at them on a level. I think the same thing has been true to a great extent in all the years of the college life. These very workers in past years, who are not in the ministry are the successful physicians, lawyers, bankers and business men in

other departments, who maintain their early principles and do honor to the occupation that gave them their best training. It is a remarkable fact that of the twenty-two presidents of the United States all, with three or four exceptions, spent at least their boyhood on the farm, many of them doing hard work for years.

The same thing is true of many of our greatest statesmen, educators and most successful business men. Why did Washington return to his beloved Mt. Vernon, Jefferson to Monticello, Jackson to the Hermitage, Webster, to Marshfield, Clay to Ashland, with such longing, loving affection? Not alone for the rest and quiet which they found there, but because of what had been wrought into their characters in childhood and early years, by the influence of these places, which so grandly fitted them for their illustrious public careers. I am sorry to be compelled to say that with all the advantages in favor of farm life, there is a restless desire on the part of many children and some parents to get into towns and cities, "not knowing the evil that shall befall them there." The very sincerity and honesty of the farm boy renders him liable to be duped and misled; and there are always fiends in human form who delight to do this diabolical work. Many a broken hearted mother in the country weeps over the ruin of her once promising son, and what is more painful, if possible, is that the daughter she once loved and cherished as the apple of her eye, by a life in the city, became a moral and physical wreck, every fond hope and ambition of both blasted forever. So my respected farmer friends, I hope you will return to your work impressed anew with a sense of its dignity and importance.

Your occupation is as old as the garden of Eden, and may be as pure and delightful if the old serpent can be kept out of it. If he makes an attempt to enter, you will have vigor and moral courage to resist him, and drive him farther than you would if your business was next door to a saloon, where he is ever on the alert to secure new victims of his intrigues.

Keep your children with you through their early years. Teach them to feel that there can be no better place for

them when they are young. If any of you are so unfortunate as not to have any of your own, adopt one, two, three or four, as one family, not many miles from here has done. I saw them last summer and my heart always goes out in thanksgiving that there are such families, and that they are farmers. Many sorrowful waifs are to be found in all our large cities, who would be very happy in such homes, and your reward will be a hundred fold in this life and the life to come. No furniture in a house can make it half as attractive as bright, well trained children. Give them the best means of education you can in connection with their work. As a means to this end next to personal influence nothing is better than good books of travels or history. And when you or they desire something more and higher be sure to send them to Ripon College. Farmers' children will always be welcomed.

LIFE ON THE FARM.

BY MRS. N. E. POOLE, RIPON, WIS.

Of all the agricultural problems set before us to-day, the farmer, himself, is from first to last the greatest.

You may discuss all other questions pertaining to farm life, such as stock, grains, fruit, dairy products and vegetables, but the most important subject for discussion, viz.: the grower of all these things, has been left untouched.

And yet he sustains to them somewhat of the relation of cause to effect, with that reciprocal action that make him seem to be as much the product of the soil he tills as the animate or inanimate life that surrounds him, and to be as dependent upon like conditions for his existence.

In the basis of his life, he claims kinship with all that has ever lived, and in the majestic realm of nature he can say, I am a part of it.

The farmer's calling is as ancient as man, and unless there is a great and radical change in the economy of nature, I predict it can never be superseded or become unprofitable so long as man exists.

Agriculture has progressed slowly until it has reached its present state of improvement, but as great works move slowly, its perfection remains for future ages to complete.

Man's inventive genius is developing higher and higher powers in the realm of agriculture, and it is becoming more skillful and efficient as time goes on.

To-day it is receiving that attention and investigation which will make it the foremost of all industries; and will make it the most elevated and ennobling, because as Horace Greeley expressed it "the most intellectual pursuit of man."

Every year brings new implements to the farmer's aid; he is no longer obliged to plod behind the plow and in the harvest field he is comparatively independent. All these inventions have lessened the labor in the house, but there is work enough yet, and we are becoming jealous of his many privileges and advantages.

Now what we want is to have some enterprising person invent a machine of five horse power to assist us in the kitchen; one that will wash and iron and wash dishes three times a day. We will name that person the greatest benefactor of this age.

It is true that a noble man elevates and exalts any occupation — so is it also true that if any trade or profession could ennoble the men, it would be the farmer's, for as the poet says:

The farmer's trade is one of worth,
He's partner with the sky and earth,
He's partner with the sun and rain,
And no man loses for his gain.
And men may rise and men may fall,
But the farmer, he must feed them all.

Let us discuss the prominent characteristic of the average farmer.— As a rule he does not claim to be perfect — but he wants it distinctly understood that he is just as good as his neighbor and perhaps a little better. He leaves perfection to the lawyer and politician, who are living in an atmosphere of refinement.

Morally, he may have some good, some bad, some indifferent traits, but his money is his own, for he has earned it

honestly, industriously and perseveringly. He is monarch of all he surveys, if the mortgage is not too heavy and he is conscious of possessing the very best farm and the smartest wife in the state. We excuse all such egotism, for it injures no one.

He is lavish of gifts when the season is abundant, but when crops fail he retrenches in everything but tobacco and such absolutely necessary articles to his health and happiness. For like most men, he has become thoroughly convinced that tobacco is to him a necessity, a *real indispensable* benefit and consolation.

What a strange Providence that bestows such a blessing on one-half of the human family and neglects to give an equal boon to the other half. Possibly God may have reflected that the smoke from tobacco would be sufficient for the *daughters* of Eve — and *we* think it is.

The farmer is his own master and speaks his own mind, unless he has a diplomatic wife and then he speaks hers, but it is all the same, for he remains unconscious of the fact though all the world may see and know. He never invests in an undertaking that will not pay; he does not propose consuming time and money in embellishments or useless ornamentation for the sake of appearance, because it does not pay. He enjoys a well built, commodious house, but a parlor he abhors, it is a useless expense and does not pay, although he usually has one to keep peace in the family. If he has not a good garden it is because his wife has not spent as much time as usual in that department, it does not pay to raise vegetables, it is cheaper to buy, but she knows the value of these articles and the convenience of having them always ready for use. The front yard to most country homes presents a neglected appearance. The rubbish is cleared away in the spring, but the trees have grown out of symmetrical proportions for want of pruning, and sheep, horses or cattle are allowed to feed on the grass, especially if the pasture feed is short, it saves mowing, you see, and what a hearty laugh he enjoys when informing his friends there are his wife's lawn mower.

You will naturally conclude that his wife had expostu-

lated with him on the manner of improving the grounds, but evidently to no purpose. Happily for the inmates, the exterior is no index to the order and neatness that prevails within. On the whole, there are no happier homes than you find among farmers. They are generous and hospitable, and welcome their friends with true loyalty. The poor and hungry never go unfed from their door; there is real comfort and more than the average contentment enjoyed in their homes.

The great object of life is to learn to grow. Farmers, while you are seeking the grandest results, the greatest good and profit from the abundance of material around you, remember that in this vast industrial process you are also cultivating the inner soil, the inner life, the mind that distinguishes you from all other objects, and unites you with the inevitable and eternal. The intelligence that directs, plans and executes. Look about you and behold God's wisdom and power. All nature works together for the development and refinement of man; the seasons come and go for his benefit. See, then, that you prove worthy and improve the advantages of growth that will lift you to the highest degrees of thought and intelligence. Make the sciences your home study. Geology will give added pleasure to your labors, astronomy gives new interest to life, the stars are always above you, whirling and revolving in countless systems. You lose the sublime ideal of agriculture and the grandest truths of nature by not having some knowledge of the elements that compose the universe.

They speak to us of a Creator who doeth all things well. Superstition dies when science explains to us the use and power of the unseen forces, and we are not startled at every new phenomenon that arises from unseen causes. These studies give us a broader and more comprehensive view of life, of God. You will find there are many things that will pay that are not counted in dollars and cents.

Farmers, educate your boys, give them all a good practical education.

Fit them for a business life and you can send them out into the world with a clear conscience, though you do not

give them one cent of money to start them on life's voyage. But while you are educating the boys, do not forget to give the girls equal advantages. One great mistake of past ages has been inconsiderately disregarding and neglecting the education of girls—deeming her qualifications of small moment, compared to his, in the preparation for the struggle of life.

Do you know my friends that is what every home in our great land needs more than all else—an educated mother to superintend its interests, to guide, assist, direct and instruct the boys and girls that are to become the great men and women of the future.

“It has been said that there never was a great man the elements of whose greatness might not be traced to the original characteristics or early influence of his mother. All the interests of society, its prosperity, its happiness, its honor, all devolve upon our children, and they will be well or ill-fitted to discharge these duties as they have been trained by their mothers.

Fortunately for the prosperity of the world in the past, that in her calling as house keeper, are combined the principles of all the arts and sciences. For the chemist's art, the doctor's skill, the lawyer's tact, the mechanic's gift, all are to a certain degree set forth in this wonderfully complicated mode of living.

There is no good reason why our farmers' children can not be well educated at home. The cost of sending them away to boarding schools is more than to hire the best of teachers in our district schools. There should be more months of schooling; three terms in a year the same as at any high school. Employ capable teachers and retain them as long as possible. Changing teachers every term is detrimental to any system of teaching. Besides the ordinary branches usually taught in the district school, physiology, astronomy, chemistry, geology and book keeping could be successfully taught. Boys and girls alike should be taught at home to keep a cash account, Dr. and Cr., as soon as they are old enough to use money. It would become a useful habit and encourage a business propensity. I comprehend

no surer way to universal education and prosperity, than the careful and thorough education of girls. Make them capable, intelligent, Christian women, and there will not be an uneducated child in all the length and breadth of the land.

Our country's greatness is the result of thriving agriculture, domestic harmony and home culture.

"The world does move."

And the hand that rocks the cradle,

Is the hand that rocks the world.

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ARRANGED BY T. D. CURTIS, FT. ATKINSON.

MEAT AND MILK PRODUCING—ALBUMINOIDS, PROTEINS, OR NITROGENOUS FOODS.

Their base is nitrogen, which comprises about four-fifths of our atmosphere, and is the destructive agent in all explosive compounds, as nitro-glycerine, gun-cotton, dynamite, gunpowder, etc. It is nearly pure in the white of egg, and in the virus of the rattlesnake, and predominates in albumen, gluten, gelatin, fibrin, casein, and all the proteins, both vegetable and animal.

HEAT AND FAT PRODUCING—CARBOHYDRATES OR CARBONACEOUS FOODS.

Their base is carbon, which comprises about four ten-thousandths parts of our atmosphere, in the form of carbonic acid gas, a combination of carbon and oxygen, which is the deadly damp in wells, but the life of soda-water. It is harmless to drink, but deadly to breathe. It predominates in the diamond, coal, wood, fibre, starch, sugar, oil, resin, etc. These are called "foods of respiration."

The proper balance of these two foods is as one part of the nitrogenous to five or six parts of the carbonaceous. The German expression of it is 1 to 5.4. The ration for each 1,000 pounds of live weight is 24 pounds of dry food—o

which 15 pounds must be digestible, and 2.5 pounds of this must be nitrogenous — or the equivalent of this. Dr. Wolff says 30 pounds of young clover hay is about such an equivalent.

NITROGENOUS FOODS.

Skimmed milk	1 to 1.9
Buttermilk	1 to 2.6
Cotton seed cake.....	1 to 1.8
Linseed cake.....	1 to 2.0
Rape cake	1 to 1.7
Malt sprouts.....	1 to 2.2
Brewers' grain.....	1 to 3.0
Sunflower seed	1 to 1.3
Hempseed cake.....	1 to 1.5
Peas.....	1 to 2.9
Red clover, before bloom.....	1 to 3.8
Pasture clover (young)	1 to 2.5
Rich pasture grass	1 to 3.6
Lucerne, before bloom.....	1 to 2.3
Field beans, in bloom	1 to 2.3
Flax seed.....	1 to 3.1
Pea meal	1 to 3.0

These foods should be balanced with more carbonaceous ones, or they will injure the animal or go to waste. The nitrogenous element makes muscle, or lean meat, and caseine, or cheese. These foods are the more expensive and difficult to obtain. Hence they are seldom over fed. It has been clearly shown that the fats in milk do not come from the carbonaceous foods, but from a proper combination of these with the nitrogenous foods. Those concentrated foods should be fed with care and caution. The aim should be to give both classes of foods. The wise farmer will grow a variety of the two classes of foods to supply the needs of his stock. It will pay, not only as a gratification to his animals, but as true economy. The science of feeding both animals and plants is one of the most important that can engage the attention of the farmer or stock-raiser.

BALANCED FOODS.

Cow's milk	1 to 4.4
Barley middlings	1 to 6.0
Wheat meal	1 to 5.7
Buckwheat bran	1 to 4.1
Barley bran	1 to 4.5
Rye bran	1 to 5.3
Coarse wheat bran	1 to 5.6
Cotton seed	1 to 4.6
Millet	1 to 5.4
Wheat	1 to 5.8
Turnips	1 to 5.8
Fermented red clover	1 to 4.1
Fermented beet leaves	1 to 4.0
Rutabaga leaves	1 to 3.9
Fodder cabbage	1 to 5.2
Buckwheat in blossom	1 to 5.1
White clover, in blossom	1 to 4.2
Red clover, in blossom	1 to 5.7
Red top	1 to 5.4
White clover, medium	1 to 5.0
Alsike (Swedish clover)	1 to 4.9
Red clover, medium	1 to 5.9
Quack grass	1 to 5.2
Red clover, in bloom	1 to 5.7

The condensed foods must have coarse foods fed with them to extend the stomach and keep its contents loose, so the gastric juice may act on and digest them. When the nitrogenous and carbonaceous elements are not properly balanced, there is waste. True economy consists in balancing the ration, and feeding what the animal will eat up clean. These foods may be balanced by feeding them alternately as well as in combination. It is foolish waste to feed all cornstalks, straw and other carbonaceous foods, in the fall and early winter. They should be fed throughout the cold season with more concentrated and nitrogenous foods, most needed in mild weather.

CARBONACEOUS FOODS.

Cream	1 to 30.5
Oat bran	1 to 9.7
Corn bran	1 to 10.3
Wheat middlings.....	1 to 6.9
Pumpkins.....	1 to 18.4
Buckwheat grain.....	1 to 7.4
Corn	1 to 8.6
Oats	1 to 6.1
Barley.....	1 to 7.9
Rye	1 to 7.0
Carrots.....	1 to 9.3
Sugar beets	1 to 17.0
Rutabagas.....	1 to 8.3
Artichokes	1 to 8.3
Potatoes.....	1 to 10.6
Barley chaff.....	1 to 30.4
Oat chaff.....	1 to 33.8
Rye chaff.....	1 to 32.6
Wheat chaff.....	1 to 24.1
Seed clover.....	1 to 7.4
Cornstalks	1 to 34.4
Oat straw.....	1 to 29.9
Winter barley straw.....	1 to 40.5
Winter rye straw.....	1 to 52.0
Winter wheat straw.....	1 to 45.8
Ensilage	1 to 12.0
Sorghum.....	1 to 7.4
Fodder oats.....	1 to 7.2
Green born (German).....	1 to 8.9
Hungarian grass.....	1 to 7.1
Italian rye grass.....	1 to 6.3
Fodder rye	1 to 7.2
Blue grass in bloom.....	1 to 7.5
Timothy	1 to 8.1
Orchard grass in bloom.....	1 to 6.5
Meadow hay, medium.....	1 to 8.0
Corn cobs.....	1 to 71.2
Apples and pears.....	1 to 43.0

If not fed other and more nitrogeous foods than these, animals will gorge themselves to discomfort, and still crave

the nitrogenous elements which these foods lack. They are only heat and fat producing. Animals exposed to cold need more of these than if kept warm.

Music—"The Sky-Lark"—Solo. By Miss M. E. Knox.

ODDS AND ENDS.

BY W. D. HOARD, EDITOR HOARD'S DAIRYMAN.

The President says I am to talk to you about odds and ends. I have got about five minutes to talk and I have only a few words to say, that in the abundant detail of our business life as farmers, the almost endless array of odds and ends in our life, there is often a great lack, a great waste, that places the farmer at the end of his years and hard labor without any profit upon his work or his time or his cattle. I have been so powerfully convinced of this that I was struck with the remark of the lady who read the last address, in speaking upon the necessity of every farmer putting down and keeping a record of the financial transactions of the day. Our education in our common schools has been defective no doubt, and yet it is where nine-tenths of all the intellect and the understanding and the judgment of America is receiving to-day, its impulse, and yet, any intelligent man can but realize the lamentable lack of accurate business education; that education whereby a man is enabled to conduct a large amount of business is often looked upon by the farmer as being finical. Little things, they think of no importance. A little thing cost me last spring the loss of an animal worth \$300, a little thing that I would have discovered, but the man who had charge of the animal did not discover. A little thing cost a man only a year ago a valuable horse worth \$1,000, and yet that little thing, had he trained himself to the study of the character of his animals, he could have prevented. In my own business as a publisher, I find myself confronted with the fact

that eighteen men and women are daily engaged in distributing my fortune one way and another, and I must have close oversight and inspection of these people, I must know whether they are dealing profit or loss to me, and I cannot take it for granted that a thing is right until I see and know that it is right; consequently, I have to be resolute, I have to be esteemed meddling, because there are certain things I must know.

Now, it is different with the farmers. If there is a man on earth who ought to be considered God's vice-gerent, it is the man who is dealing with life, the breeder, the farmer, the only man to whom Heaven has delegated the right to hold life as best befits himself. Now, these primal forces of the farm ought to call on him for a very large judgment and at the same time a close one, and yet how often do we see men, as was insisted in the admirable address of our president, going along year after year, putting excellent feed into the mouths of unworthy animals, living year after year and every year, finding themselves not a cent better off than they were the year before, except perhaps the price of their land, the increase in its valuation. If I were to ask the question of the farmers of Fond du Lac county, how many men have accumulated property upon these farms since I was here thirty years ago, and can show it in a bank deposit or accumulation in actual earnings over the increase in valuation, what sort of a verdict would I get my friends? Now we have so little a thing for instance as this to show us how close attention a man must give to small matters. Let us turn to the county of Sheboygan. The bankers of the county of Sheboygan report that the farmers of that county have on deposit in the banks of that county \$1,500,000. Where does it come from? Does it come from the old loose, helter-skelter way of conducting a farm, or does it not rather come from the careful management of the small details of his business. The farmer puts himself in charge of these animals, these cows, he is engaged in dairying, the moment he does that, he is compelled by the force of circumstances to watch them day after day and become a judicious overseer of his business. I venture to say gentlemen, that this

accumulation of profits in Sheboygan county cannot be paralleled by any county of the state of Wisconsin. Here is an evidence of the value of attending to the small details of farm life.

I have been wonderfully impressed since about ten years ago, when I commenced to study these things, with the fact that a large portion of the farmers of Wisconsin are practically dissipating the honest earnings that they ought to have, and it is because of a lack of business training.

I said to a merchant at Sturgeon Bay: "Sir, you have a magnificent hay crop here; you have a stretch of dairy country, you have on this little tongue of land stretching up into Lake Michigan, as fine a theater for the display of intelligence and judgment as can be found in the northwest." Oh, yes, he says, "We have a good hay crop, but it will not be worth anything to us." I asked why. "Simply this, between having animals so poor that they are not worth anything for the business that they are engaged in, and men so heedless and stupid and indifferent to their best interests, the whole of this hay crop will be fed to these poor animals, and next spring they will be worth no more than they were last fall." Now, that was a business man's judgment, accustomed to putting things together, and by virtue of business training looking into the principles of things, and noting that these small forces that work upon the farmer finally bring him either in debt or into bankruptcy. I feel for myself, faith in the intellect of Wisconsin, particularly in the agricultural intellect, and the sympathetic intellect of people in towns like this, where there is a massing of the judgment that shall finally fructify the agricultural intellect of Wisconsin, until we shall emerge from those unsatisfactory ways and do the things of judgment and method, and finally become one hundred per cent. more prosperous, and I hope Heaven will speed that day. It is not the love of filthy lucre I look for; it is not simply the money I look for; but my thought, and observation have taught me, that there is nothing in the world that enlarges a man's judgment and intelligence better than a little good prosperity, and that we need prosperity in order to be good Christians. My observa-

tion is that poverty to-day among the men in cities, is the cause of drunkenness a thousand times more than drunkenness is the cause of poverty.

I believe men drink because they are wretched; I believe men drink because they seek surcease from sorrow. The way to make people intelligent is to make them feel that they have some share in life beyond mere living. It is this taking hold of men's minds that is bringing out these results, that is bringing out meetings like this, bringing down the life of Ripon, and the farm life of the country together, and letting them feel that the discussion of these questions shall bring better food, better prosperity and better hope for the whole of us. Agitation lies at the bottom of all hope for the world. The farmer lives between his life of events, his judgments are begotten from the isolation of his life and finally he begins to measure the world by what he finds within his line of business. It won't do; we must rub against one another; and in so rubbing correct these errors of judgment, and the best evidence that you can see of that in the farmer will be in taking care of the little things, building up the fences, having a neat home and surroundings. These things are not matters of money, they are questions simply of having a little intelligence. The handsomest home I ever saw in my life was a log house in Michigan embowered in climbing roses. How often will you see a man spend \$3,000 for a house, and have a fifty-cent door yard. There is no reason or necessity for it. We must cultivate and bring to bear hard practical sense and judgment in this matter of small things, the odds and ends, and help one another to a sounder, better view of life with relation to them.

The convention adjourned to meet at 9:30 A. M.

MORNING SESSION.

Convention met pursuant to adjournment at 9.30 A. M.
January 26, 1888.

President Adams in the chair.

IMPROVED STOCK—WHAT IT IS AND HOW TO GET IT.

By G. E. MORROW, PROFESSOR OF AGRICULTURE, STATE UNIVERSITY,
CHAMPAIGN, ILL.

The differences in our farm live stock are caused by environment, or conditions of life, and heredity. The formibilities of development of any animal at birth depends on what it has inherited from its ancestors. The extent to which this development may go will be determined by the conditions surrounding it.

Usually animals resemble their parents; often, more remote ancestors. When parents and more remote ancestors all possess one or more quality in common, its transmission is almost certain. Extraordinary qualities are not transmitted with certainty, extreme varieties from common types are rarely transmitted. There are many natural functions which may be developed together to a good degree, being in no sense antagonistic to each other. Extreme development of any one almost certainly is accompanied by comparative weakness of others.

In selecting animals, whether for direct use or for breeding purposes, individual merit is the most important consideration. If this be inherited the probable value of the animals as reproducers is greatly increased.

Pedigree is important as the best means of determining that the ancestors did possess the qualities desired. Pedigree does not make good lack of individual merit. The test of value of a pedigree is the merit of the animal possessing it.

Improved stock is that which better meets some of the wants of man than does the common stock of the country or locality. If it does not do this neither pedigree, former reputation or certainty of reproducing its characteristics, give it a right to this title.

Whether a given animal or family or breed of animals is improved so far as a farmer or a class of farmers is concerned, depends on what the requirements are.

The first question in selecting stock is: What are they wanted for?

There are many farmers, breeders or stockmen who need their animals almost exclusively for some one purpose. In such cases, the most extreme development for this use which can be secured without injury to vital functions is often easily arrived at.

A larger number of stock owners of all kinds need their animals for more than one purpose or class of purposes. Such men are wisely content with something less than the greatest possible development in any one direction; finding their wants better supplied by animals of symmetrical development of two or more natural functions.

In any case it is a serious mistake to needlessly multiply the points required. The addition of each point limits the repetition and multiplies the difficulties of securing uniform transmission to offspring.

The special dairy farmer need not be troubled by the fact that other farmers, in selecting cattle for breeding, look almost exclusively to indications of special fitness for beef production; while a much greater number wisely say they find their wants best met by the cattle which have had the natural capabilities for both beef making and milk giving, cultivated to equal degrees. The great mass of special dairy farmers will do wisely to select and breed for the highest development of milk giving possible without impairing health, and vigor.

In the human race we tenderly rear and carefully cultivate those children who have inherited little capacity for growth in desirable directions. It is a waste of time and effort to do this in the care of our farm animals. It is the part of wisdom to select only those which show good promise, and, so far as is possible, have inherited the qualities desired. Because he affects a much larger number, the sire is more important than any one dam.

The best proof of merit in reproduction is not individual merit, important as this is; not inherited merit, important as this is — but the fact that the ability to transmit desired

qualities has been tested. The proved good breeder ought to be worth more than the untested one.

Breeding is usually safer and wiser than purchasing. Persistent use of carefully selected sires on the best females practically obtainable is the quickest, cheapest and most advisable method of stock improvement for the mass of farmers.

HOW TO GET A PRACTICAL RESULT FROM DAIRY EXPERIMENTS.

BY G. H. MONRAD, CHICAGO, ILL.

It may seem to you that I am rather presumptuous in offering to read a paper of this kind; it may seem to you that I have no right to express my opinion, but I beg you to believe, that I honestly feel, *now* is the time to open this subject, and I shall give you my reasons.

This state has the honor to have been most liberal to agricultural experiment to Farmers' Institutes and to this Association, this state has a prominent practical experimenter, who is willing, I believe, to aid the dairymen, and yet there is *something* wanting; there is *something* which prevents us from getting the full benefit of the money spent and of the untiring honest work of such men as Professor Henry and others. There is *something* which may some fine day result in the state ceasing in taking a substantial interest in these experiments, in these educational efforts.

This *something* is a lack of appreciation and co-operation from our practical farmers and dairymen.

The general impression in the United States seems to be that the European Governments do everything. *Far from it*. It is only after the farmers have shown their willingness to help themselves, that the Government steps in, assists those who help themselves.

How is it here? This association offers a membership and a full report of its proceedings for the ridiculously low sum of one dollar (\$1.00). And yet, we average only 200 members while the number of dairy farmers in Wisconsin with five

cows and more, may be estimated at not less than 10,000. If every one of these would become a member, we should have \$10,000 at our disposal and dare everybody say that the printed reports will not benefit its readers to the tune of twenty cents per cow? Why? I have made twenty dollars by reading a single number of a dairy paper.

Just think of the unsolved problems that are scattered over the dairy field, which can only be solved by costly exhausting experiments.

But, ladies and gentlemen, this question of hard cash is not the only point. We also want the farmers, the creamery men and the cheese-makers to sacrifice *some* time and submit the *some* inconvenience by inviting the experimenters to stop at their place and watch the practical work while they control it from a scientific standpoint.

In order to find out if any particular feed affects the quality of our butter, there are two tests to be made; one preliminary, which proves if there is any particular effect on the butter at all, and one conclusive test to prove *the lasting* effect of any particular food on the butter or cheese.

The first test any farmer can make is by setting the milk where it is protected against all outside influence and raising the cream quickly by help of ice-water; then skim and divide the cream in two lots: Churn one perfectly sweet at once and ripen the other as usual. If there is any flavor from the food it will show at once in the sweet cream butter and if there should be any taste or smell left in the butter from the soured cream, try if a little higher acid does not drive it away or hide it.

If you succeed, you have proven, that though the flavor has been there, a good saleable butter for immediate consumption can be made in spite of that particular food — always provided that you do not rely on your own or your friends' judgment, but submit it to a competent, *commercial* judge.

This test is practically used by the Scandinavian Butter Preserving Company, when they refuse to buy anything but sweet cream butter for canning; they are thus enabled *at*

once to find out if the Dairymen have followed their instructions as regard the feed.

The other test to find out whether any particular food affects the keeping quality of butter, is more complicated and is more expensive to make.

First, we want to find two farms within easy distance, where the same breed of cows are kept and where the same care and water can be given. Better still, of course, to divide a herd and keep each division in separate stables on the same farm.

We then proceed to make out a feeding plan by which both herds get the *same* grain feed; not only the same in *name*, but actually out of the same lot, carefully mixed. One lot gets first-class unimpeachable hay, while the other gets the food that we want to test,— say ensilage.

Feed them for a week at least, and then set your milk from both herds separately and treat it *exactly* alike, in fact, give it to the butter maker without letting him know which is which.

When made, set samples of each lot aside in cold storage and let good commercial judges score it once a month for three or four months, keeping them in complete ignorance of what they are testing. Send samples of the new milk, skim milk, butter milk and butter from each lot to the chemist for analysis.

Repeat this test for one or two weeks, then reverse the feeding to the [two herds, wait as before, and repeat the experiments.

If, then, both lots of butter keep equally well, and if similar experiments in other states corroborate the result, *then*, and not *until then*, can we be sure that, as for instance, ensilage, being a fermented food, does not affect the keeping quality of the butter or cheese.

You will observe the necessity of having all other conditions *exactly* alike, but the one we wish to test.

When Professor Segelcke and Fjord made some experiments with skim cheese, they sent reliable, trained young men, with good thermometers, etc., to the factories. Samples were taken from analysis of the milk, of the whey and the

cheese fresh from the press. Annotations were made about every little detail in the manufacture, while the cheesemaker went on his usual every day way.

If, for instance, they wanted to see the effect of the heat in the curing room, cheese of the same make was placed in different temperatures and from time to time submitted to commercial judgment.

In experimenting with any of the different tests for milk and cream, the first evident duty of the operator is to prove that he can repeat the test with the same milk again and again and get *the same* result.

The next is to prove that the test gives practically the same result as the churn.

For this purpose, we must have trained young men who can demonstrate that they are able to take 200 pounds of milk, divide into two lots, churn separately and get, practically, the same result.

To show you how nearly exact this can be done I will give you the practical examination a young man was put to in Denmark.

He was given 6.50 pounds setters and 300 pounds of milk; this he divided up and set and churned in three lots, repeating the test three days.

From 100 pounds of milk he got:

	lbs. butter.	lbs. butter.	lbs. butter.
1st day	3.45	3.48	3.465
2d day	2.81	2.79	2.78
3d day	3.455	3.46	3.46

The highest difference was consequently 3-100 part of one per cent. of the milk which may be considered near enough.

If, then, we want to try any of the different test systems, it is more practical to use this way of controlling them, than the chemical analysis, but I want, nevertheless, to have the chemist's assistance in controlling the tests.

In practically carrying out such tests, it is necessary to have a director, *who* leads everything — who, if you please, holds all of the different threads in his hand, *who* controls not only the practical work, but also the scientific work, by

giving double samples for analysis, thus proving their accuracy.

It is also necessary to have a class of reliable, intelligent young men who can be trained for this work, and in order to get this, I should say a National School would be *the* thing.

It is not enough to have, however, good experiments in Wisconsin and in New York or Illinois, we want them to be conducted on the simple system in each state so that they may supplement and corroborate each other compiled at headquarters.

I am happy to say there is a tendency in this direction, and if now the dairy farmers will do their share and put their shoulders to the wheel and put their hands in their pockets, we may yet get a practical result from the dairy experiments which, I hope, will be made now when the Hatch bill is passed.

In 1866, Denmark exported 6,730,500 pounds of butter to England at an average price of 22½ cents; 1883, it was raised to 35,358,400 pounds at an average price of 29 cents.

And this is the result of a hearty co operation between the scientists and the practical dairymen.

DISCUSSION.

The Chairman — What percentage of loss is there in churning sweet cream?

Mr. Monrad — The result in Denmark has been 6 and 7 per cent. We use in Denmark a revolving dash churn, and we find we have to use a lower temperature for sweet cream, at least from 4 to 6 per cent.

Question — Is there any market in this country for sweet cream butter?

Mr. Monrad — No, sir. The object of making it is by that means any little fault in the making, or the cream can be detected. When you put on acid, like charity it covers many faults, as this butter is made for the English market, we ripen the cream only a little less than you do, and that

butter is salted with 3 per cent. and at the canning establishment it is salted with about 3 per cent. more, making 6 per cent of salt. Sweet cream butter when it is kept will not get a rancid taste, but it gets tallowy.

The Chairman —Prof. Henry is here and we would like to hear him talk about the experimental work in the line of the dairy.

Prof. Henry — I felt proud in coming to this meeting, that I could bring along a couple of pretty good samples of the Experiment Station force in the persons of Dr. Babcock and Prof. Short. Dr. Babcock was connected with the New York Experimental Station and I am very proud that we have imported him into our own state. Our Experimental Station is devoting the better part of its little fund to the dairy interest, but dairying is such a broad subject that it reaches almost every interest in the state. For instance we have a third young man at the laboratory following ensilage experiments, testing the digestibility of ensilage. Now, the digestibility of ensilage, corn, fodder, and so on, would affect feeders of all classes. As an interest I consider dairying one of the most prominent in the state, it ought to be the leading interest. We want to co-operate with the dairymen, and expend its appropriation properly, but the first thing is to get our men, and get our laboratory equipped,— get ourselves in good training at home, before we go out much among the farmers. We hope to have more money and enlarge our work.

THE SILO — FROM THE CREAM STANDPOINT.

BY H. S. WEEKS, OCONOMOWOC, WIS.

I am to say something to you about "The silo from the Cream Standpoint," presumably because the production of cream is my specialty in dairying; but I take it that as this is a dairyman's meeting, whether our attention is devoted to milk and cream, or their products — butter and cheese — we all occupy a common standpoint as to the wisdom of

adopting that system of feeding which will give the best results for the money and labor expended. The question then is, how are we to discover which, all things considered, is the best? It is not a matter of individual opinion, but a question of facts and figures, hence all we have to do to arrive at a correct conclusion is to investigate and compare the results of the different methods. It is the disinclination of the average farmer to adopt this simple proposition that renders it so slow and difficult a task to introduce any improvement on the old established methods in agriculture and dairying.

How is it with the manufacturer? how quick he is to investigate the improvements which are continually cheapening the production of his goods or wares, and which have enabled his competitors to undersell him, otherwise his business would soon be gone and ruin stare him in the face. And wherein is the case different with the farmer? If my neighbor can feed his cows cheaper than I can, other things being equal, he can make more money, while I am struggling against fate to make ends meet. It is useless for me to shut my eyes to his improved methods and declare without investigation that they are no better than mine, attributing his success to better luck, a better farm, or any, rather than the true reason, viz.: that he has been governed by business principles while I have gone on the "good old way," having an impression that farming is not business but simply a hap-hazard occupation in which nothing is certain except hard work and poor pay.

It is true that the operations of nature, the action of the elements, often render the success of ordinary farming doubtful. Frost and snow, wind and rain, heat and drouth, affecting for good or for harm; and we must therefore be alert to adopt the system and methods which experience has proven to be the least affected by adverse conditions, and right here I wish to score the first point in favor of the silo. In this great corn belt we have a forage crop that is, with proper care and cultivation, *sure*, and which is the most productive of any other, furnishing the largest amount of feed from a given area of ground, but which, as

ordinarily gathered, cured and fed, has a large part of its substance and nutrition wasted. The silo offers a way to store and preserve it *all*, in the very best condition for feeding, and we who have experienced its benefits are trying to convince every farmer, and especially every dairyman, that he cannot afford to ignore the valuable improvement.

But, says one, "We admit that corn fodder is a good thing in the drouth year when hay is scarce, and good enough without putting it in the silo. Ensilage is only another craze which will have its run like the 'root craze,' the 'cooked food craze,' etc., which had their rise and fall and are now relegated to the dead past; let the fancy farmers spend their money on it, we can't afford it." Says another, "You can't make me believe that it is cheap to handle such a lot of green stuff which you admit is largely composed of water. I can furnish water from the tank cheaper than that." (It is to be hoped he has a tank heater to bring the temperature up to 80 degrees this cold weather the same as ensilage comes out of the pit.) Well my doubting friends, the silo is no longer on trial. Experience has answered all of these questions to the satisfaction of practical men who, like yourselves, were perhaps slow to believe and were convinced almost against their will.

We do not claim that ensilage as is perfect a ration by itself as pasture grass, but that it comes the nearest to it of anything yet discovered. The water that goes into the silo in the corn stalk, has a mission to perform in the cow's system like the succulent pasture grass, and very different from the water in the tank, though the chemist's analysis does not define wherein the difference lies. It is enough for us to know that it is converted into milk and cream in greater proportion than the best of dry fodder supplemented by all the water the cow can be induced to drink.

While fodder corn well cured in the field, and carefully taken care of afterwards, is excellent feed, and perhaps the next best thing to ensilage, yet it has lost much of its succulence and in its place has taken on woody fibre which requires more vital energy in the animal to digest and thus is less valuable.

It should, however, be planted liberally by the dairyman as a soiling crop and will yield rich returns in the late summer and autumn when the pastures are bare. Some of my neighbors wondered last spring what I expected to do with such a quantity of fodder corn as I planted, but I had vivid recollections of lying awake nights the preceding drouthy summer wondering what I was going to feed the hungry mouths depending upon me, and finally solving the problem by buying at a round price a couple of stacks of clover hay which with plenty of mill feed tided me over until the silos could be opened. A couple of months' profits however, had meantime "gone where the woodbine twineth." The big field of fodder corn this season, not only filled the silos, but carried my cows right through the drouth with plenty of milk and cream to meet an increased demand. There were no stacks of hay to be picked up in these parts; had my necessities been the same, it would have had to come from regions remote from this sun burned, drouth stricken portion of the earth's surface, and my occupation would I fear have been gone.

I would only add that with proper methods and care in filling the silo, there need be no failures, and no serious loss; doubtless there is much yet to learn about it, and changes may be made in handling and pressing ensilage, the list of forage crops which can be profitably siloed, increased, but that it is a *permanent* thing, and will eventually be as common as is now the growing and feeding of hay, I have not a doubt.

DISCUSSION.

Prof. Henry — How many years has the silo been used upon the farm you live on?

Mr. Weeks — This is the seventh year; my father built the first complete silo in the state seven years ago. There were two built, as we supposed in those days they must be, partially underground with concrete and stone.

Question — Do you feed your cows their rough feed exclusively on ensilage?

Mr. Weeks — Yes, from the very first, so we have the experience of seven years now. Of course we feed plenty of mill feed with the ensilage, as a forage crop. I raise no hay on my farm, except some meadow hay I feed my horses.

Question — What is the relative production of milk between ensilage and hay?

Mr. Weeks — I can not say. I came to the farm after the silo was built, and I sell my cream, consequently I don't know what amount of butter might be produced.

Question — Do you know what your average cream production per cow is?

Mr. Weeks — Well, I get an average of twenty per cent. of bulk. I sell my cream by the measure. The cream stands twenty-four and thirty-six before I skim it, at the temperature of ice water, forty degrees. I set my milk in a tank of ice water until it is thoroughly chilled, then I set it into a cold storage room, with ice above, and the cream thickens up, which is what is wanted by those who use it.

Question — Do you feed the ensilage before or after milking?

Mr. Weeks — I feed it after.

Mr. Monrad — I would like to hear Mr. Hiram Smith's opinion upon, how much ensilage increases the butter yield, if any; we all know it increases the milk yield.

Mr. Hiram Smith — I found an increase of nearly twenty per cent. in the milk flow, and expected a corresponding increase of butter, but when I churned it, although the result was entirely satisfactory, in feeding ensilage I did not get the relative increase in butter, although there was some increase of butter.

Mr. Briggs — Mr. Weeks, how much meal and what do you feed?

Mr. Weeks — Bran is my principal feed, outside of ensilage. This winter I am feeding about forty pounds of ensilage to a cow, and about ten pounds of bran and two pounds of oil meal to each cow that is giving milk, in three rations. One immediately after milking in the morning. We milk at 5 o'clock, and at half past six they are fed a ration of ensilage, bran and oil meal mixed, by throwing in the ensilage

first and the bran and other stuff on top, and they mix it themselves pretty well. Then at noon we give them a feed of ensilage and a handful of bran; they are turned out of the stable at noon and watered, and the stables cleaned, and then they come back in the stables, then they are fed at 5 o'clock again.

Question — They have no hay?

Mr. Weeks — Not a wisp of hay through the whole winter.

Question — In the summer they have no ensilage during pasture?

Mr. Weeks — No, I have fed forty head of cattle from the first of November to the first of June on ensilage, raised from sixteen acres of land. I am carrying upward of fifty head this winter, and I devoted a little more land to corn last year.

Question — What corn do you raise?

Mr. Weeks — Until this year I have raised the Southern White,—the Horse-tooth corn, and got the seed from Virginia. But this year I planted a portion of dent corn and put it into the silo, and I think I shall adopt the plan again. Being corn that naturally grows here, it is sure to reach the stage where it has good ears. Last year there came in our part of the state a tremendous blow and rain-storm after the drouth, and it knocked my corn all down so I had to cut it the latter part of August, before it reached the stage that I could have wished.

Mr. Beach — I am feeding ensilage and weigh my milk and butter, and we are able to make a pound of packed butter, ready for market, from $17\frac{1}{2}$ to $18\frac{1}{2}$ lbs. of milk. Formerly we considered 20 lbs. in winter a fair average, we are feeding ensilage, bran, and a little hay.

Mr. Monrad — When were your two experiments made?

Mr. Beach — In the winter. We weigh our milk every day and also the packed butter.

Mr. Allen — Were they new milkers?

Mr. Beach — Of the 23, 17 came in since September; the rest are strippers.

Question — What breed are they?

Mr. Beach — Some are Jerseys, some are Durhams, and

some are scrubs, I feed twelve quarts of bran in two feeds. I feed only twice a day. We commenced with 25 pounds of ensilage and increased until we fed about 45 pounds to the cow in two feeds.

Prof. Henry — A person who has had no experience is apt to think that ensilage is ensilage. Now, friend Beach has put corn into his pit that has 100 bushels of ears to the acre, and the next man puts in corn that has not a bushel of ears. The first thing a man ought to state when he talks about ensilage, is what kind of corn it is.

Mr. Hiram Smith — I wish to state that the ensilage I referred to was immature corn. It had been planted too thick and never reached the roasting stage. Therefore it was an entirely different make-up from that fed by Mr. Beach.

The Chairman — This question naturally divides itself into several parts, and we will take up first the method of planting, and the kind of corn we shall plant.

Mr. Weeks — My method is to get the ground in as good condition as possible, as early as possible in the spring. Last year I ploughed in the fall, and spread my manure during the winter, carried it out upon the land as fast as made. In the spring I used a disk-harrow and went over the ground with this and followed with the smoothing harrow, and made as mellow a bed as possible. I sowed my corn with a one-horse drill, but it planted too much seed. Another year I shall have a drill that will put a kernel in not less than 6 to 8 inches apart. It is planted in rows 3 feet 8 inches apart. I think 4 feet all the better. We want it to get all the sunlight and air possible, in order to perfect the ears and get the best results. I planted one half bushel to the acre. As soon as the corn has been in the ground a few days I go over it with a slanting tooth harrow, and I do that three or four times; in fact, I ran the harrow over the corn when it was 8 inches high, and did not pull out any considerable amount, but saw the good results in keeping the weeds under from the very start. You want to harrow both ways, lengthwise and crosswise. I follow after that with the sulky corn cultivator, because I can cultivate more shall-

low with that than with the other. I think it is not good judgment to cut off the rootlets by going down too deep.

The Chairman — I want to call for the opinion of experienced men as to the variety we had better plant.

Mr. Hiram Smith — For the last six years I have planted mostly the B. & W. corn, and every year have raised a small portion of other kinds. The B. & W. makes the most fodder, but whether it is as good as the small corn, of course is an open question. It is not supposed to be quite as rich in nutriment as the small corn, my friend, Mr. Beach tells about, but we get more tons and my opinion is decidedly in favor of the B. & W. We get a very large growth and are perfectly independent of the drought. No man need fear running out of hay; indeed, I think the quicker we begin to run out of hay the quicker we will begin to increase our profits.

Mr. Beach — I raise the B. & W. corn, the ever-green sweet and the Yankee corn. We generally begin with the B. & W. corn, while our strength is good. Then we follow with the sweet corn. I say to a man in regard to ensilage, — "It is all in there that you raise, it is kept without being wasted, the cattle eat it all, it is easily digested, the milk is rich in butter, and the butter is good."

Mr. I. J. Clapp — Every man should know his location and the variety of corn best adapted to it. I have tried B. & W. corn two years, and it would never mature in our part of the country. Last year I planted native corn, and it matured earlier; I put it all into the silo, without cutting or anything. I feed from twenty to twenty-five lbs. ensilage, and about six to eight quarts of bran, and some hay and oats chopped together. It makes a cheap ration, and I am very well satisfied.

Mr. John Boyd — I raise B. & W. and find no trouble in having it mature, and have raised it for years and used it dry, before I had the silo. I have raised another kind of fodder which I think is worth more than corn, and that is sugar cane. You cannot raise quite as much as you can of the B. & W. corn, but there is more sugar in it, and it will grow twice; you cut it down, and it will shoot up again.

I have had it shoot up three times in one year. It is the amber sugar cane. I got the seed from Minneapolis, and I think it is valuable for making good, rich milk. I think it makes more than any other kind of fodder I have ever used.

The Chairman — I would like to have Prof. Henry close the discussion on this branch of the question.

Prof. Henry — A man of my position takes conservative grounds. My advice to the farmers is, to be sure and plant some kind of fodder corn, silo or no silo, and have a good sized field. For most parts of the state I would try some of the large varieties. Then try some of the earlier varieties that will mature. From yellow flint you can get at least 35,000 pounds of fresh cut fodder to the acre. Of the B. & W. you can get at least 50,000 pounds.

Now, I have heard farmers say, — "I have been farming thirty years without a silo, and I guess I can do it yet." Don't go on that idea. Mr. Beach said last night that we don't know the possibilities of our business yet. The testimony of these men is most valuable. Plant some kind of fodder corn, silo or no silo. Plant some kind for testing.

Mr. Clapp — I find my cows don't eat the B. & W. corn all up, but the dent corn they will eat up, stalks and all, don't leave a bit.

Mr. Weeks — Perhaps they don't eat it because the stalks are not cut up.

Mr. Clapp — The cows would not eat it when it was green, cut right out of the field.

The Chairman — I don't think the presiding officer ought to have an opinion, but unfortunately he has. It don't seem to me that this large Southern corn is having a fair show here. I have raised it two years, and I don't find anything that will equal it in yield and feeding value. We will take up the question now of cutting the corn and putting it in the silo.

Question — Mr. Weeks, do you let your corn wilt after it is cut, and if so, for how long?

Mr. Weeks — I never have done so until the last season, when my corn blew down as I said. I put it in large stooks

and it stood about two weeks before putting in the silo. I don't think my ensilage is as good as other years.

Question — Do you think its standing in stooks was the cause of its not being as good?

Mr. Weeks — No, I think the cause was that the fodder itself was not so mature.

Question — What kind of machine do you use for cutting?

Mr. Weeks — I have a stationary 10-horse engine, and the largest sized Belle City Cutter. I have two silos, and I have divided one of them, making three pits. I calculate to put in about two feet in depth in one a day, letting it be there three days, and the third day it will be heated sufficiently so I can put in more. This year from the dry condition of the fodder, I had to wait longer, to get it up to the point to make sweet ensilage, and I think I succeeded, but I have some doubts whether it is any better than the slightly acid would be. The heat ran as high as 140 in some cases. You take green fodder and the second day you can get it up to 140 without any difficulty at all.

Question — What length do you cut it?

Mr. Weeks — My theory is that the shortest cut is the best. I cut it $\frac{3}{8}$ of an inch.

Question — Suppose it was not filled up when it was hot enough, would it injure it?

Mr. Weeks — Yes; it would commence to decompose.

Question — Then if a storm should come on so you could not work, it would be injured?

Mr. Weeks — If it was several days it would injure it some. I had a three days' storm come on once, when I had one pit partly filled, and my ensilage began to get moldy on top. My men discovered it and thought it would all be spoiled. It went down two or three inches perhaps. I had the boys go in and take their forks and throw it all over, and the next day it was dry and we put fresh fodder on top, and I never was able to discover that it was not just as good.

Question — What sized silo holds your sixteen acres of corn?

Mr. Weeks — I call them two silos, each one thirty feet

long by twelve feet wide, and fourteen feet deep masonry, and I have about four feet of building raised on the masonry. I think the maturity of the corn has a great deal to do with making sweet ensilage. I don't think it would be hardly possible to make sweet ensilage with corn that was immature.

Mr. Allen — It is clear to my mind that in that heating up you are destroying the food, and generating carbonic acid, and carbonic acid is poison.

The Chairman — It has been demonstrated that three tons of fodder put up in that manner is equal to a ton of hay, and if this is so deadly, why don't the cows find it out?

Mr. Allen — They do find it out; they are drunk half the time. I believe the silo is a good thing, but I do want it to be put in there sweet, and I want it to be kept sweet, and by heating it to that degree, 140, you must generate gases that are poisonous. First is generated carbonic acid, and then when it strikes the air, it becomes carbonate of ammonia, and then it begins to rot.

The Chairman — The assistant chemist of the experiment station is here. Let us hear from him.

Mr. Short — You get me where I am as much in the dark as you are. But I will tell you about what we were doing at the farm. We had seven silos filled at different times with different corn, and the corn in different conditions. A large silo has been filled with uncut corn. The others were filled, some with dent corn, some with B. & W. and some with Yankee corn—that is Flint corn. Mr. Woll took samples right along as it was being put in, and we took samples at the same time from corn that it had been in the shock. The way we did was something like this: we went into the field and cut so much corn, one half of that was stacked, and left in the field, the other half went into the silo. Now, the silos have just been opened, and we are feeding from them, and the looks of those silos proves that we don't know everything about ensilage. Two silos right side by side filled with two different kinds of corn, but treated exactly the same, one of them was almost rotten,

and the reason why we don't know. The other one was just slightly acid.

Now, on making an analysis of this ensilage we found under 1 per cent. of alcohol, and under 1 per cent. of acetic acid, and under 1 per cent. of nitric acid, practically sweet ensilage. Now you know the process of heating destroys the bacteria, and unless we destroy the bacteria we are going to get sour ensilage.

Mr. Beach — How much heat does it take to do that?

Mr. Short — That depends on the bacteria. A good stout one, you have to heat up to about 212 for three hours.

The small Yankee corn has considerable sugar in it, and if we fill a silo with Yankee corn alone, that starts fermenting very soon, and we get a more sour ensilage than with the B. & W.

Now this sugar is changed first to alcohol, then we have some carbonic acid. By covering it with tarred paper, and excluding the air, the carbonic acid is left, and the bacteria are kept out, and if we can keep the air out, the bacteria will stay out for a long time, and that makes sweet ensilage.

Question — Will the carbonic acid in the feed do any harm?

Mr. Short — You have all drank soda water, and perhaps some of you beer. I never heard of a man's being poisoned by drinking soda water, and both beer and soda water contain carbonic acid. It is a very good thing when you drink a little of it.

Question — What proportion of carbonic acid is in the air that you breathe?

Mr. Short — That I can't say. Professor Babcock says about 1-100 per cent.

The Chairman — Do you think there is enough carbonic acid in any ensilage you find about the state to hurt any cow?

Mr. Short — Certainly not. There is not as much carbonic acid, probably, in forty pounds of silage, as there is in a bottle of appolinarious water or soda water.

Mr. Allen — Did you ever notice in what condition it

leaves your cow? Don't you know they will lie down and be in a sort of stupid condition?

Mr. Short — I never saw it.

Mr. Allen — Professor Henry, did you ever notice the difference between cows eating that and dry feed?

Prof. Henry — I think we have got ensilage testimony enough not to waste any time on it. We have too much to attend to here to waste time on a matter as trivial as that.

We have fed ensilage on the University farm every year since 1880, and we have had no drunk or silly cows on the farm. I wish to modify one statement of Mr. Short's. He said that the ensilage in one silo was very 'poor, rotting. It was too poor to feed in an experiment, but it was of such a quality that the cattle ate it readily and willingly. We found, when we reached the bottom of the silo, a place where the boards had sprung in about three inches from a vertical line, which let in air, and probably cost most of the waste.

HOW TO MAKE CREAMERY BUTTER ON THE FARM.

BY E. G. FULLER, BRILLION, WIS.

One of the possibilities, born of the newer methods of dairying, brought into vogue during the past ten or twelve years, is creamery butter on the farm.

One is almost astonished at the manner in which methods have been revolutionized in nearly all leading dairies during the past decade. The silo, deep setting, the cabinet creamer, centrifugal separation, and many improvements in methods of feeding, are all creatures of recent birth. At first thought, one is astonished at the rapid introduction of these new ideas; at the next, he wonders in view of the great advantage over old methods, that they have not been adopted by four times as many of the intelligent farmers of the country.

Before the introduction of cold setting in deep cans, and

the wide dissemination of dairy knowledge, when the "rule of thumb" prevailed in the dairy, only the older and more experienced butter makers, were able to turn out a really fine article of butter. It took years of experience, and careful practice, to become an expert butter maker.

To-day a neat and intelligent boy or girl of fourteen years of age, can become a good butter maker, after a few days' instruction. I do not mean by this that they could learn all there is to be learned about butter making. Our oldest and best butter makers are still students. But they could learn to make a good batch of butter, which would bring a good price in market, far above the average dairy sales.

A paper giving in detail the method of butter making, as practiced in our modern dairies, seems almost superfluous, before so intelligent a body of dairymen, as those composing the Wisconsin Dairymen's Association; yet a report would no doubt seem lacking without a paper upon the subject; and the fact that one of the younger members has been assigned the task of presenting such a paper is but one more argument in favor of the introduction of modern appliances in dairying.

While I shall describe the deep setting system, and believe it the best and most economical means of making butter upon the farm, I do not wish to be understood as intimating that good butter cannot be made in the old fashioned shallow milk pans. I believe that under proper conditions, just as good butter can be made by this method, as by any other. In this idea I may meet some opposition in this convention. But facts are stubborn things, and one of them is that some of the butter which sells in the open markets of New York, at the very outside prices, is made by the good old fashioned process.

But these dairies are fitted up in an expensive manner, the setting rooms are very cool and of an even temperature, and every facility for keeping milk perfectly pure is provided.

I have now in mind a dairy I visited last summer. The building could not have cost less than \$4,000. Several tons of ice were stored above the milk room, two dead air spaces,

and three walls surrounded it, three doors had to be passed in order to enter it. Tiled floors and walls surrounded the room, which was always at a temperature of 60° F. Upon marble shelves and tables, the milk of eighty pure Jersey cows was set in shallow pans.

But such a house is beyond the reach of our business farmers, and while the work of skimming several hundred pans of milk per day, may do for a millionaire farmer, it will not do for the man who must earn his bread and butter upon the farm. Nor is a house costing a few hundred dollars, and answering all the practical purposes, within reach of all.

The question to be solved is this: How to make good butter — creamery butter — with no better facilities than those offered by our ordinary farm houses. The kitchen pantry with its culinary odors, and the cellar, with its various odors, all of which combine to defeat the efforts of the would-be butter maker, who endeavors to make butter by the open setting process, and who is sure to fail, no matter how careful attention she may give to the mechanical process; or how much neatness she employs.

Milk, cream and butter are all remarkably susceptible to the effect of any foreign odor; and while the farmer, accustomed to eat but little butter beside his own, thinks he is eating first-rate butter, the epicure at once detects these foreign odors, nor need he taste the butter to do so, a "smell" is all he wants of it.

Fortunately the problem has already been solved for us. The cabinet creamers, where milk can be submerged away from the influence of all foreign odors, is the solution of part of the problem, at least as far as the milk is concerned.

Or, if you have a good milk room, all the essential points may be had in a common milk can twenty inches deep, eight inches in diameter.

To give directions in brief for good butter making, creamery process:

First. Attend to it that cows have proper food and pure water. Don't expect your cow to drink stagnant water and convert it into pure milk.

Second. Exercise every care in order to have the milk kept clean, both in milking and in care of all milk vessels. These should be scalded and aired daily. Sal soda should be kept for use in cleaning pans, pails, etc.

Third. Setting milk; this should be done as soon as possible after being drawn from the cow, and the can submerged in ice water, or cold spring water.

Cream rises rapidly in a falling temperature, and if milk is allowed to cool in the pails, the raising of the cream is delayed some hours. If from any unavoidable cause, the milk has been allowed to cool, it may be warmed to the temperature of newly drawn milk, before being set. If kept at a temperature of 40° to 60°, cream will all rise in ten or twelve hours.

Milk should be removed from the stable as soon as possible after being drawn from the cow. No stable, no matter how much care is exercised in keeping it clean, is fit for milk to remain in any length of time. If no ice is used, and very cold spring water is not to be had, it is better to allow milk to set 24 hours. Cream is usually allowed to ripen 24 hours before churning, though some churn in 12 hours. Where several days' cream is to be churned at a time, the cream should be kept as cool as possible, but not allowed to chill, until 24 hours before churning, when it is warmed to 60° and kept as near that temperature as possible until ready to churn, which should be done when the cream is in first stages of acidity. Cream can be kept perfectly sweet and fresh for several days, if put in cans and submerged in water, air tight. At home we churn every day in summer, every other day in winter, and usually add a few spoonfuls of sour cream to each can to develop acidity.

The usual direction for churning is, churn at a temperature of 62°, but this must be taken *cum grano salis*. Judgment is necessary to success in this matter, in summer, in a room as warm as the ordinary dairy rooms, 58° will not be too cold, while in winter, in a cold room 64° or 65° will not be too warm. While if cream is churned sweet, as some do, in order to get a full yield of butter, 56° is about the right temperature.

A skilful butter maker will make good butter in almost any churn, but the general preference is for a revolving or an oscillating churn, one with no inside fixtures.

Stop churning when the butter has formed in small pellets, or grains; use your thermometer to ascertain its temperature, and if above 60° , reduce it by adding cold water or brine. Draw off the butter milk. Wash, first in brine, then with pure water, until water runs off perfectly clear; which will usually be the third washing. Fifty degrees is about the right temperature at which to wash butter; but here again one must use judgment. In a warm summer day it is difficult to get too cold water, while in winter 56° is none too warm in a cold room.

Butter should be worked and packed at a temperature of about 60 degrees. If it gets much warmer, it will be greasy; if much colder, it will be crumbly.

After draining half or three-quarters of an hour, the butter is ready to salt, three-fourths of an ounce per pound is sufficient to remain in the butter, but as there is considerable water in the butter at this time, it will be necessary to add more than this. An ounce and a half to the pound of butter, estimated in the churn, I have found about right. Salt in churn, mix thoroughly, revolve the churn a few times, allow to drain a couple of hours, and your butter is ready to pack.

Where butter is not made into prints, I have no use for a butter worker. The object of its use is simply to press the butter firmly together and force out the water, and this can be done just as well by packing in thin layers.

Avoid any grinding, or sidewise motion of the packer, as this will cause white greasy streaks in the butter.

It is far better to use a package that can be filled at a single churning, round up slightly. Take a fine wire, or stout, smooth piece of wrapping twine, and cut off the top evenly. Cover with wax paper, or take a piece of butter cloth, cut to fit, sprinkle over a thin layer of salt, and close the package.

Fifty pound tubs usually sell best in market; but it is hard to get two churnings precisely of the same color, and

uneven color detracts from its market value. A fine grade of butter, in Bradley boxes, or eight or ten pound pails, finds ready sales in Chicago.

When coloring is used, it should be added after the cream is put in the churn. Very few dairies make butter in winter of enough color to meet the market demands in this respect, and its use will add several cents per pound to the market value of the product.

There is still considerable prejudice against the use of butter color; but when a man makes an article for market he must meet the market demands; and I consider the coloring of butter just as legitimate as the coloring of the clothes we wear.

Where this process of butter making is used, the danger which it must encounter from foreign odors, occurs during the ripening of the cream, and packing butter; this where a separate dairy room is not one of the conveniences. If the cream must be warmed and ripened near the kitchen stove, during which time it should be stirred frequently, in order that it may ripen evenly, it is almost certain to absorb some of the kitchen odors. Covering the cans with several thicknesses of cloth will help very much toward keeping the cream pure.

While these directions, intelligently followed, will produce good butter, which will grade "fair to good creamery," or even "good to choice," I do not think "fancy creamery" can be made on the average dairy farms of our state. Not the butter that can always be depended upon to bring the highest market price.

I claim that with proper facilities for manufacture, and these include a dairy house, the skilled butter maker on the farm, can turn out just as good — even better butter — than the creameries. But not one farmer in one hundred has these facilities.

I think the practical solution of this question of creamery butter on the farm, is to be found in the co-operative creamery. The investment necessary for each farmer in a neighborhood, to erect such a creamery, would be far less than would be required to construct a suitable dairy house for

each. The labor of manufacture would be taken from the overworked housewife and put into the hands of a skilled workman.

A uniform quality of butter could be produced, which being marketed in large quantities, could be shipped and sold economically, and at a better average price than would be secured by the individual farmers.

Again, there is not in every household a person who is competent to become a first-class butter maker. There are several farmers in my vicinity who have purchased creamers during the past four years. I purchased the first in our town, and I think the first in the county. A neighbor in the adjoining town in Manitowoc county, at about the same time bought one. From the first we have succeeded in getting good prices for butter, but I know of no others who do so. I sold a creamer to a neighboring family, and was particularly anxious that they should prove successful as butter makers. One day I called at churning hour, by request, and endeavored to give them a little benefit of advanced dairy knowledge. I had previously told them to stop churning when butter was in granular state; but they had tried it and said it was too much trouble. Washing butter they did not believe in, thought it was not as good. So they churned into a big lump, and finally the lady intimated to me that she had made butter in Germany before I was born. They always ask me how much we are getting for butter, and when they hear me mention a price a price five to ten cents above theirs, they "bless" their commission man, and declare he is cheating them. And during the four years that have passed they have not yet been able to make themselves believe that it *might* be the butter instead of the commission men.

There are too many of this class, wise in their own conceit, who cannot recognize the fact that the last decade has wrought a veritable revolution in dairying. They still cling to their own methods. Claim that they like their own way best; which is all right as far as to making butter for their own use, but when an article is made for public mar-

ket, public tastes must be consulted, and the product made to meet the demand, if a remunerative return is expected.

Again, there are many who do not know how to make butter which will stand the test of being placed on a butter market. They make a few hundred pounds per annum, which is sold to the country merchant at eight to fifteen cents per pound (and dear at that). Did they take but one of the many agricultural papers, they might get their eyes open a little. But they still jog along at the same old gait, and grumble about hard times. They are either too poor to take a paper, they say, or they have no time to read, or they don't believe in papers. They are all humbug. "Them fellers don't know any more about farming than I do, they are just printing them to make money." I have always observed that it was in the homes of the successful and prosperous farmers that the most papers were found; and somehow I have come into the habit of accounting the presence of a goodly number of agricultural papers as a cause, rather than a result of prosperity. Not that I think papers will make a farmer, but I do consider them just as essential to successful, progressive dairy farming as proper tools and implements to till the soil. There are thousands of men of intelligence and ability engaged in dairying, and these papers are the medium for the exchange of thought and experience, and these thousands of heads will evolve more wisdom in a year than the ordinary farmer can acquire in a life-time: hence the necessity of reading the papers to keep abreast of the times.

Following my statement in regard to the incompetency of the general mass of people to become first-class butter makers, I wish to quote a few lines from a recent number of the *Rural New Yorker*.

"All the fine arts require a peculiar temperament and delicacy of taste, in the broad sense of the word. Not one man or woman in ten has the characteristics to become either a good butter or cheese maker any more than they have to become fine cooks or 'artists' in any line.

"Undoubtedly advice and instruction, as well as sharp criticisms, have had the effect of greatly improving the av-

erage quality of dairy butter during the last twenty years. But this raised average comes mostly from the improvement of the few rather the many. There is as bad butter made now as there ever was, and an immense quantity."

* * * * *

"Gild edged butter can only be produced by gild edged people—by this I mean people of constitutional neatness and refinement, joined with conscientiousness and operative skill. The proportion of such people to the whole mass must in our present state of civilization, be relatively small, and the butter produced by them should be and is rightly ranked as a luxury, and as such commands a high price."

To repeat, while I believe that with proper conditions, and skill, the private dairy can produce a finer article of butter than the factory, owing to the general lack, and cost of these facilities, the practical solution of the question is in found in the co-operative creamery.

And with this, intelligent dairy farming, with butter as the output, cannot well fail to pay better, as a rule, than any other class of farming that could be pursued in most parts of the state.

In order to have butter at the season of the year when it will bring the best price, the larger portion of the herd should be winter milkers. Many farmers and farmers' wives do not like the idea of winter butter making, but I have yet to meet the one, who having tried it, did not prefer it to summer.

The cream from fresh cows churns much more readily than from those that have been giving milk for a considerable time.

It is usually claimed that fresh cows make better butter than farrow. I cannot speak from experience with sufficient knowledge to entitle the statement to much consideration, but I have been to some pains to gather information upon the subject, and am inclined to think there is not any marked difference between the farrow and fresh cows, as far as quality is concerned. But there is no question about cows in an advanced state of pregnancy making a poorer grade of butter.

Their cream is also much harder to churn.

As closing advice let me say, no amount of pains, skill or neatness is ever thrown away in the production of butter. Always make the best you can and place it in a butter market to sell, and you will get pay for all your trouble in making your best effort.

DISCUSSION.

Question — At what temperature will the cream be chilled?

Mr. Fuller — I don't like to get the cream below forty.

Question — Can you ripen cream in twenty-four hours at a temperature of sixty?

Mr. Fuller — Usually have a little trouble, I warm it up to about seventy generally. Speaking of the effects of silage on cream, I want to say at the farm of Mr. Theodore Havemeyer, Mattowan, N. J., they have some of the oldest silos in the country. I think they have buildings probably costing \$100,000, and they have Jerseys worth \$1,000 each. They fed them on ensilage steadily about eighteen months, without being turned to pasture, they never went out of the stable except for exercise. To-day they feed ensilage exclusively, for forage feed for their cows, and are very much pleased with it, and they simply would not have fed it if it had any bad effects upon such animals as they have. They sold the increase for two years for \$24,000.

Convention took a recess to 1:30 o'clock P. M.

AFTERNOON SESSION.

The convention met at 1:30 P. M. President Adams in the chair.

Mr. I. J. Clapp being called on for a statement as to his silo, spoke as follows:

Mr. Clapp — My silo is about 22x14 ft., and 18 feet high. I put my corn in whole, do not cut it up at all. I cut it with a reaper, and gather it into bundles, lift it with a horse fork

after it has been drawn to the silo, and drop it down into the silo. I put it in whole and feed it whole. There are many people who do not feel that they can go to the expense of building a silo, and buying the machinery for cutting the corn. They could manage to build their silo, if they did not have to go to the expense of cutting it. I have neighbors who have put it in this year the same way, they are equally well pleased with it, and they have told me that if they could not have put it in whole, they could not put it in at all. I put it in with my own help on the farm, and can do it very rapidly, and I have never seen better ensilage, the cattle eat it all up. There is one opening in the building where I take it in, and another opening in the opposite end where I take it out. The opening is similar to ice house doors, you take down as you get down, and all the sides are solid, made of pine lumber and building paper, as air-tight as I can make it. I put up 10 inch studding, on the outside I put on common drop barn siding, and on the inside rough boards, then a coat of tar paper, and then sealed it up with common six-inch grooved and tongued flooring. My corn is a kind of hybrid dent. I get it in early, so it matures enough, so as to get it in before the storms come, and I have it pretty well ripe before I cut it. I wilted it about two days, but I think that was a little too long. I have no difficulty in getting it out of the silo with a fork. I uncover one compartment at a time. I never would cut a silo down. I wilt the corn right on the ground, cut with a reaper and leave it right in the bundles, just as it is dropped by the reaper.

Question — How many cubic feet would it take to make a ton?. We want to know something about how large to build a silo to carry a certain number of pounds.

Prof. Henry — From thirty to forty-five. From thirty pounds of dry, well cured fodder to forty-five for heavy ensilage.

The Chairman — When it is put in whole, it wouldn't weigh as much would it?

Prof. Henry — I cannot answer that question.

Question — How do you lift your corn into your silo, Mr. Clapp?

Mr. Clapp — I have a carrier right from the top of the silo, just as I would have in my barn, and the same gear that I use in my barn for hay.

Music — "The Little Maid Milking Her Cow" — Miss M. E. Knox.

RECENT INVESTIGATIONS CONCERNING MILK.

By S. M. BABCOCK, PROFESSOR OF AGRICULTURAL CHEMISTRY,
UNIVERSITY WISCONSIN.

Every dairyman knows that the yield of milk has no relation to the amount of butter which a cow will produce; a few have reached the conclusion that the amount of cream which the milk yields is almost as deceptive for determining the amount of butter which it will give when churned. By far, the greater proportion of thoughtful dairymen attribute the difference in the yield of butter from different samples of milk or cream to a difference in the amount of fat which the milks or creams contain and suppose that if the amount of fat could be accurately determined in the milk or cream, it would furnish an absolute measure of the butter which would be obtained by churning. Unfortunately upon this point, but few data are available, as there have been but few butter tests made that are accompanied by analyses of both the milk and the butter obtained. A comparison of these tests shows almost as great a difference in the proportion of butter fat recovered by the churn, from the milk of different cows, as is found in the amount of cream, or even of milk, which the cows would produce.

There were among the cows at the New York experiment station two Jerseys that gave about the same quantity of milk; a chemical analysis showed that these milks were of about the same quality, that is, that they contained about the same amount of fat. No one could have determined from the appearance of the milk, or even from the analysis, which was the better cow, and yet one of these cows would yield on the average, about half more butter than the other. There was

recovered in the butter from the milk of one, about 95 per cent. of the butter fat, and from that of the other, but little more than 60 per cent. In these tests both milks were treated in the same way. In the same herd were two other native cows that gave about the same quantity, and quality of milk, and yet the fat recovered from those milks by the churn varied over 10 per cent.

In the tests of three Jersey cows belonging to the president of the American Jersey cattle club there was found in the butter from one, 96.8 per cent., from another, 99 per cent., and from the third 79. per cent. of the fat in the milk. These cows were tested at the same time, were given the same kind of food, and their milk was treated in the same way. I believe that differences as great as these cited would be found in almost any herd by testing the individual cows. I have been unable to reconcile discrepancies of this kind which have come under my observation by differences in the chemical composition of the milks. In some cases an excess of casein or albumen has characterized milks which did not yield butter in quantity which the analysis indicated. This is especially true of colostrum milk which often contains double the amount of solids found in normal milk. The increase in solids is usually albumen, the fat and other constituents of the milk being about normal; such milk rarely gives butter, even by prolonged churning. On the other hand I have had samples of rich milk that showed nothing abnormal in their composition, which gave no butter by prolonged churning under conditions which usually gave fair results. Experiences of this kind have convinced me that an explanation must be sought in the physical constitution of milk rather than in its chemical composition, and it is to this side of the question that I ask your attention to-day.

Milk, when examined with a microscope magnifying 400 or 500 diameters, has the appearance of a clear liquid holding in suspension an immense number of globular bodies of yellowish color which comprise the fatty portion of the milk. These fat globules vary greatly in size, the largest being about 1-2000 of an inch in diameter, while the smallest are scarcely more than 1-10 of this size. Formerly, these

globules were supposed to be surrounded by a thin membrane which kept them intact and prevented them from uniting when they came in contact. This hypothesis has furnished a plausible explanation for all the observed phenomenon in the creaming and churning of milk. The fact that the larger globules were first to rise, was explained on the ground that the membrane being heavier than the fat, so encumbers the small globules that many of them never rise at all. The ripening of cream is explained by supposing that the slight acid developed partially dissolves the membranes so that they are more easily broken, while the object of churning was to violently rupture these membranes and set the fat free. Rarely is a theory so consistent with observed facts, and yet I believe there is no reliable evidence presented to show the existence of a membrane while there are many facts entirely inconsistent with this assumption.

I will not review here all of the arguments in favor or against this membrane, but will mention one or two points against its existence. First, all of the observed phenomena of milk fat may be duplicated in artificial emulsions in which there certainly can be no membrane. By churning an artificial emulsion at a temperature above the melting point of the fat which composes it, the globules are broken up into smaller ones but are never separated in a form analogous to butter. The longer the churning is continued the more perfect is the emulsion. When milk is violently agitated at a temperature above 100° F. the same thing occurs, the globules being continually broken up, their numbers being greatly increased, moreover this occurs without any change in the microscopic appearance of the globules. This would obviously be impossible if a membrane existed. The only inference from facts of this kind is that milk itself is an emulsion and subject to the same general reactions and changes that other emulsions are. If this conclusion is true our facilities for studying the phenomena of creaming and churning of milk are greatly increased as it permits experiment with artificial emulsions in which certain peculiarities may be exaggerated, or if desirable, eliminated and their

effect observed. This may be done to an extent absolutely impossible in so complex a liquid as milk. Accepting the hypothesis that milk is an emulsion, let us turn our attention to the properties of simple emulsions and the conditions which are necessary for their existence in a permanent form.

The term emulsion is applied to mixtures of oil or fat of any kind with water or any other liquid which has no solvent action upon it. There is no chemical union between the oil and the emulsifying liquid; it is a mechanical mixture and no emulsion can be formed with liquids which exert a solvent action upon the oil. Thus no emulsion can be formed with ether nor with any liquid which mixes freely with the oil. A second essential condition is that the emulsifying liquid possess a certain degree of viscosity. A permanent emulsion cannot be formed with a limpid liquid. You all know how difficult it is to mix oil and water; no matter how thoroughly the two are shaken together they quickly separate when left at rest, both the oil and water being unchanged. If, however, a little albumen or even mucilage be dissolved in the water and then shaken with the oil, the emulsion formed will be permanent in proportion as the liquid is viscous and the mixture thorough.

When air rises through pure water it will escape from the surface without forming a permanent bubble. If, however, a small quantity of soap or albumen be dissolved in the water, the air when it reaches the surface will not escape directly, but will lift up the surface of the liquid as if there were a membrane stretched over it, and will form a bubble which will remain for some time. The formation of bubbles is due to the property of liquids known as surface tension. When a number of bubbles come to the surface of a liquid having this property, those first formed are either pushed to one side or raised up without breaking the films which separate them. If the liquid is very viscous, and sufficient oil be mixed with it, the whole of the liquid will be required for these films and there will be a mass of foam. This is the phenomenon which occurs when the whites of eggs are beaten to a froth. The more the eggs are beaten the finer are the bubbles of air, and the more permanent is the froth. This foam or

froth is perfectly analogous to an emulsion in which the oil is replaced by air and those liquids which are most favorable to the formation of bubbles or froth, are the ones which most readily form emulsions with oils. We will find therefore that a study of the conditions favorable to the existence of bubbles or foam will lead to a better understanding of much of the phenomena of emulsions, and finally of milk and cream.

I have in this cylinder a solution of soap in water, sufficient soap having been added to render the water quite viscous. By shaking the cylinder the air is distributed throughout the liquid in bubbles of varying size. If it be left at rest for a few moments the bubbles slowly rise towards the surface where they form a layer perfectly analogous to the cream upon milk, but owing to the great difference in the specific gravity of air and the liquid, the separation is much more rapid than with cream. You will observe, at least those of you who are near, how the bubbles rise, first that the large bubbles come quickly to the surface while many of the smaller bubbles are moving in the opposite direction; the causes of this downward movement are the currents formed by the large bubbles. You will also notice that the bubbles attract each other forming groups which rise together very much as a single bubble would, but no matter how near to each other they may be, none of them unite together to form a single bubble. This only occurs after the bubbles have reached the surface and after the films have by the action of gravity become very thin. This is exactly the way in which cream separates from milk, and the appearance is the same as this when milk is observed with a microscope so arranged that the globules in rising cross the field of view. The large globules are the first to reach the surface while many of the smaller ones are carried back and forth by the currents, some of them never reaching the surface.

There is another analogy which may be shown with this solution. If water be added to it thereby reducing its viscosity the bubbles will be seen to rise more rapidly. The same will occur with milk, the addition of an equal volume

of water will cause the cream to separate much more rapidly and more completely than when the pure milk is set. Nor is this all; the breaking of the bubbles or in other words the disappearance of the foam is in a certain sense analogous to what occurs in churning. You observe in this cylinder containing the more viscous liquid that the foam is more persistent than in the other, and if we could remove the foam from these, or in other words, skim them, and stir the foams in any way that the foam from the more viscous liquid would be broken up or churned with more difficulty. So it is with emulsions and with milk. The creams from emulsions with viscous solution are bulky and permanent; the cream from milk with viscous serum separates slowly, occupies a large volume for the fat which it contains and churns with difficulty or perhaps will not churn at all. The cream upon colostrum milk is often 50 per cent. to 75 per cent. of the whole milk and will rarely give butter even by prolonged churning. The addition of several volumes of water, however, to the milk before creaming will reduce the viscosity of the serum to a point where the cream obtained will give butter.

WHIPPED CREAM.

Every dairyman knows that cream taken from sweet milk does not churn readily and does not give up all of its butter. The same cream, upon standing until it is "ripened," will churn easily and will yield nearly all of its butter. Now, what change takes place during the ripening of cream, which makes it churn more easily. It is simply a change in the viscosity of the milk serum brought about by the formation of a little acid which removes a portion of the casein from solution so that the fat globules may be more readily united. Sweet milk can scarcely be churned, but the same milk, when soured, will churn easily and yield nearly as much butter as if the cream alone were churned. There are, however, occasionally samples of milk, and even of cream, which will not respond to the churn after they have been soured. Such milks will often be found to contain a large amount of albumen; this is not removed by the acid formed, and keeps the viscosity of the serum at a point

where churning is impossible. If milks of this kind be heated to a point sufficiently high to coagulate the albumen (about 130° Fah.) before it is set, the cream will be found to churn readily. Milks scalded in this way should be set in shallow dishes and not in deep cans, as the coagulated albumen retards the movement of the fat globules so that in deep setting many of them fail to reach the surface.

You will observe in the foam upon these cylinders that the largest bubbles are the first to break, so in churning the large globules are the first to unite. I have determined the number of globules in milk, noting the number of globules below a certain size; this milk was then churned for a few minutes and the number of globules determined again in the same way. The small globules were found undiminished in number, while the large ones were to a great extent united, as shown by their diminished number and distorted appearance.

Let us consider briefly the proper temperature for churning. It is evident that churning can only be conducted with success when the fat globules are of such a consistency that they will adhere to each other when they come in contact. The temperature at which cream can be churned with satisfactory results has a narrow range, rarely if ever being outside of 50° F. to 70° F.; below 50° F. or above 80° F., very little butter will be obtained; below 40° F. or above the melting point of the butter fats, 95° F. to 100° F., no amount of churning will produce butter. Obviously all milks should not be churned at the same temperature if the best results are to be obtained. In a test of individual cows I have known a difference of four or five degrees to be made in the churning points of six cows, the milk from one, a Holstein cow, giving quite a soft butter was churned at 56°, that from another cow, a Jersey, with a very firm butter was churned above 60°; these temperatures had been found experimentally to give the best results without the dairymen knowing the reason for the difference. At low temperatures the viscosity of the milk serum is considerably increased causing the cream to froth and swell; this often makes it advisable

to churn at a higher temperature than would otherwise be desirable.

I will briefly review the conditions and properties of milk which affect the yield of butter. In this, I shall not consider the absolute yield but the per cent. yield of the butter fat which the milk contains.

1st. The size of the fat globules. Large globules, other things being equal, will separate more rapidly and churn more easily than small ones. Milk with large globules, unless they are accompanied by a large number of small ones will yield a large part of its fat to the churn. In general, the more uniform the globules are in size, the better the yield, as in that case the more uniform will be the creaming.

2nd. The viscosity of the milk serum. The more viscous the milk serum, the slower and more imperfect will be the creaming; the greater will be the volume of cream in proportion to the fat content and the more difficult will be the churning. A low viscosity of the serum is therefore most favorable to the production of butter.

3rd. A suitable temperature for churning. This should by no means be the same for all milks, especially when single cows are tested. Cream from cows, which is soft, should be churned at a lower temperature than that in which the butter fat is very firm. In mixed milk this factor is not of so much importance as the different kinds of fat tend to neutralize each other.

I believe that in those cases where the churn fails to produce as much butter as the fat in the milk would lead one to expect, that it is due to one of the factors which I have mentioned. In regard to the cows at the New York experiment station already mentioned, the one giving the largest yield of butter gave a milk with large globules and with a serum of low viscosity. The one giving the smallest yield gave milk with small globules and a viscous serum. The two cows with a medium yield produced butter almost in proportion to the size of the lobules—the serum in both milks having about the same viscosity.

I believe that these conditions may be overcome, and

when a more thorough understanding of their causes and effects is obtained by a more extended scientific investigation of the subject, that methods will be devised which will give quite generally a yield of butter which will approach closely to that indicated by chemical analysis.

DISCUSSION.

Prof. Henry — I believe Dr. Babcock very carefully calculated the number of globules in a quart of milk. If he remembers his figures I wish he would give them.

Dr. Babcock — I don't think I can give the exact number, but if I recollect right, it was four with something like twenty ciphers attached to it.

Mr. Beach — Would you ever advise to mix water with new milk to raise cream?

Dr. Babcock — In some milks, if cream is the only object, you will get a very much more perfect separation. I do not think it would injure the quality of the cream.

Mr. Hoard — I had a three-quarters Jersey cow once, but for two years it was extremely difficult for me to get any cream from her milk. The milk appeared to be rich, and yet if it was set in any way for thirty-six hours, it would throw up but very little cream. By the aid of a friend in our town I gave it a partial microscopic examination, and decided that the milk globules were very small, a large number of them. By an accident the cow ate too large a quantity of meal, and very nearly died in consequence of her gluttony. I finally saved her, and there took place in her a remarkable change, and ever after that for the year that I kept her she gave an astonishing amount of cream, and the milk was as blue as if it had been skimmed three times. Now, I would like to ask the Doctor if he has any idea what change took place in this cow in consequence of that action of hers — whether it was an increase in the size of the globules or what it was that produced this change?

Dr. Babcock — I think it was much more likely to have been a change in the viscosity of the milk, for even if milk

contains very small globules, it will yield the cream after standing.

Mr. Hoard — But, it will remain in perfect emulsion?

Dr. Babcock — It will remain in perfect emulsion, in very viscous milk they will never rise. I believe every body has seen it in colostrual milk, and yet those milks are very much richer than the later milk of the cow.

Mr. Hoard — I know that a creamery man who has been treating what we call slow or stubborn milk, or what you call viscous milk, will add about 25 per cent. of water.

Dr. Babcock — That is what I said in my paper. I may mention one experiment I made as to the effect of viscous serum upon churning. At the time these experiments were made, we separated our milk by the Cooley System in submerged cans. Taking the cream from two or three cans, it was mixed with water, about the same amount of water, as the skim milk removed, so that we had a milk with very much less viscous serum than at first. This artificial milk was returned to the creamer and creamed the second time, and a portion of it creamed the third time. The mixtures being warm before they were set. These three samples from the first, second and third creamings were churned in a test churn, having quart bottles, all the bottles being in the same churn, so that each received the same amount of agitation. The order in which these butters came was exactly in the order of viscosity; that is, the one which had been creamed twice came in two or three minutes. I will state, by the way, that these creams were churned while sweet, they were not ripened in any way, they were all of the same age, and had been treated alike. The second creaming required about half an hour to churn, while the third came in about one and a half hours, and gave no more yield to the amount of cream than the third creaming did.

Another experiment was made in the same line, with the centrifugal, in which the first cream from the milk was divided, and these mixed with water containing a little salt to increase its specific gravity, so that the separation would be perfect, and creamed a second time in the centrifugal. These two creams were churned in the same way, neither

of them being two hours from the cow, and the second one, that is, the one from which the serum had been largely removed, the cream came in less than a minute by the test churn, while the other never came at all. It was churned an hour or two, and of course, we got some butter, but nothing that would be called butter hardly. Another thing, these two butters were placed side and side in the dairy without salting. This was in the summer time, and the temperature of the dairy was probably between sixty and seventy. This was done to note their keeping qualities. The butter from the washed cream remained sweet, did not turn rancid at all, as long as they were kept there, while the one from the sweet cream, from which the serum had not been washed was all mouldy within a week, and both butters were kept there for three or four weeks, until one of them became too offensive to have around the dairy at all, while the other was apparently sweet. Another experiment I made to find the yield of butter in three tests. In these three cases the cream was ripened equally. The quantity was more from the washed cream in two instances, and in one it was more from that which was unwashed, but there was a great gain in the keeping qualities in every case. The quality of the butter was never tested to any extent, and I cannot say anything upon that point.

Mr. Hoard — Would not succulent feed add to the proportion of water.

Mr. Babcock — It might. I have not tested that point. I will state this, that a highly albuminous ration seemed to delay the creaming of the milk.

Mr. Hoard — It is a well known fact in the dairy practice that the cream rises more readily during the most succulent period of the cow's feeding, and that as the cows approach that portion of the year when the proportion of water is less in their feed, the creaming is slower, and the churning is slower.

Dr. Babcock — We know that the longer cows are from being fresh, the smaller are the globules, but the effect of the feed upon that point, I could not state, but the fact that the creaming is slow, indicates that the viscosity is high.

Mr. Beach — You spoke of scalding milk. What effect has that upon the butter product?

Dr. Babcock — As to the quality of the product I am hardly competent to state, as to the quantity of milk, it is increased. I think there is no exception to those milks which contain a high amount of albumen, that the yield is greater when they are scalded.

Question — Isn't it apt to make mushy butter?

Dr. Babcock — I should think it would be. I am not speaking of the quality, but of the quantity.

Prof. Henry — At the experimental station we tried experiments like this: Our milk was set in the Cooley can with ice in the can, the natural milk as it came from the barn had a temperature of about 90 to 95 degrees.

We heated it up to 110 degrees, and in some instances to 120, and then 130 in other instances. Then we plunged it at once into the Cooley cans, in hopes that we would get more cream by heating it above what the cow did, but we did not.

Prof. Babcock — The coagulation of the albumen retards the raising of the globules, but if that same milk had been raised in shallow pans you would not have found it so.

Mr. Hoard — I want to ask two more questions. Do I understand you to say that if the milk was heated, it should be set in shallow pans?

Dr. Babcock — Yes, shallow settings with scalded milk, those two ought to go together.

Mr. Hoard — The other question is whether you have made any experiments with cows at different stages of gestation?

Dr. Babcock — No, I have not with that in view.

Question — I understand you to say, that water diminishes what you term the viscosity of milk.

Dr. Babcock — The viscosity of the milk serum.

Question. Then, those cows which give poor milk would give milk less viscous than rich milk?

Dr. Babcock — Yes, and the cream would separate quicker. There is more albumen in milk in cold weather than in summer, and therefore more viscosity of the serum.

Question — Is it certain because it is winter, or may it not be because the cows are not fresh?

Dr. Babcock — I am not competent to answer that, not having made experiments in that direction at all.

Mr. Hiram Smith — There is no difficulty in churning a fresh cow's milk in winter, but there is a stripper.

Mr. Beach — What would be the effect of pouring warm water into cream to bring it to the proper temperature for churning?

Dr. Babcock — It would reduce the viscosity of the serum that is in the cream, and it would churn more easily, and I do not think it would affect the quality of the butter if the water is not too warm. I would not advise boiling the cream, but a moderate quantity of water at 100° won't hurt any cream at all, you get fully as much butter from it, and I don't think it can hurt the quality anyway. I would not put it in at 120°. Of course the greater the amount of fat in a given volume the more readily will it churn, so unless the viscosity is the real objection, I would not advise the use of water. In those creams which are very difficult to churn the addition of some water will be of great advantage.

The Chairman — I would like to call for the ideas of one of the dairy women of our state. Mrs. Bragg, what do you think about this?

Mrs. Bragg — I used to set the can of cream in a can of hot water to heat up the cream, but when I was at Mt. Sterling, Mr. Gould told me to go home and try it the other way, put the hot water in my cream, and I find I can churn a great deal quicker. I can churn twenty pounds of cream in twenty minutes, and I never could do that before. It sometimes used to take half an hour, sometimes three quarters and sometimes two hours, now it always comes by the clock in twenty minutes.

Question — Do you pour the warm water into your cream to warm it?

Mrs. Bragg — I used to set my cans into the warm water, but now I pour in water hot enough to warm it up to 60 or 65, sometimes put in one or two gallons. I use shallow setting.

Prof. Henry — I have been watching the faces of the audience fully as much as I have that of Professor Babcock, and I believe he has had a most eager and interested class of listeners before him this day. I consider that Dr. Babcock's investigations mark a new era in dairy matters. Dr. Babcock is the first to study milk from a physical standpoint. He has come into a great dairy state, and I hope no farmer will fail to stand by him in his efforts to advance this line of work. Some of you will go out of this room, and say, "That wasn't very interesting, we didn't hear anything that we can take home, at all." Don't you be so sure of that. It is a good thing for us to study these matters from a scientific point of view. Scientific men are every day bringing up practical ideas, and I have no doubt that Dr. Babcock in his laboratory will bring out ideas that will be practicable to the farmers in this state, and I hope that you will all join hands with him in believing that from intelligence, and energy and push will come our best results in the future.

Music — Duet — "The Lonely Bird," Miss Goodfellow and Mrs. E. Woodruff.

THE COW AS AN ECONOMICAL FOOD CONSUMER.

BY C. R. BEACH, WHITEWATER, WIS.

The claim of the dairymen that they can realize more money from a given number of cows than can be obtained by feeding an equal number of steers is very generally admitted. But there are those who claim that this larger income is the result of extra labor, rather than due to any inherent superiority on the part of the cow in extracting nutritive value from the food she consumes.

The object of this paper is to prove that from the peculiarity of her organization she does possess this superiority.

The ultimate end for which we keep cattle is to convert the coarse vegetable growth of our farms into human food.

Now, if I am able to show conclusively that from an acre

of pasture, a ton of hay or a bushel of corn we can realize not only a greater money value, but also a large amount of human food by feeding them to dairy cows than is possible to realize by feeding them to steers for the production of meat, and I might add more value than by feeding to any other domestic animal, I shall have gained my purpose. In determining the relative value of different articles of human food, we have first to determine the value of the elements of which they are composed. A pound of beef has more value than a pound of potatoes, because the protein and the fat that compose the beef has greater nutritive value than the starch of the potato.

With this standard to determine values, I propose to compare the cow as a milk producer with the steer as a producer of meat. And in doing so let me call your attention to two animals, both of which are the highest representatives of their respective classes. The steer Mammoth, raised and fed by John D. Gillette, of Elkhart, Ill., and the cow Clothilde, owned by Smith, Powell & Lamb, of Syracuse, N. Y. This steer, when one year old, weighed 1,400 pounds; when two years old he weighed 2,250 pounds—making a gain of 850 pounds, having eaten besides pasture grass and hay, 5,600 pounds of shelled corn, or 15 pounds per day.

It is this second year's growth that I shall use in making my comparison.

Of this 850 pounds of added weight fifty per cent., or 425 pounds, is water, leaving 425 pounds of dry solids in the form of muscle, fat, bone, hide, hoof, horn and hair, only one half of which can be used as human food; 72 pounds of protein in the form of dry muscle fiber, and 140 pounds of fat, 212 in both free from bone as the food value of this one year's growth.

I have not ascertained the live weight of Clothilde, but as she is Holstein I presume that her live weight will not differ much from the steer, 1,400 pounds. If so their food of support will not materially differ.

This cow, when six years old, gave 26,021 pounds of milk in one year. In answer to a letter written to her owners, as to what she was fed, during the trial, they answered that

she had pasture grass, hay, roots and ensilage without weight." For grain, she was fed ground oats and wheat bran, in equal measure, not to exceed twenty pounds per day, and less during the flush of grass; so we may presume that her feed did not exceed in value that fed to the steer. This 26,000 pounds of milk, if standard quality, would contain 3,380 pounds of dry solids, reducing the sugar of milk to the value of fat we have 2,860 pounds of dry food equal in value found to the 425 pounds contained in the year's growth of the steer, or six times the amount, and thirteen times the amount in boneless beef.

If I have taxed your credulity too strong by this illustration let me come down to a lower scale.

In looking over the records of the various fat stock shows, held in Chicago, I find that 300 steers of the average of twenty-five months had made a gain of two pounds per day, or an average growth of 1,500 in two year and one month. These steers were the very best of their class that the whole county could produce. They were bred, selected and fed designedly for prize winning, we may therefore reasonably suppose that the two pounds per day is the maximum of growth for this length of time. This 1,500 pounds of live weight will contain 730 pounds of dry solids, only 430 pounds of what has value as human food.

I think you will allow that it would not be difficult in as wide a range to select 300 cows that with the same feed will give 8,000 pounds of milk per year, 16,660 pounds in the twenty-five months; this 16,660 pounds of milk will contain 2,166 pounds of solids, but will in this case off-set the sugar of the milk against the waste in the steer and we still have 1,280 pounds precisely identical in composition, and equal in food value to the 430 pounds of available solids in the steer, 1,280 to 430 or almost precisely three times as much.

But let us compare these two classes in another way. These 1,500 pound steers, as they are very fat, will yield sixty pounds of dressed beef to the hundred pounds of live weight, or 900 pounds of dressed beef each, of which forty pounds will be bone, leaving 860 pounds of boneless beef.

This 16,660 pounds of milk will make 1,666 pounds of cheese equal in nutritive value as food to 2,500 pounds of boneless beef, reaching nearly the same conclusion as before, or three times as much food from that fed to the cow as to the steer.

One more illustration and I have done with this part of my subject.

Prof. Henry, in his report from the experimental station for 1886, has given us a long and very interesting report of the result of feeding the calves of common stock up to two years old. Out of this report I have gleaned the following facts:

Ten steers that weighed 508 pounds each, April 26, one year after, weighed 1,043 pounds, making a gain in one year of 535 pounds each. These ten steers had each eaten, aside from hay and pasture grass, 2,384 pounds of corn meal and bran. But as these steers are not very fat they will not yield more than 45 pounds of dry solids to the hundred pounds of live weight, or 240 pounds in the year's growth.

Any well selected dairy of common cows fed as these steers were fed, pasture and hay, with 2,384 pounds of corn meal and wheat bran equal to 10 pounds per day for 238 days, will give 5,000 pounds of milk each. This 5,000 pounds of milk will yield 650 pounds of dry solids; but we will discard the sugar in the milk and then we have 480 pounds of protein and fat precisely identical in composition to the 240 pounds in the growth of the steer, or twice as much; but this 240 pounds contains only 127 pounds available for human food, making the milk of these cows three times the value of the meat of the steers.

If it be claimed that few dairy of cows in Wisconsin will give 5,000 pounds per cow, I answer still fewer lots of steers will put on 535 pounds of growth in one year.

In confirmation of what I have said, forty-five years ago, a French writer claimed that a cow would draw from the same pasture a quantity of matter for the food of man, more than double the quantity extracted by a fattening ox.

Should you ask the reason for this superiority on the part of the cow in extracting nutritive value from her food, I

answer: It may be done in part to qualities peculiar to her sex. I mean fineness and delicacy of organization.

Do not suppose for a moment that I am promulgating any new dogma in cowology.

I do but confirm Hoard's doctrine of *Nervous Temperament*.

By virtue of these qualities the heifer matures earlier and makes better beef.

The ewe shears more pounds of wool in proportion to her live weight; and I might add, woman performs more work in proportion to the food she eats.

It is doubtless for this reason that from time immemorial, women have been paid less than men for equal work. I know that by radical reformers; this is looked upon as a great wrong—a relic of barbarism, but we can perceive that this custom may have had its origin in the very nature of things, and those old custom makers may have had clearer visions and juster views than we have been willing to allow.

Should the time ever come when women shall be placed on perfect equality with men, receiving equal pay for equal work, they will have much the advantage.

Were our wives to share in our incomes in proportion to labor performed, I fear some of us men would find it more difficult to meet our *little private personal expenses*. I fear that they would oftener attend and talk at these institute conventions, and so deprive us of the pleasure of boasting of what *we* have done. In fact, we should lose much of that prestige that comes from the heaven ordained and heaven given right to *mastership*. And the time would come when we should inspire as little *reverential fear* as dehorned bovines of the male persuasion. Pardon this digression, for in my zeal for the truth I sometimes wander from my subject.

But there is another and better reason for this superiority the cow as a food extractor. The first use that both the cow and the steer make of their food, is to maintain their normal condition. The remaining nutritive value that the cow extracts, she yields up to her owner every twelve hours in payment for material furnished and care bestowed.

She has adopted the pay down policy, and if more of us

would follow her example we should better understand the wisdom of it. But she has not only paid her debts, but she has also freed her system of this accumulation, and the burden of *carrying* and *caring* for it. And she is ready the next day to work up an equal amount of material with equally good results.

It is *this* peculiarity of the cow that gives her superiority as a food converter.

Not so with the steer. The accumulations of to day he puts upon his back, and for carrying it and he must have an additional amount of food of support, you ask him for payment or at least for some security that you shall receive pay for the food you are furnishing him.

He will tell you, that he can do nothing of the kind. That the best he can do is to make a will in your favor by which you shall at his death *inherit* his accumulations more or less, on condition that for every pound that he put on you give him daily two per cent. of its weight, in good hay or its value, and if you fail to do it he will let what he has already put on go to waste, or he will take so much out of his food of accumulation.

If you are feeding him a full ration this necessary daily addition to his food of support, is so much taken out of his food of accumulation, and it is only a question of time when it will take all that he can eat to maintain him, and so entail a loss to his owner to the full amount of his food.

The steer Mammoth to whom I have before referred, is a good illustration of what I am trying to make clear. In his second year of feeding he consumed 5,800 pounds of corn, adding to his live weight 850 pounds, weighing 2,250, his third year he consumed 8,400 pounds of corn and added to his live weight only 200 pounds, so that the price the owner paid this steer for carrying this 850 was 2,800 pounds of corn and the price of 650 pounds of lessened products.

The point is that the cow by daily separating her accumulations from her organism keeps herself in the best possible working condition.

There is no call for any increase in her food of support, and she will continue to work as a food converter, many years

with increased rather than diminished result. While the steer from the first day he is fed to the day of his death, gives a daily lessened product in proportion to food consumed.

I have spoken of the cow as an economical food consumer only relatively, but indirect proof has often great value, at least in confirming what we before believed to be true. The positive and direct proof that the cow if given a fair chance will and does pay a profit above the cost of her keeping and care has so often been presented, before this association, both theoretically and by actual proof, drawn from the balance sheets of our best dairymen, that I shall not at this time attempt it.

The success of Ward White, of Hiram Smith, of S. R. Hustan, of John and David Flack, of C. P. Goodrich, and many more that I could name, who have drawn their entire income from their cows and have grown rich, is better proof than any mathematical demonstration I might present.

While these men I have named may differ in their methods of feeding and handling their cows they will all agree that the more comfortable the surroundings the better the results, and further, that the more they have studied how to intelligently combine their feeding stuffs for a specific purpose, the less has been the cost of production. In short, that their success has been in the exact ratio of their appreciation of a better knowledge of their business.

And that the cow has in no case failed to respond to improved conditions, showing plainly that she has not yet reached the limit of economical production.

We must all remember that there is no *inherited* or *acquired* power in the cow to make or modify the conditions that surround her, or to extract more from her food than the food contains.

It is for her owner to see that she has the best possible chance, if we expect the best possible results. That a *good cow* in order that she may show that *she is good*, must *always of necessity* be supplemented by a good owner.

And that fineness and delicacy of organization which will

cause her to respond most readily to favorable conditions, will make her equally susceptible to whatever is unfavorable.

The cold bleak winds or drenching rain that would scarcely be felt by a fat bullock, would chill a sensitive cow to the marrow of her bones and shrink her milk below paying quantities. The farmers of Wisconsin, who have made the keeping of cows their chief business, have been fairly successful, but had they given them better cows and fed them with *more intelligence*, their profits would have been greater.

And to those who keep cows and claim that they do not pay, let them ask themselves if they have given them as good a chance as they might or ought, and if not let them blame themselves, and not charge to the cow what was the result of their own neglect.

The more we study the cow, and the more intelligently we handle her, the better will we be convinced of her wonderful capacity, and adoption, for converting our feeding stuffs into human food, and so giving them an increased money value.

John Randolph once rose in his seat in congress and shouted at the top of his voice, "I have found the philosopher's stone. It is, pay as you go — pay as you go."

The cow pays as she goes, and if given a fair chance, will extract more wealth from the soil of Wisconsin than has ever been yielded by the mines of California or Nevada.

Mr. W. D. Hoard was called to the chair.

DISCUSSION.

Mr. Hazen — Mr. Chairman, Mr. Beach has drawn some comparisons between the food productions of the cow and the steer, but he don't say anything about the extra labor and expense in producing milk and making butter. The labor is a big question with most farmers.

Mr. Beach — Are the owners and feeders of steers so

modest that they are unwilling to press that point themselves, to show that they produce their stuff cheaper than the dairyman does his?

Mr. Hazen — I didn't say that they had.

The Chairman — Then, you are answered.

Mr. Graves — How many years must you keep your cow before she will come up to the maximum.

Mr. Beach — Not any longer than I keep the steer before I commence feeding him for beef. But the object of my paper is not that, not a matter of dollars. I wished merely to show the wonderful capacity of a cow to take food and convert it into human food. It is as clear as daylight and beyond all necessity of demonstration, that a cow will pay better than a steer, we don't want to demonstrate that one hundred times over, and the reason why is because she has the power of taking the same amount of feed and making more human food out of it. Every man that has ever kept a cow knows she pays better than every steer he ever owned. I don't need to demonstrate it. I am only giving the reasons why.

Mr. Briggs — What is your actual opinion as to the expense of extra hired help in caring for say fifty cows over fifty head of steers, giving them no further care than is necessary to produce the most beef on the one hand, and the most butter and cheese on the other?

Mr. Beach — I will start you double, and see how you come out. I think I can take care of ten cows as easy as a man can twenty steers, and if she will produce three times as much, I have gained on him a little.

Prof. Henry — Let me put it in a different shape. I think the statement can be made without being controverted, that, let alone the question of work, it will take more feed to produce a pound of beef to-day in Wisconsin, than the beef itself is worth, the bare feed alone, at the highest market price, and to feed upon the cheapest possible food will only bring it down a little. The only man that makes money out of beef, is the man that buys steers of some other man, who has raised them a year at a loss of about two cents a pound. He feeds them a few months longer and sells them.

The Chairman — Can you breed a calf from a steer and grow him up to three years old, or thirty months, and sell him at the present prices of beef and get your money back.

A Gentleman — He shouldn't be kept thirty months. I saw a statement that thirty-one calves at eleven months sold to the dressed beef butcher for \$3,100. That man didn't lose any money.

Mr. Allen — What are you going to do with the calves? We don't want to kill them, it isn't economical to kill them, and the question is to get the best results we can out of them.

Mr. Beach — I remember when a boy, father was ambitious to be rich. He bought ten calves, he hadn't milk enough, but he got through till winter, then he made a pen around a hay stack and put them in there. We boys took care of them, drove them to the spring to water, etc. Before spring they began to be taken with the black leg, and one died, and then another, and all died but one little fellow, I can remember distinctly how he looked. Father took him, washed him, put an anguintam string around his neck, and let him go. He went to the stream to drink and got drowned. Father made twice the money on those calves that he would if they had lived.

Mr. Allen — That is not a fair answer to the question.

The Chairman — You are stating that we must raise these calves irrespective of whether we make money or not.

Mr. Allen — Before you have a cow, don't you have to have a calf?

The Chairman — Not a steer calf. I never knew a cow produced from a steer calf yet.

Mr. Adams — I do not, in a dairymen's convention, like to hear it said emphatically that under no system of treatment can the production of beef be made a profitable industry in Wisconsin. I do not believe it. We have no business to indict the beef business because some men do not handle it as they should. The beef men of the state might turn to the dairymen and say, "You are only producing one hundred pounds of butter to the cow;" what could we say?

Mr. Briggs — I don't know what the dairymen of Wiscon-

sin do with their skim milk. I presume they feed it to the swine; but I believe it can much more profitably be turned in the direction of raising fine cattle.

The Chairman — Brother Adams brings forward an indictment. Now, the mischief with the people of the state of Wisconsin, every one of us, is that when the indictment is presented, we flinch. An indictment does lie against a man in Wisconsin who is producing beef as he is producing it, and the indictment stands against a man who is producing cows as they are producing them. When a farmer of Wisconsin allows himself to be so indifferent as to keep cows that only produce one hundred pounds to the cow, he stands before the fact a coward, and a man who produces a steer at the present cost and the present loss and the present indifference, stands a coward before his own ignorance, and there is only one road out of the question for such dairymen and such beef men, and that is a better understanding of the problem.

Now, I don't think we need to flinch at this indictment, we need to look at these questions and take them home to ourselves, and when we come into this convention, it ought to be characterized by the boldest utterances consistent with the truth.

REPORT IN RELATION TO TESTING MILK FOR PER CENT. OF BUTTER.

BY J. A. SMITH, AGENT WIS. STATE DAIRYMEN'S ASSOCIATION.

In making this report, I am impressed with the vastness of the subject, and at the same time humiliated with a consciousness of how little I really know. That humiliation would lock my lips, had I not conscious knowledge that I have found out some things,—even if they are no more than negatives,—with a degree of certainty, even with imperfect instrumentalities; and further, it gives me a little courage to stand up beside men and scholars, who are far more learned and wise, than I dare presume to be, when they confess they have no more certain knowl-

edge, on some points, than I have; and are trying to learn, from any source,—even from one as unlearned as myself,—as humbly and as sincerely as I am trying to learn from them. The thing or truth that experimenters have really learned is, how little we all knew about this almost living, breathing thing—milk—one year ago. We have made some advance. So I know of no better way than for the earnest learner, and the scientist, to each contribute of his knowledge to the general stock, and out of it all evolve some truth.

It was assumed, one year ago, that the methods for testing milk were complete; that they either had stood the test of scientific scrutiny, or were capable of triumphantly undergoing it; and that the aid of the practical man to apply the tests, and deduce reliable conclusions, was all there was to do.

The work I essayed to do, called for careful, patient perseverance, for truth, and a disposition to heed its claims,—for no respecter of persons, in a selfish sense, or the private interests of manufacturers of testing tools, that would not perform; and it also called for the counsel and aid,—as the result proved,—of the skillful chemist, who could interest himself, in a practical way, to explode or endorse the work, as it developed. This aid of the chemist, I confess I did not suppose at first it would be necessary to call for; and was betrayed into that way of thinking because I supposed the work of the oil testers had been already subjected to the scrutiny of chemical analysis, before it had been pronounced reliable enough by the manufacturers to entitle it to be considered a just umpire, with which to divide money. But in that view I was mistaken; as I have not learned that any such work has been done elsewhere than at the Experiment Station of Wisconsin; and undertaken there only upon the pressing advice of my brother, Hiram Smith, one of the executive board of our State Dairymen's Association, and sanctioned by the sub-committee, and also upon the kind invitation of Prof. W. A. Henry, superintendent of the Station, after it was learned that no oil-testing of milk then had the sanction of chemical science, so far as was

then known. The Experiment Station rendered every assistance in its power.

The value of time in this convention admonishes me that I must talk, so far as clearness of statement will permit, with the greatest economy of words. The 2nd of September last, having more time than now, to be concise in statement, I made, through *Hoard's Dairyman*, a partial report of the facts found to that date; and also explained why, and for what, I was asked to undertake certain work. As I can not hope to make certain parts more concise or clear now, I will use so much of them, in fragments, as will aid in giving the audience a fair understanding of the work I am to report about.

It is known to many of the deeply interested dairymen and manufacturers of dairy products, in this state, and by the representatives of the dairy interest in other states, who are looking with anxious solicitude for results that the legislature of Wisconsin enlarged the regular appropriation to the Wisconsin Dairymen's Association, so as to give a sum deemed sufficient to do something definite, if not large, in the way of subjecting milk to the oil-test, with a view to show, pointedly, the vast difference there is in the quality of that taken to co-operative factories and sold for domestic uses, and now paid for, according to weight or bulk, instead of according to true value.

To put the work in motion, the Executive Board of the State Dairymen's Association met in Fort Atkinson, the last of April, and outlined some definite work, that was largely formulated by Hiram Smith and W. D. Hoard. The President, Hon. H. C. Adams, the Secretary, D. W. Curtis, and the Treasurer, H. K. Loomis, were made a sub committee to employ a suitable person to superintend the work and provide himself with the needed instrumentalities. The sub-committee, chose your humble servant and gave me pretty nearly a blank card to do the best I knew how, to solve some of the problems that are vital to the dairy interests of the state.

The main work it was proposed to do, was, to take an oil-test of the milk of herds, as delivered at a butter factory,

and see what per cent. according to its weight, each mess yielded of the butter that came from the churn, so as to determine what the individual milk-producer *should have* of the money, as compared with what he receives under the system, that generally prevails, of prorating money according to pounds of milk. Also to show that the weight and quality of *cheese*, was dependent more largely than is generally conceded, upon the per cent. of fat in the milk; and show how *cheese-money*, divided according to quality of milk, compared with that prorated according to its weight.

I accepted the commission in the confident belief that though nearly a new thing, that the reliable churning of milk in test-churning tubes of $\frac{5}{8}$ of an inch in diameter and nine inches long, and the correct measurement of the oil in them, was an accomplished fact; and supposed that all there was to do, was to use attested tools to show the truth about the difference in the quality of milk, so as to get data which would lead to paying for it, according to its true value, for butter and cheese making, and for domestic uses. I then had no more thought that the reliability of the tools to do the work with, was in question, than I have now, of questioning the accuracy of a Fairbank's scale, in weighing in the milk to be tested.

But I soon found the claim of reliability, without solid foundation; and the whole business of churning milk and reducing it to oil, for the purpose of defining its per cent. of butter-fat, in a chaotic condition, and founded on the veriest assumption. Bear in mind I say *milk*. I am not talking of cream; neither was I asked to experiment with it; as that business was either considered settled, or not within the immediate purpose of our special line of work at that time. So, in point of fact, I have not gone beyond my instructions, or engagements, to churn cream, only in a few tubes, as a matter of curiosity, to ascertain if cream-oil had water in it as well as milk-oil.

Simply to churn cream in the well-known churning tubes saying nothing of the correctness or incorrectness of the measurement of the oil, or the exhaustiveness or non-ex-

haustiveness of the churning, was not then, and is not now, difficult of accomplishment; and the reported success in that direction, is accounted for by the fact that cream has only one-half the per cent. of caseine and albuminous matter in it, and four or five times the fat there is the same bulk of common milk. Success in churning milk, at that date, had been assumed, as I now believe, largely from the fact that the few trials made in the fall and winter of 1886-7, were made with milk that was either very rich in fat — almost cream — or was that of cows, the milk of which was easily churned; and was as candidly and earnestly assumed, as it was ignorantly and confidingly believed, by myself and others who proclaimed it from the institute rostrum, one year ago. We found we could churn in May and June, 1887, such rich milk, with measurable success; but the common and low grade milk, we could not churn, and separate, with satisfaction and certainty. No one, even with more experience in churning cream with success, and trying to churn milk, too, had achieved any better success, at that time, if using churns of the regulation form. The sample for milk — four-fifths of an ounce — if the milk was of a low grade, did not make a measurable amount of oil, often less than 1-20th of an inch in depth on the surface of the serum. This small amount, when 1-100 of an inch — a space that the eye cannot define the fine lines of, when placed against a film of oil, yet represented nearly one-fourth of a pound of butter in each 100 pounds of milk. Experts made a difference of two and three spaces, often in measuring tubes, within the same sixty seconds; and no living man could measure twenty-five tubes twice alike. I became convinced it could not be done in any glass churn of practicable length for churning, and later the latest methods to measure after concentration of the oil, confirms the view. We demonstrated it in the improvised device, alluded to further on, and it has been adopted in the University plan, that it is hoped is to solve the whole problem. So that kind of churn, and the small sample of milk, after faithful and patient trial, for weeks, were rejected; and a half pound of milk was churned in a pint jar, and the oil concentrated in a tube, the inside diame-

ter of which bore a known relation to 100 pounds of milk, and to the quality of milk in the said churn-jar. This gave far more complete churning and separation — gave ten times the oil the tube did, and thus eliminated 9-10ths of the liability to err in measurement. It was thought, for a time, the difficulties had been largely surmounted.

A word about the purity of the sample: No man can justly take the ground that an infinitesimal part of a valuable whole, can be taken to measure the value of that whole, unless the sample is of the utmost attainable purity, and constant reliability. Mighty temples are reared in harmonious proportions, because the truths of the little square and measuring rule are heeded. Vast piles of precious ores are paid for, their value being predicated on the integrity of a small sample, assayed. So in measuring the valuable product in large masses of milk, the representative sample should be as pure and true as human agencies can make them. "The best is none too good," has been the motto of the rectangular churn-builders, and the truth applies with peculiar force to testing milk for butter-fat, when the sample taken for the standard eight inch tube is only 1-2000th part of the whole, which is in 100 pounds of milk; and in the tube of double length 1-1000 part of the whole. Still finer — the actual fat measured, is only 150,000th part of the bulk of the 100 pounds of milk in the short tube, and 1-25,000th part in the double tube. I say this to show how exceedingly pure the sample of milk should be, the sample of measured or weighed fat should be, and to answer as well as it may, the criticism that has been made on my work, that I have been *too* exacting, as to the purity of the sample of oil, that is obtained. This is true of all kinds of testing, including chemical analysis. Not only must the sample be representative, but the process that determines the butter fat must be exhaustive, and the sample of oil, purity itself.

[In the report as delivered by Mr. Smith, at the annual meeting, in January, he gave in detail the history of his detection of water in the supposed oil, which invalidated the measurement, and how he found it was of varying per cent. in different herds, and in the same herd on different

days, and gave the proof of his work, as fortified by chemical analysis, and why he discarded that kind of a test. He also alluded to the claims made by the Fargo Bros., of Lake Mills; that they had succeeded, later on, in getting the oil quite free from water, through high heat and rank acidity, before churning in their double length tube — which view was fortified by Prof. F. G. Short in the result of one churning; 78 per cent. of which gave substantially oil water-free; but 22 per cent. of the tubes did not churn at all through lack of acidity, it was alleged. This whole controversy is now deemed obsolete, as well as all test-churning in small churns, to get true per cent. of butter fat in milk or cream; and therefore, not to lumber these pages with matter now dead, at the request of the author, the Secretary omits that portion of the report. If no churning of small samples of milk can be relied on — *which is the fiat of chemical science* — then the question whether there is, or is not, water in oil procured through the action of the churn, need be no further discussed. Having abandoned the oil-test, and the use of it, in his experiments, Mr. Smith then went on to make such facts as he could with the weighing test, and the report is again taken up, at this point.]

In the meantime I tried weighing the butter produced, with a delicate scale, using grain weights, and constructing a table to show how much butter in 100 lbs. of milk, the weight of the sample in grains, represented, and not reduce the butter to oil at all. I had more hope of that method, as simpler, cheaper, more easily understood by all, and giving more confidence in its fidelity in representing the body of the milk it was taken from. The method was tried on the University Farm, side by side with the oil test and the farm churn, the same day, and the same churning, using in the test one-half pound samples of what the chemists call “parallels,” which is mixed milk divided; and there was not a day in which the weighing test did not come nearer to the yield of the regular farm churn, than the oil test did.

Dr. H. P. Armsby also tried weighing the butter fat, and found the range of error less by that method, as between individuals, or patrons, than the oil test made; but at the same time concluded that the excess of water in some oil test tubes, made up for defective churning, or for other causes that varied the results, so that the churn yield and the tests more nearly accorded; but this was made not by true, reliable results, but by an accidental balancing of errors. “Balancing of errors” is a lottery,— it is not truth, for they are

just as liable to intensify the error, as to have errors neutralize each other. Error robs somebody, and so defeats the end in view,—square justice between man and man,—not justice simply between a manufacturer and his aggregated patrons, but between him and each individual patron, so that each may have the benefit of making good milk, or the penalty for making poor milk.

While it would not be true that I was satisfied that the weighing test had solved the problem, yet it was the only thing that gave a hope; and it is true to-day, that it comes nearer the truth in milk-testing, than the oil and water test, unassisted by long sustained high heat, by chemicals, or centrifugal force. Because of the pressing importance of the work I was set to do, which was to show in as clear a light as possible the vast difference there is in the butter contents of milk pooled at our factories, with a view to teach farmers the necessity of submitting to tests as soon as the facts are fully laid before them, I had no alternative, then, but to make trial with the only practical thing that there really was to try with, or retire from the work. We had tried the oil test for milk, for all we knew, or all that anybody else knew, at that time. I laid the facts before the chairman of the sub committee, and some of the members of the executive board, and was told to go on, and find out what I could.

With such tools, then, as gave most assurance at the time, of showing approximately true results, I tested the milk of a butter factory, which used gathered milk, and separated with a Danish-Weston Centrifuge; and also tested the milk of a cheese factory; the latter to show the individual character of milk from fifty-four farms, and also the number of pounds of butter there could have been made, from the milk that actually did make, so many pounds of cheese.

The facts made in the Fort Atkinson Butter Factory, by A. R. Hoard, and partly with my assistance, are, in brief, to the effect that 213,431 lbs. of milk, that was devoted to the test, made of packed butter, just as it was sold, 9,496 lbs.; and the samples defined 9,498 and 24-100ths lbs.,—an overplus of 2 and 24-100ths lbs. I give the “un-doctored,”

unamended, unaltered record, just as the scale-beam, moved by grain weights, made the facts; but at the same time state that it was a lucky balance of overplus and deficiency, and not because I feel an assurance that the churning was perfect, or that the marvelous record could be made again, by that, by any oil test, or even by chemical analysis, only as it might happen to do it. Indeed, a knowledge of the details convinced me that though approximately near to truth, that something better is wanted to fully satisfy the demand; though for cheaply testing individual cows or herds, it is simple and will tell very closely the character of the animals tested.

By it the butter value of the milk of each herd, at each day's trial, and the average per cent. for the whole time, is all down in detail, embracing a mass of figures that I will not attempt to read, as it would drive you all home, ere you would listen to them; but I can give, in one minute, the condensed essence of the facts that it took many weeks to ascertain; and those facts prove, in a measurably conclusive way, just what the State Dairymen's Association, is seeking light about; and that is, that pooling milk, by weight, at our butter and cheese factories, is stupid and unjust, and should be relegated to the dead past, just as fast as the facts, and the just way to prove them, are made known. Those facts showed that the milk, in per cent. of butter-fats, ranged all the way from 3.14 per cent. of butter to 100 lbs. of milk of the poorest herd, to 5.85 per cent. for the best. This would show that if common milk is worth \$1.00 per hundred, that the first is worth only 78.5, while the latter is worth \$1.46-2 cts. per hundred lbs. Each patron really was paid the same per hundred lbs. It is such rank injustice, such assaults on the wisdom of co-operative dairying, that would surely undermine it, that the society had in mind to rectify and repel, when it asked me to undertake the work of testing milk. I knew there was a great difference in the milk of individual cows, before the work was commenced; but did not know that whole herds, for weeks and months, would show such a marked difference, as the facts proved.

The following table will show the per cent. of butter in the milk of each herd for the period of 33 days:

No.	Part butter.	No.	Part butter.
1.....	3.97	32.....	4.99
2.....	3.39	33.....	5.01
3.....	4.32	34.....	4.67
4.....	5.15	35.....	4.34
5.....	3.64	36.....	4.68
6.....	3.49	37.....	3.37
7.....	4.52	38.....	4.66
8.....	5.38	39.....	5.01
9.....	4.28	43.....	3.14
10.....	5.85	44.....	4.38
11.....	4.40	45.....	4.66
12.....	3.91	46.....	4.19
13.....	3.39	47.....	4.59
14.....	4.28	49.....	4.85
15.....	3.87	51.....	4.53
16.....	3.99	52.....	4.45
17.....	3.75	54.....	3.99
18.....	4.32	55.....	3.82
19.....	3.85	56.....	4.82
20.....	4.48	57.....	5.23
21.....	4.27	58.....	4.94
22.....	4.48	59.....	5.82
23.....	4.43	60.....	4.31
25.....	4.34	61.....	4.14
26.....	4.84	62.....	4.56
27.....	4.66	63.....	5.33
29.....	4.68	64.....	4.17
30.....	4.39	65.....	3.17
31.....	4.63		

NOTE.—Numbers omitted show that patrons having these numbers had stopped before the test commenced.

FACTS FROM THE CHEESE FACTORY.

In making experiments in cheese making, the Saukville cheese factory was engaged for the purpose, with results as follows: During twelve days of September and twenty-two days of October, 197,559 lbs. of milk were received, which produced 21,117 lbs. of green cheese, and 20,394 lbs. of cured cheese. The milk received in September,—79,002 lbs.—made 8,051 lbs. of green cheese, or 9.68 lbs. made a pound of cheese. It shrank in curing to 7,729 lbs., or 4 per cent. This showed that 100 lbs. of milk produced 10.19 lbs. of green cheese, and 9.78 lbs. of cured cheese. Experienced manufacturers will not fail to note that it is uncommon for September milk to yield less than 10 lbs. of cured cheese per 100 lbs. of milk. But last September we were in the midst of a drouth, and the cows of the factory in question

were part of them on short pastures, and the most of them being kept in fairly good heart, with fodder corn, fed in its greenest condition, from the field. This latter, while it kept up the volume of milk and saved the cows for good production when the rains and the grass came, did not result in giving a milk as well laden with solids as is usual for September milk, made on good fall pastures. These facts should be borne in mind. The 118,557 lbs. of milk received during 22 days of October made 13,066 lbs. of green cheese and 12,665 lbs. of cured cheese. One hundred lbs. of the October milk made 11.02 lbs. of green cheese and 10.68 lbs. of cured cheese. The average of the two months' milk showed that for the days the tests were taken, that each 100 lbs. of milk made 10.69 lbs. of green cheese and 10.32 lbs. of cured cheese.

Butter tests of each mess were taken each day, which showed that if the milk had all been used to make butter that it would have produced 8,751.19 lbs. This would call for 22.57 lbs. of milk for each pound of butter. This would show that the ratio of cheese to butter in said milk stood as 2.18 of cheese to 1 of butter. As 2.50 to 1 is generally imputed to ordinary cheese, this shows that milk that makes more than one pound of cheese to 10 lbs. of milk is richer in fat than standard cheese. Standard cheese I call that which produces one pound for ten of milk.

The butter test of the September milk showed that it took 25.68 lbs. of milk to yield a pound of butter, and taken by itself, was poorer than standard milk by the same rule,—that which yields a pound of butter from each 25 lbs. This shows, as the cheese produced from the same milk, did not yield 10 lbs. of cured cheese to the hundred, that the cheese shrank in weight below one pound for ten, at the same time the butter test proved the milk did not yield quite 4 lbs. to the hundred. This gave confirmatory evidence of the validity of the position I have held to for years, that the per cent. of retained fat in a cheese made from average milk, dictates the weight of the cured merchantable standard cheese. The 79,002 lbs. of September milk tested 3,076 28-100 lbs. of butter.

I now call your attention to the facts made by testing the milk for butter fat in October, when the solids of the milk increase their per cent. per 100 lbs., 118,557 lbs of milk tested 5,674 91-100 of butter, or 20.89 lbs. of milk would make a pound of butter. The same milk did actually make a pound of green cheese for each 9.07 lbs. of milk. This would show that the ratio of cheese to butter in said milk, if the ratio of butter had been retained, would stand as 2.22 to 1 of butter. But we are driven to conclude that it was not so retained in the cheese, because if it had been the weight of the cheese would have been more. By rule of three, if 79,002 lbs. of milk made 7,729 lbs. of cured cheese, then 118,557 lbs. of same quality of milk would have made 11,597 lbs. of cured cheese. It actually did make 12,665 lbs., showing a gain of 1,068 lbs. of cheese in the said milk, because of the better quality,—that is, more butter and casein in it per one hundred pounds. But part of that gain must be imputed to an increase of the per cent. of casein in the milk, as chemical analysis shows that when milk gains in its per cent. of butter fat, that it gains in casein also, though it is true that transient causes affect the per cent. of fat in milk, more than they do the per cent. of casein. Right here is where Bro. Hoard's "Nervous Theory" comes in, to account for the temporary loss of fat in milk, when little loss of casein occurs.

By a further dissection of the facts, I find that if the per cent. of fat in the October milk had been the same as in September, that there would then have been only 4,601, 32-100ths. The tests showed there would have been 5,674 91-100ths. This would show a gain in butter alone, because of the increased quantity in fat of the milk, of 1,073 59-100ths lbs. of butter. This would make 5 lbs. more—in round numbers—gain of butter, to go into the cheese, than there actually was of added weight in it. As part of the additional weight of the cheese was unquestionably made from increased per cent. of casein in the milk, what must be the inevitable conclusion? Simply this: that to make room for the casein in the cheese,—a substance that does not waste much into the whey vat, some of the butter had to leave

to give it place, and did leave; else there would have been more weight of cheese. How much, then, wasted into the whey vat? No one can tell positively, in such case, but the chemist, by an analysis of the whey — which of course could not be undertaken for such large quantities. But the demonstration is complete enough for all practical purposes. So I reason it out in this way. In good normal milk, the butter fat is as 8 to 7 of the casein, in the same milk. If now, $\frac{7}{15}$ ths of the actual gain of 1,068 lbs. of cheese, was casein, then there were 498.4 lbs. of it in the cheese, over that necessary to make cheese equal to the September cheese in quality. That taken from the excess of cheese, shows there were only 570 lbs. of the 1,068 lbs. of gain, that was butter, and actually present in the cheese to make its gain; and the difference, occupied by the 498 lbs. of casein, had passed out in the process of cheese-making, into the whey vat. That amount of butter, at 25 cents per pound, is worth \$124.50, that was lost.

You may ask if there is no help for this, by any skill of cheese-making? None that I know of, save that of the impracticable way of coagulating milk when warm from the cows, or that of abstracting some of the fat,— that which has once separated from the milk — and do it before coagulation is attempted. I am convinced that the richer milk is in fat,— that which has been allowed to stand and partially cream itself,— the more the fat wastes into the whey-vat, because of the want of coagulating force in the rennet to sieze and retain it. The Hon. X. A. Willard, taught, long years ago, that pure cream cannot be coagulated with rennet. It follows from this truth, that the nearer milk is like cream, that the more it wastes, if coagulation is attempted. It is the casein, and not the fat, that is coagulated. The fat is simply held in mechanical mixture, while the cheese is being made. The more complete the natural emulsion of the milk, at the time the rennet is introduced, so much the more will the rennet hold of the fat. This accounts for a greater weight of cheese from new, warm Jersey milk, good for five pounds of butter per 100 lbs. than can be made from the gathered milk of a factory, half or more of which has

stood over night on the farm, and has not been vigorously stirred, and has thrown up much cream, and which is good for five per cent. of butter, if the separation is made with a centrifuge. The separator can take it all out by mechanical force, but the rennet cannot keep it in the cheese curd.

To my mind, the lessons these facts teach are, first, that it is a waste of butter fat to make cheese of the gathered milk of a cheese factory at a time when there are about five pounds of butter in each 100 pounds of milk; and that it does not enrich the cheese to have about one-half pound of butter per 100 pounds of all the milk, in the whey-vat; and if there is any practicable way to save it that it should be done. I know well the allegation, and feel the force of it,—that we cannot tolerate the skimmer unless we consent to have skim cheese,—that we can not open the flood gates unless we take the flood. But in these days of scientific experimentation and testing, why can we not have a standard for cheese as well as the cities have for milk and cream,—that is, pay for each according to the per cent. of fat in them.

The casein in 100 pounds of cheese that has been made from 1,000 pounds of standard milk is only worth about 64 cents, either in cheese or out of it; and the butter in it makes the rest of its selling value, whatever it is. The other alternative is to stop making cheese when the milk is so increased in fatty contents that the rennet can not seize it so as to retain it in the curd. Again, this latter view would rule out nearly all the Jersey and Guernsey milk from the cheese factories, and gathered-milk butter factories, unless the owners of it had it tested, and had pay for its true value.

But I forbear to enlarge upon the consequences or suggest a way out that may be feasible,—as it is my mission to state facts as I found them,—not speculate what had better be done in view of them. The facts of the proved difference in milk are now more within the reach and comprehension of farmers than ever before; but, of course, by the efforts of many others as well as myself.

The range in the quality of the milk of the Saukville cheese factory, in butter content, was from 3.70 per cent. to

5.22; showing the same injustice in pooling milk by weight as the butter factory had shown, though not so wide a difference in the per cent., partly for the reason, it is believed, because the tests were commenced later in the season when the milk is richer, and partly because there is a less per cent. of Jersey cows, in the herds at Saukville, than at Fort Atkinson.

There are many lessons I could draw from this facts—but not now. This brings me to the point of telling what has been done to try and learn to obviate the conceded weak points in testing milk, by any churning process, both while the last part of the tests at the two factories were being made, in October, and before the average data the facts make, were known.

The publication of the partial report of September 2d, fell, as it happened, into the hands of parties who were testing milk, delivered in the great cities of Philadelphia and St. Louis. This was being done by the lactocrite of Dr. DeLaval, of centrifugal separator fame. They were pleased to learn that the State Dairymen's Association of Wisconsin, had undertaken a work of such prime importance to the dairy interests of the world, and claimed to have in their instrument, a semi-chemical and semi-mechanical machine that would show, with certainty, the per cent. of butter-fat in milk. They asked me to investigate its claims. There was only one machine within reach—at Elgin, Ill., and the agent had but a limited experience in operating it. Mr. D. T. Sharples, while an expert in operating separators, confessed at the start, that he knew but little more how to use a lactocrite, than I did. But he is a practical man, and had full printed instructions, and we had the able assistance of Mr. Fred Kron, the proprietor of a factory a few miles out, and who was as intelligently hungry for facts, as we could desire, and would not take a dollar for all he did for us. We set it up, and tried to make up in earnestness, for what we lacked in skill. We made some wild leaps the first day, and did not better it much, the second day. But we learned a little; enough to encourage us to go on. I soon saw there is little or no terror in chemicals—not much more than in

brine. We got nearer to the yield of the factory churn, at every trial; and what gave greatest hope, found what you will see fortifies the position of Dr. S. M. Babcock, of the Wisconsin Experimental Station, as he will speak to you later on, in this convention — which is, that here was not much variation in the per cent. of fat in the milk of the same herd from day to day, as churning shows — got nearer, at last, than any small tube churning I ever saw do. It eliminates the weak spot in all tests made by churning — it takes out, to uniformity, the misleading and unknown per cent. of foreign matter — chiefly water, that partly invalidates all oil-testing, or cold churning of any kind, with small samples, that leave it in. I came back pretty well convinced of the truth that centrifugal force and chemicals must be used to make the fat substantially essential oil; and also to get the total fat, there is in the milk, and get it every time; which churning has never yet done, as analysis has shown. So the scientists affirm. This is why I said at the time, through the press, that all testing of milk by churning processes might have to bow down to the essential principle of the lactocrite, which involves no churning, and uses chemicals and centrifugal force; though it is possible the latter may be dispensed with. The strife about methods of test-churning, would then be tame stuff — obsolete, and the tools dead property.

I saw then, that the work of the practical man must be held in abeyance till the work of the chemist had been done to fortify, or explode the claims of the new method, being tried in the experimental department of the State University, and immediately thereafter took up my work in the Farmers' Institute, and have only occasionally looked in upon the chemists in Prof. Henry's department, to learn of their progress in the same work, as conducted by Prof. F. G. Short, who is with us to-day. It would be presumption in me to anticipate a word, in regard to what he deems it prudent to say, or not to say, about the recent, and pending experimentations he has undertaken, to help solve the unsolved problem. Only this, will I say:— the officials of the station recognize the perplexing facts about defective churning of small sam-

ples of milk, as compared with the more uniform results of large churning — recognize that water must be taken out to uniformity, to make of the oil an umpire for the equitable division of money, and with semi-chemical, and semi-mechanical methods, are earnestly trying to get testing instrumentalities that will be more reliable than any that have yet been used among us; and may give us tools and methods, as good as we all thought the oil-test was, one year ago. Of course, if they deemed any method essentially perfect now, they would not waste their energies or the time and funds of the university, in further experimentation. Because those churning methods are not perfect enough to prorate the butter of the pooled milk of farmers, however good they may be to adjust the aggregate pay the operator should give to the corporation, is why, in part, they are with us to-day; and why Prof. Henry, as chief of the station, feels justified in using part of his force of chemists, with the approbation of the officials of the university, to thus try to subserve the great dairy interests of Wisconsin.

Again their efforts in behalf of this good work, is vindication enough for me, that they felt the validity of the criticisms of the common oil-test, that forced them into their and my own recognition, as the work developed; and their efforts, and presence to throw light upon the question, are also a rebuke to those who assume to know it all, and who alleged my objections were not as rightfully interposed, as they have been conscientiously presented, and defended. So if I am sinning, and frittering away time and money, I am sinning in illustrious company.

They repudiate the oil, or weighing test, that involves churning at all, and in this, go a step further than I did, before I had really comprehended the result of the difference in the viscosity of milk,— as discovered and explained by Dr. S. M. Babcock, now of our Experimental Station. I encountered the same obstacles he did — defective churning of an occasional sample of the milk of the same herd from day to day, but kept imputing the cause to some mistake in treating or churning the specimen, instead of imputing it to the per cent. of viscosity the cows put in the milk, and

which it is believed chemicals only will overcome, so that the total fat will be uniformly and certainly secured.

It was anything but a gracious task for me to say the then popular oil-test for milk, in which so many dairy friends were interested, through purchasing and manufacturing them, was an unreliable method; and I felt the criticism, if not the sting, when told I was doing harm instead of good to the dairy interest, that certainly has had a good share of the earnest endeavors of my life,—that I was tearing down and leaving nothing in its place; and rebuked by some whose good opinion I highly prize, and still prize — because I know they were honestly drawing wrong conclusions, from what they deemed my temerity. But in view of what at least a part of the scientific world, and some of the oil-testers know now, I ask what would be the value of my opinion on dairy matters, or my reputation for discernment of obvious facts, if I had tried to make it appear the oil-test churn told the truth between man and man, and did not need to be “doctored” if skillfully manipulated? I had as much regard for dead and dying property investments, as any man ought to have, who is in pursuit of truth; but still had to call things by their right names. Not being a chemist, I did not know enough to be at home in a chemical laboratory; so it was impossible for me to have any share in the honor of evolving the method the chemists of the Experimental Station are trying, with great hopes of success; but I did know enough to do something towards showing the professors that the oil-test for milk, was a “delusion and a snare,” as it existed one year ago, and thus perhaps made them more anxious to get a better way.

It will not be all fair sailing, even if a perfect way of testing is found. There are vested interests of the manufacturers, and still more of the users of old methods, that will resist the introduction of any method that essays to supercede their own, and will cling to the business of making shrines for the modern temple of Diana, with as much tenacity as did their prototypes of old. They have felt themselves saved from the rapacity of dishonest patrons, by having interposed an umpire that keeps them from paying

for more butter than they have to weigh out, till they have lost sight of the more vital question whether each individual patron gets his due; and they will be loth to surrender what has served them so well. The introduction of the new and better way, when it puts forth its claims, will wait upon the urgent demand of the very best class of dairymen, who are not only honest, but are keeping the very best butter cows, and will insist upon having pay for what they actually produce.

Pending this coming conflict, we shall hear all the changes rung on the "last ditch," allegation that the oil test tells the truth. That allegation is the old moss-back conundrum that has been quoted to me from the start, and it is this: That as the oil test, especially for cream, tells pretty nearly the amount the factory churn produces, therefore the test must tell the truth, as to the butter value of each mess of milk delivered. Taking this superficial view, some men whom I believe mean to be just, think the oil test good enough now, and that to call its reliability in question, is doing more harm than good to the great dairy interests of the land. Though I have talked to you long, the importance of the subject and the plausibleness of this allegation, emboldens me to ask for a few moments more, for on the truth of what I shall say depends whether we can introduce a new and better way, after it comes. I am going to state the question fairly, and it is this: "If the united samples say there should be 400 lbs. of butter in the factory churn, and the said churn turns out just 400 lbs., then have not the test churns told the truth, and has not each man received his exact due, and his milk been correctly tested?"

You may think, Mr. Chairman, and this crowd may think, I am an absurd and reckless man when I say, "No, sir; not necessarily. It may be so accidentally." As this is the keen needle-point to this whole question, and one that befogs many, and one for which I received more sneers for asserting, than for any other assault on the oil test, let me tell you why I dissent, and feel I am right, and will be fortified by every chemist in the world who has a clear head. Now why? I still believe there is a great liability to be a marked

difference in the water content of oil, more than in packed butter, but I waive that point for the time being on both systems, and answer: "Because of the difference between the churnable, and the unchurnable fat there is in milk, in all test churning with small samples." But why do the worked out results from the samples hit the yield of the big churn so closely sometimes? Simply and solely, because, 1st, some of the specimens were either underchurned or under-measured; and, 2nd, because other samples absorbed more caseous matter, that no washings or meltings would eliminate; and perhaps had water left it also. These latter would make up for the deficiencies of the former,—the plus would balance the minus, the operator would have a concurrence of sample and churn-yield, on the same principle and just about as often as the lottery gives a big prize. This is the reason why tests that involve both churning and melting do not get the total and therefore uniform results in fat.

Now I will work out a practical problem to make it more plain: Mr. A. brings 1,000 lbs. of milk to the factory, and the oil-test resulting from melting a sample that has an unknown per cent. of foreign matter in it, decides there is 4 per cent. butter, and the farmer is given credit for 40 lbs. of butter in the pool. A chemist takes the sample, and says there is only $3\frac{1}{2}$ per cent., and therefore, only 35 lbs. of butter. Then Mr. B. drives up with his 1,000 lbs. of milk, a sample is taken, and it is reported the oil-test shows the same results as in Mr. A's milk,—40 lbs. A chemist takes a parallel sample, and analyzing it, decides there is $4\frac{1}{2}$ per cent., and therefore 45 lbs. of butter, in the 1,000 lbs. of Mr. B's milk; and the inference is, there was defective churning of the small samples,—that the milk really had in it an unknown amount of unchurnable fat. But the factory churn, because of better churning of a large body of cream, says there is 80 lbs. butter. This makes a concurrence of sample and churn-yield, and the operator gives each man pay for 40 lbs. of butter, and assumes justice has been done, when the chemist, and the real truth, says one man contributed 35 lbs. to the pool, and the other 45 lbs. One farmer

has lost 5 lbs. of butter, and the other has had pay for 5 lbs. that his milk did not make:— but the butter-maker extols the oil-test, because he has paid for no more butter than he actually got out of the churn. He is all right, in his finances, but Mr. B. is short just one dollar per day, when butter is worth 20 cents per pound, and Mr. A. is carrying round money that Mr. B. earned.

So though the two samples may have told the truth about the churn-yield, the samples have not told the truth about either mess of milk, nor has the money been divided on the basis of right and justice, as between the owners of the cows. The oil-tester may exalt such an umpire to the vaulted skies, as an honest distributor of the avails of honest toil; yet the truth is, as explained above.

These considerations make the better and true way of testing, still make desirable.

Music — “Trusting” — Solo — Miss Maud Goodfellow.

Convention adjourned for the Banquet given by the ladies of the congregational society, to meet at nine o'clock A. M., at the Opera House the next day.

BANQUET.

THURSDAY EVENING, JANUARY 26th.

TOASTS.

A. E. THOMPSON, ESQ., *Toast Master.*

Song — Among the Lilies — Arranged by L. C. Venables — Male Quartette.

1. Our Guests — Response by Geo. L. Field.
2. Our Hosts — The People of Ripon — Response by H. C. Adams, Madison.

Vocal Solo — F. G. Lumbard, Chicago.

3. The Farmer Girls — They rule the boys who rule the Nation — Response by A. J. Decker, Fond du Lac.
 4. The Pioneer — Response by Capt. D. P. Mapes.
- Piano Solo — Miss Lena Harwood.

5. The Rising Generation — May it prove the real cream of the world's dairy — Response by Prof. J. W. Robertson, Montreal, Canada.
6. Buttermilk as a Beverage — Response by T. D. Stone.
Vocal Solo — Wm. Workman.
7. The Milk Maid — She never fails to respond to the call, "To Arms" — Response by W. D. Hoard, Ft. Atkinson.
8. The Jersey Cow — "Little, but O — !!" — Response by Geo. A. Austin, Neillsville.
Piano Solo — Grand Valse Brilliante — Op. 6 — Schulhoff — Master Clarence Shepard, Sheboygan Falls.
9. The Farmer Boys of Wisconsin — Give them a chance for their heads as well as their hands — Response by John Gould, Aurora, Ohio.
10. The Three B's — Brains, Bread and Butter — Response by Rev. H. L. Richardson.
Song — (a) Lullaby of Life — H. Leslie — (b) Country Fair — Waltz Song — Abt — Male Quartette.
11. The Farmer of the Future — Will his muscle be saved by the Educational Institutes — Response by W. H. Morrison, Madison.
12. The Dairy Pursuit — The "Old Boys" in the dairy business — Response by Hon. Hiram Smith, Sheboygan.
Vocal Solo — "America" — F. G. Lumbard.
Music by the band.
Male Quartette — W. B. Millard, C. A. Ellenberger, W. B. Judd, M. J. Trier — Miss Mary Hollenbeck, Accompanist.

MENU.

MEATS.

Roast Beef.	Roast Turkey.	Boiled Ham.	Baked Chicken.
<small>SPICED</small>	Corned Beef.	Tongue.	

ENTREES.

Pressed Chicken.	Veal Loaf.
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RELISHES.

Celery.	Chili Sauce.	Cucumber Pickles.	Tomato Pickles.
Grape Pickles.	Chow Chow.	Mixed Pickles.	

SALADS.

Chicken.	Cabbage.
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BREADS.

White Bread.	Corn Bread.	Graham Bread.	Rolls.
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JELLIES.

Cranberry.	Apple	Currant.	Crab Apple.	Orange.
	Wine.		Lemon.	

CAKE.

Assorted.	Chocolate.	Thanksgiving.	Maple.	Caramel.
	Cocoanut.	Pound.	Angels' Food.	Banana.
	White	Jelly.	Date.	Doughnuts.
				Fig.

CHEESE.

Rosendale, Eldorado and Eureka full cream.	Cottage Cheese.
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FRUITS.

Valencia Oranges.	Messina Oranges.	Florida Oranges.
	California Oranges.	Apples.
	Tea.	Coffee.
Jersey, Holstein and Hereford Cream.		

The banquet was all that could be desired. More than 500 sat down at the first table, while large numbers filled the spacious galleries until the tables could be set again. To say that the Association was royally and elegantly entertained, by the ladies of the Congregational Church, would be only a mild way of saying it. Ripon may justly feel proud of her two opera halls, with enterprising citizens to prepare a banquet equal to any which the Association has ever attended.

The venerable Captain Mapes responded to the "Pioneer:"
Gentlemen of the Association: I see by the papers that I am put down to respond to the sentiment of "Pioneer" and Father of Ripon. If so let me welcome you in my own behalf and in behalf of our little city. One of the best methods we have adopted to bring out the place has been to invite the most important associations of the state to hold their meetings and banquets with us. It brings together all the best talent of the country to see our city and its beautiful surroundings. We are proud of our city, and hope you may be so received and treated that you will go from us sounding a pæan in its praise. And now let me tell you of my experience in the dairy business. I think my claim to *length* of experience can be sustained, for ninety years ago I got my entire support from the dairy; my first efforts

for a living were *milking* and they said I did it well and grew finely. But now the old clock may stop short never to go again, and I may never have the pleasure of again meeting this Association, but still hope to make out at least ten years more.

Fifty years ago I lived in a dairy county, Delaware, in New York. I was a merchant and sold my goods to dairymen, taking their butter by the pailful, and here I found trouble in telling a lady her butter was not as good as her neighbor's; with my notions of gallantry I could not do so. So I prevailed on them to send their butter to New York City in their own packages. Then I had to meet with competition from Orange county butter, and was obliged to claim that Delaware county butter was as good as that from Orange. But it was not; our county was new and Orange county was old with her cultivated grasses, rich and sweet, while our country had leeks and wild grasses to give flavor to their productions. You will know in your experience that you must have sweet feed to make sweet butter. This, you of Wisconsin, already have; now go on until you are as rich as Jay Gould. He got his start from a Delaware county side-hill farm, and now he is the richest man in America.

Trade or business has its toils and pleasures. There have been many improvements in your trade and business, but you have not thus far been able to dispense with the milk pail and stool. At milking time each one has to take his or her pail and go to the yard; the lord of the manor, his wife, sons and daughters, hired help, all join in the daily task of milking. To offset this I am told that many of the best matches in the country have been made over the milk pail, and new dairies started.

And now, gentlemen of the association, we thank you for your visit. Come again, and may I be here to greet you with a welcome. Heaven bless you. Good night.

MORNING SESSION.

Convention met pursuant to adjournment at 9 o'clock A. M., January 27th.

CLOVER FOR THE COW AND PIG.

STEPHEN FAVILL, DELAVAN, WIS.

In obedience to orders from our executive committee, I come to the consideration of the question of clover for the cow and pig. As this is strictly a dairy convention, had not the pig been coupled with the cow, I should have understood that only the cow was intended and clover only for dairy purposes. But as they have put the two together I shall consider the term cow as standing for all our farm animals that eat grass, but shall consider clover in its especial adaptability to the cow and pig. The value of clover as a fertilizer is so well understood and so generally admitted that it is not necessary to spend any time in discussing it. But as to its feeding value farmers are not so unanimous. But I am inclined to think that the disagreement in regard to its feeding value comes largely from the different methods of handling it. I mean the time of cutting and the curing after it is cut.

I have so often written and talked upon this subject that it seems hardly necessary to do so at this time. But I remember that this may be read by some that have never read what I have before written, and so the paper would be incomplete without telling how, in my experience, is the proper way to handle it to make it of the most value as feed. The first thing in the programme is to cut early while it is grass. The rule that I learned when I was a boy, and the one that many farmers now follow, is when about one-half of the blossoms have turned brown then is the right time to commence the cutting. I would just reverse this. I would have all the cutting done before any of the blossoms (or very few of them) had turned.

My experience, and I think all that have carefully noted the results, will agree with me that the early cut hay is very much the best. The question is, then, at what stage in the growth of the clover should the cutting be commenced? If I had only what I could cut in one or two days I would wait until it was nearly all in blossom, but if I had

much to cut, say two weeks' work, I would commence as soon as it fairly commenced to blossom. I don't mean the straggling ones that appear some days before the general blossoming, but as soon as they begin to be general over the field, and then some of it will be decidedly too old before it is cut. The philosophy of early cutting will readily be understood with a little thought. The stalk and leaves are full grown when the head comes out, and every change after that is an effort of nature to mature seed, and the consequence is the stalk is constantly changing to a woody, hard substance, and to the extent of the change becomes unpalatable and indigestible. After it is cut what then? Fairly wilt and then put in the barn to cure. To be more specific follow this plan as nearly as the weather will permit. Start the mower in the morning as soon as the dew is off (not before if you have to wait until noon), run until noon (or a little later). Start the tedder as soon as eleven and run till half-past twelve, and if the day is fair by half-past one you can go to putting the first cut in the barn. If you have a large amount to cut and have a strong force, start the mower again about four in the afternoon and cut till the dew begins to fall, and then in the morning as soon as the dew is off tedder it, and by eleven it will be fit for the barn if the weather is fair. Clover put in after this plan will heat in the mow, but not enough to hurt it if there is no foreign water in it, either dew or rain. It will carry its own juice safely but not any extra water. The heating in some way seems to do it good, at any rate stock will eat as much more readily than they will that dried in the sun so it will not heat in the mow. It should be put in a tight barn (a common boarded and battened one will do), and when all is in, the doors should be kept shut as much as possible to keep out the air. Another thing, when the clover is all in it should be covered with dry straw or dry hay (if the straw can be had) a foot or so deep, if not covered with something, some of the top will be spoiled. Clover put in as I direct will heat and turn to a reddish brown, but it will have all the leaves and blossoms on. I have put in my clover in this way for the last eighteen years and have never had any spoil. But

others have reported to me that they had followed my directions and their hay had spoiled. But in every case where I have been able to get at the bottom facts in the matter, I have found the hay had been wet after it was ready for the turn or had been cut when the dew was on. In either case the water must be dried out.

This plan of working will require judgment to be used all the time. If the season has been wet and the clover of rank growth and the stalks full of water it will have to be dried more than in a dry season. The question will be asked, will clover put up in this way make good feed, and if so, for what kind of stock? I answer, all kinds of farm stock, from the geese to your fancy driving horse. Of course, if fed to horses that are to be driven fast it must be fed in small quantities, for if fed all they would eat they would stuff themselves so they could not travel. But for the horse for farm work or slow driving there is nothing in the way of fodder that is any better. T. B. Terry, of Ohio, tells me that he has a pair of horses on his farm that have been fed nothing but clover hay for the last six years. They have not had any grain and have worked all the time. He does not keep hay before them all the time, but feeds them three times a day what they will eat in about an hour, and they keep in good condition and are able to do full work. But he says the clover must be cut early or it would not do. For milch cows there is nothing better in the way of fodder. They will give milk when fed upon it almost as well as on pasture grass. And then for fattening cattle it is the best fodder I have ever tried. An amusing incident occurred on my farm a few years ago. I had a fine lot of steers feeding, I put them in the care of my man (as I could not be at home all the time), told him I would like to have him to see what he could make of them by spring. When he had been feeding them about two months I was looking them over one day and I said to him, "Your cattle seem to me to be doing very nicely." "Yes," he said, "but if I only had some good timothy hay to feed them with their corn I could make them hump." "Well," I said, "you can get some from the west end of the big mow that is very nice."

About a week after I was at the farm again, the cattle were in the stable, and I saw they were eating clover hay. I said to him, "I thought you were going to feed the steers on timothy." He said "I did try to have them eat it, but the darned fools did not know what was good. They nearly broke the stanchions down in trying to get some locks of clover that was a little out of their reach." I might add the steers came out finely; they gained on the average 500 pounds in six months' feeding; 2:77 pounds per head daily. But how about the hogs and clover?

They will eat the kind of hay I am talking about and do as well on it, especially store hogs; one feed a day should be given, and they will be much more healthy and less likely to get that dreadful scourge, the cholera, than if fed entirely on corn. But it is not from the winter feeding that we get the best results from hogs with clover. It is for summer pasture that it gives us the greatest profit. I suppose that the statement that more pounds of pork can be made from an acre of clover than from an acre of corn would be thought extravagant; but the facts and figures will warrant its being made. Let us use our pencil a little. Fifty bushels of shelled corn would be fully an average yield per acre, and twelve pounds of pork for a bushel of corn (fifty-six pounds) would be fully up to the average. That would give us six hundred pounds for the acre of corn.

An acre of fair clover will pasture eight hogs from the time the clover starts in the spring till fall, and anything of a good hog that weighs when turned out, say 100 pounds, will gain another 100 pounds by fall, without any other feed, and that would give us 800 pounds as against 600 pounds for the corn. The question of whether it is best to feed hogs when running to grass is still an unsettled one, some good farmers claiming that it is better to give no other feed; only plenty of water and salt. But my opinion and practice is to feed a little corn every day; not enough so they will depend much on it, but enough to neutralize to some extent the gas in the stomach caused by eating the clover. From one to two pounds a day is enough, and it should be fed regularly the first thing in the morning. Hogs are creatures of habit,

like the rest of us, and will soon get to look for their feed only at the regular time.

Many make a mistake in letting the clover get too large before the hogs are turned out. They want to be put on it as soon as it is up a fair bite, if not it will outgrow them and get too old. They should have free access to salt and ashes mixed, keep it under cover, and those that have not tried it will be surprised at the amount they will eat. It will be understood from what I have written, that I consider clover as the sheet anchor of the dairyman and the hay-raiser, and in order to get the most from it, it must be *cut early and not dried too much in the sun*. Another advantage of early-cutting is the second crop. The chances for a crop of seed, and certainly for a second crop of hay, are very much better if the first is out of the way.

SKETCHES ON REPRODUCTION IN DOMESTIC ANIMALS.

BY PROF. E. A. A. GRANGE.

Reproduction may be defined to be the process by which living bodies produce others similar to themselves—a proceeding which is of great importance to the agriculturist who is engaged in stock raising.

In commencing my remarks upon this subject, it is of little moment where I begin, for if we follow the course through we eventually get back to the starting point.

I have selected for my beginning the period of puberty, or sexual maturity, from which time onward I shall briefly discuss such subjects as gestation, sterility and its removal when possible, hygienic treatment, or care and management of the young, breeding sex at will, concluding with a description of some of the difficulties in parturition; and in doing so, will endeavor to be as brief and practical as possible. for I am well aware that the full consideration of such an immense subject would occupy a great deal more time than we have at our disposal.

PUBERTY, OR SEXUAL MATURITY,

is the period when animals have sufficiently matured to be capable of bringing forth their young, which condition varies considerably in different species, and even in different animals of the same species. Surrounding circumstances also change the advent of this period; domestication, for instance, by inducing more rapid development of the animal, hastens the coming of puberty, and it is sooner attained in the female than in the male.

Although animals arrive at this interesting stage of their existence considerably before they have matured in other respects, yet it is not considered advisable to breed from them until they are about full grown, as it is thought to weaken their constitutions and produce early decay.

The usual period in the mare being about three years, in cattle say two and a half years, in sheep about one year and a half, and in swine and bitches about one year old; but I have the records of one or two cases where animals are said to have produced their young at very much earlier periods than the above; one of the most remarkable is reported in one of the first volumes of the *Lancet* (a medical journal), in which it is stated that a bull calf three months old copulated with a heifer calf about two months old, and within nine months the heifer brought forth a calf, and both did well.

The period when reproduction ceases is not exactly known. I have known stallions to become sires at upwards of thirty years, and mares are recorded to have produced at considerably beyond that age. Cattle are said to have produced their young at over twenty years; but for other animals, I do not know of their having conceived at any advanced age. Puberty is preceded by a condition termed the œstrum or heat, which term is generally lost sight of in a more popular phrase for each species. This condition is characterized by a peculiar systematic excitement, producing in some animals a degree of ill temper which renders them even dangerous. In the female the generative organs are turpid with blood, with a mucous-like discharge from the vagina

which has a peculiar odor that attracts the male and enables him to distinguish between those females which are in season and those which are not. It also seems to excite the amatory desires of the male, which, in a great measure, accounts for male and female animals remaining quietly together when not in season.

The oestrus is intermittent and occurs at certain seasons of the year, but may be induced at almost any time by bringing the sexes in contact with one another a few times. The duration of the heat varies from one to fifteen days; it is shortest in the cow and sheep, and longest in the bitch.

GESTATION OR PREGNANCY,

is the time during which the female carries her young in the womb, while it is undergoing certain development. This period, like puberty, differs in different species, and also in different animals of the same species. The usual time for a mare to carry her young, is eleven months, or say 335 days, it often being a little longer when colts are born than when fillies, but the time is subject to considerable variation; for instance, in one case where a record of 284 mares was kept, the period varied from 307 to 394 days; but the extreme limits are considered at from 300 to 400 days, below or beyond these, being of exceedingly rare occurrence.

In the cow, the period is usually estimated at nine months, or say 274 days, but the record of 1,062 cows at an agricultural college in Germany, gives the average, 283 days. In the *American Journal of Medical Science*, the result of observation in sixty-two cows, gives the shortest period as 213, and the longest at 336, the average being for male calves, 288, females, 282.

In sheep the usual time is five months, or say 152 days; in one instance where a record of 429 was kept, the period only varied 13 days.

In swine the period is about four months, or as some record it, three months, three weeks and three days. The bitch takes only two months, or sixty days. As the signs of pregnancy are of importance to those engaged in stock

raising, it may be well now to mention some of those which can be recognized without much difficulty. About the earliest symptom taken into consideration is the cessation of the heat, after which the venereal appetite subsides, the animal becomes comparatively tranquil, and does not exhibit any desire for the male, and in many instances the male will refuse to copulate with the pregnant female. This is perhaps more noticeable in the bull than in most other domestic animals. Occasionally we meet with females that will receive the male up to within a very short period of parturition.

As a rule in cattle and sheep there is a tendency to lay on fat during the early months of pregnancy, and many owners take advantage of this circumstance when preparing their animals for market. About the middle period of pregnancy, the means resorted to, by way of telling whether an animal is in young or not, is by making an examination per rectum or per vagina. I prefer the former, for I think there is less risk of causing abortion. To proceed, the animal should be standing with its forequarters elevated, in order that the foetus (the creature before it is born), if present, may come closer to the pelvic basin, and to bring it still more within our reach, the bottom of the belly should be raised, by assistants passing a sack, or something of the sort, under it and raising it up. The rectum should be emptied of its contents, the hand and arm well oiled and the exploration made. The foetus can generally be easily felt, indeed when pressed upon it will often make a convulsive movement.

As pregnancy advances, more evident signs develop themselves. The belly becomes quite pendulous and the enlargement of the foetus enables one to feel it through the walls of the abdomen. If the stomach be distended with cold water, the movements of the young creature can often be seen as well as felt. As the period still further advances, and the time for parturition draws nigh, the lips of the vulva become swollen, there is usually a jelly-like discharge from the vagina, and the udder becomes fully charged with milk. In the mare, wax gathers upon the ends of the teats.

In the cow the points of the hip drop, from the stretching of ligaments, when she is said to be down in her bones, and in the course of a day or two, if everything goes right, the young creature is produced.

STERILITY OR INFECUNDITY

is the unfruitful result of copulation, and as it is often within our power to remove this condition, it may be well to notice those causes which are of most importance.

In some instances it is a permanent condition, for instance it is generally permanent in monstrosities and hermaphrodites (an animal possessing many of the characteristics of the opposite sex to which it actually belongs) in cattle when twins are born, the one a male, the other resembling a female, the latter is called a free-martin, and will not breed, but it is generally a hermaphrodite. There are cases recorded where free martins have bred, but then, of course, they were not hermaphrodites. It is also the result of diseases of the generative organs, such as fatty degeneration of the ovaries, or tumours, which cannot be removed.

The temporary causes are often the result of premature, or late coition, when the generative organs are not in a proper condition for conception, or in other words, when the animal is not in season; under-fed or over-fed animals are not so likely to conceive as those in moderate condition. Animals of a very nervous disposition are not so likely to procreate as those in moderate condition. It has also been observed that mares accustomed to work hard, active exertion before being put to the male is favorable to conception, and from this fact, the Arabs often gallop their mares to such an extent as to bring them almost breathless before the stallion, and when the act is accomplished, they leave them to stand for a few hours to "cool down."

Change of climate has also an injurious effect upon the fecundity of an animal, sometimes putting it altogether in abeyance, at others only rendering the animal barren for a time.

But in all cases of infecundity, a careful examination of

the generative organs should be made, for many cases of apparent infecundity are due to malformation of the mouth of the womb, or some obstacle which can be removed, and almost valueless animals are thus made worth hundreds or even thousands of dollars. If the condition is due to the presence of a tumour, this can generally be removed without much risk to the animal. But the difficulty is very often due to the closing of the mouth of the womb, this can be overcome by an operation which, if skillfully performed, is not dangerous. The animal must be secured, if a mare by the side line, if a cow, by fastening the two hind feet together, though not too tight. The hand and arm should then be well oiled with say, olive oil, the fingers and thumb, being drawn into as small a compass as possible, should now be introduced into the vagina, and the obstacle felt for; if the fault be at the mouth of the womb, it will be found wholly or partially closed, but it may be dilated by gently insinuating the tips of the fingers, until the cavity of the womb is reached. This operation has been known and practiced by the Arabs for many years on their barren mares, and of late years it has been practiced successfully on cattle. In some instances the mouth of the womb can not be dilated with the fingers; in such instances a surgical operation has to be performed. This should only be done by those understanding the anatomy of the parts.

With regard to the percentage of barren animals I have endeavored to obtain statistical information on the subject, but as records are not usually kept, I have not been very successful. In 1881, where a record of 2,764 mares was kept, 73.86 per cent. were fruitful, 26.24 per cent. were barren and 3.65 per cent. aborted. In the cow it has been estimated that 79 per cent. were fruitful. In sheep, out of 8,500 only 740, or about 12 per cent., were unfruitful. In an ordinary flock of sheep it is generally estimated that as many lambs will be produced as there are ewes; the twins making up for the barren animals, etc.

HYGIENIC TREATMENT, OR CARE AND MANAGEMENT OF PREG-
NANT ANIMALS.

The mare, if employed for labor, may be worked up to within a very short period of parturition, if the work be moderate and in harness. She should be kept in moderate condition, and regularly exercised at all events. The cow, if kept for milk alone, may be milked to within a very short period of calving, but if any value be placed upon the calf, then milking should stop about the fifth or sixth month, for if milking is prolonged it very likely proves prejudicial to the foetus by diverting the elements of nutrition from the womb to the udder; they should be fed on the best quality of easily digested food, care being taken that they do not become too fat, for if obesity is allowed to proceed to an extreme degree it may retard the development of the foetus or produce abortion. They should be kept from the smell of blood. In cows it sometimes happens that one will abort after the other, if allowed in contact with one another. The odor of one which has aborted should at once be removed. Harsh treatment on the part of attendants should be sternly suppressed, and surgical operations should not be performed if they can be avoided. After parturition the mothers should be kept comfortable for a few days, as they are very likely to take cold at this time.

ATTENTION TO THE OFFSPRING.

The foetal membranes (after-birth) should be removed at once, and the natural openings examined, to see if they exist, if they do not, artificial ones may be made and kept open for a day or two with pledgets or lint, or something of that sort. All collections should be removed from the nostrils and mouth.

The mother should be allowed, in fact encouraged to lick the new-born, but should she appear indifferent to her young, she can often be induced to lick it by sprinkling the skin with bran or a little salt. The friction caused by the tongue of the mother is very necessary as it excites the circulation of the blood in the skin, which is very likely to be

driven from it when the young creature is deposited in a colder atmosphere than its delicate skin is accustomed to. Young animals should be kept in dry places. After the first birth attendants should leave them as much as possible to themselves, for by too much interference the mother often becomes careless and forsakes the offspring. As soon as it is able to stand nicely, gentle exercise may be allowed.

Having reached the period where the young creature is brought into the world, it may be well now to discuss very briefly some of the circumstances which control its character, as well as stamp its form. Beginning with the influence of the parent, I may state that the most popular theory is that the male has the greater influence in determining the character of the produce, but I have known of so many instances where the characteristics of the mother were retained, that I am inclined to think, in many cases, neither parent can be regarded as possessing superior powers for developing the character of the progeny; but the popular idea being so much in favor of the male's possessing these superior quantities, has led to his being selected with greater care regarding his pedigree, form, action, disposition and constitution, while it is too often thought that anything in the shape of a female is good enough to breed from; and as I believe the better bred and more vigorous animal has the greater power in stamping the offspring, I think this in a great measure accounts for so many young possessing the superior merits of the sire.

Theoretically speaking, it is often supposed that the male gives the external form to the young, while the internal organs resemble those of the mother, indeed the appearance of many hybrids has great weight in establishing this theory. Take the mule for instance, which is the produce of the male ass and the mare; here we have the external form of a slightly modified Jack, we have the long ears, the slender legs, the contracted feet, thin tail of the Jack, while the belly is round and smooth, resembling the mare. Then on the other hand, take the hinny, which is the produce of the stallion and the female ass: here we have the external form of a slightly modified horse, the ears, mane, tail, legs and

feet resembling that animal in a marked degree, while the belly is small and hucked up; but these rules are not always borne out practically, for I have known many animals that would puzzle the greatest expert to tell whether the sire was a horse or a Jack. In fact it is a common expression among breeders "that such and such an animal breeds after itself, or the sire, as the case may be." So it is plain that the characteristics of both parents are modified to a greater or less extent in the offspring.

While speaking of the influence of the parents upon the young, I may mention some interesting and well authenticated cases where the influence of the male extended even beyond his own immediate get, through the female that he had impregnated, to her offspring by another sire, or as it is sometimes called "the influence of previous impregnation."

One of the most interesting cases of this nature was a mare belonging to the Earl of Morton, which was impregnated by a Quaffe (a specie of Zebra), to which she produced a striped colt, and this mare produced striped colts for several years afterwards, although bred to stallions without such marks. Indeed, there are cases almost without number where mares which have been bred to Jacks and produced mules, but their progeny for years afterwards resembled the Jack, nor is this confined to the equine race, for there are cases recorded in which polled heifers have been served by Short-horn bulls, and in after years, when served by bulls of their own breed, they produced calves resembling the Short-horns. There are many cases of this description also, but perhaps these are sufficient to show that offspring of an animal is not to be depended upon if she has conceived by one of another breed, indeed some even go so far as to regard the dams in the light of a cross, and there seems to be some reason in it.

Animals are also occasionally born with the most extraordinary marks upon them, though perhaps peculiar nervous influence transmitted from the mother to the foetus. The most remarkable case that I have heard of this kind, is described in Prof. Miles' very interesting work on stock breeding, the substance of which is that a number of Alder-

ney cattle were pastured with some United States cavalry horses with the letters U. S. branded upon them. The heifers eventually had calves, and singularly enough, one of them produced a fawn-colored calf with the letters U. S. plainly marked in white letters upon its shoulder. There are many just as remarkable cases as this reported, which would lead one to think that surrounding objects sometimes have an effect upon the progeny.

BREEDING SEX AT WILL.

This subject has caused considerable speculation for many years, and various theories have from time to time cropped up, gaining favor for a time, or until they were practically proved to be wrong, but as they present a certain amount of interest I shall mention some of those which were most popular. At one time it was thought that the right testicle and the right ovary were instrumental in producing males while the left produced the females, but this was found not to be the case, as it was shown that animals with only one testicle produced both sexes, and that females with only one ovary brought forth young of the same nature. Another theory which was popular at one time, and is now in some places, was that the sex depended upon the maturity of the ovum at the time of fecundation, and that in the early stage of the heat a female would be produced, but if the act was not performed till the heat was subsiding, a male would be the result. Now, if this were the case would it not happen that animals in a state of nature who, being allowed to copulate when they feel disposed, would produce a large percentage of females? This does not appear to be the case with sheep. It has also been suggested that the age and vigor of the animal has a good deal to do with the sex, and that if an aged and vigorous male impregnate a young and less vigorous female the result will be a male. It often happens so, but cannot be relied upon with sufficient certainty to be of any practical importance. Some males appear remarkable for getting more of one sex than the other, but the circumstance which controls this remains yet to be discovered.

With regard to the selection of parents I must be very brief, having already occupied a good deal of time. In the selection of the sire I think the weak points of the dam should be considered, and if possible the deficiency supplied by him. I have a great aversion to breeding from unsound animals, whether it be in wind or limb. I am also of the opinion that violent crosses are not advisable. What I mean is, that by putting an enormous stallion to a very small, narrow mare you will not get a medium-sized, well proportioned horse, but rather a weedy, mongrel looking creature; but the motto which should be adopted above all others is, "Breed from the best."

[At this point I illustrated the difficulties of parturition by means of large sized diagrams, without which a written description would be so difficult to comprehend that I omit it.—ED.]

DISCUSSION.

Mr. Briggs — Let me ask you, do you ever use a brace at the time of parturition? A friend of mine sent me one and I find it very useful.

Dr. Grange — You mean something like a miniature crutch?

Mr. Briggs — Yes; any farmer can make one. I have the fauceps, too, and have kept these instruments, with instructions how to use them.

Dr. Grange — Well, sir, there is no instrument made like those. (Showing his hands.)

Question — Where will you examine to determine whether there is life in the foetus?

Dr. Grange — You will invariably find that out when you manipulate a little while, there will be movement somewhere; I generally depend on that.

Question — You said that generally in the case of free-martins, the female is a hermaphrodite. How do you determine that where everything appears all right on the outside?

Dr. Grange — The only way I can determine is by post mortem examination.

Mr. DeLand — There is a matter which, as dairymen, we want to know. What is the cause of the retention of the placenta? Also how long is it advisable to leave it to the animal to dispose of it, and when you find it, should it be removed by mechanical means, how to do it. All dairymen have trouble in that respect.

Dr. Grange — With regard to the cause, I cannot offer any explanation that is satisfactory to myself. There is no way that I know of to cause them to throw off the placenta sooner than they will do it of their own accord. There are many remedies advised, but I do not believe in them at all. In regard to the length of time which an animal may retain the placenta, there is a good deal of diversity of opinion. Where the cows are under my own supervision or I am passing the establishment where they are every day or so, then I leave them for about two or three days, but if I go out into the country six or seven miles to see an animal which has retained its placenta then I remove it at once. It does not matter when the cow has only calved five or six hours, and I have never removed one in so short a period and had any untoward results, but from force of habit I generally leave them a couple of days. Now, in regard to removing them. I proceed in what might be considered by some, an unscientific manner, but I have practiced it for so many years, without any untoward results, that I feel I can recommend you to do the same. I take a broomstick or fork handle, some round stick, and I take that portion of the placenta that is hanging out, and I wind it around the broom stick several times. Then I take the broom stick, and I keep winding it around, and I wind out the placenta. Sometimes there will be considerable resistance offered. In cases of that kind, I pass my hand into the womb and see what the trouble is, and you can generally trace it to firm attachments, the adhesions have not been broken down, but they can generally be broken down without very much trouble, and I keep on winding until the whole thing comes away.

Prof. Henry — That one statement is worth all this convention has cost.

Mr. Briggs— Sometimes we are mistaken as to when we have fairly succeeded. An inexperienced man might think he has got the placenta delivered, and still a portion of it remain.

Dr. Grange— Yes, that is very true. The only way you can determine is to pass your hand in and feel. In cattle it does not seem to me that it is absolutely necessary that it shall all be removed. It is different with the mare. In that case I spoke of, I called to see the mare two days after she had the foal. I said, "What is the matter with her? it looks to me as if she was suffering from some kind of blood poisoning," it looked like a serious case. I asked if she cleaned all right, they said "yes." I said, "I am not satisfied about that, I am going to see." So I examined and found a piece of the placenta about as big as my hand and I removed that and washed out the womb with warm water and gave her some nitrate of potash to help the kidneys, and ordered bran mashes, and a few days after she was as well as she ever was.

Question— Is there no danger of producing inversion of the womb by drawing that placenta with a round stick in that way?

Dr. Grange— I don't know, I have practiced it for fifteen years and never had any trouble.

Question— In winding that broom handle, you use immense force?

Dr. Grange— I wouldn't say immense force. Of course it should be wound gradually and with as little force as possible.

Mr. Briggs— If it is done carefully there is no danger.

Mr. J. A. Smith— I wish to give you the facts about the making of those two cheese which are before you. There are the solids of one hundred pounds of milk in each one of those cheese, and I will describe to you the way they were made. After the vat was filled ready for the cheese making, one hundred and twenty pounds were taken from the vat and put into each of two smaller vats, one hundred

and twenty pounds into each vat. The milk then stood twenty four hours and kept as cool as we could, and there was no trouble as it was the 27th day of October. At the end of twenty-four hours, the cream from the milk of which the small cheese was made, was skimmed off, twenty pounds of it, thus taking off a large portion of all the cream from that milk. Now, then, for this larger cheese, twenty pounds of skim milk was taken from the bottom of the vat by means of a faucet so that what remained in the vat was just one hundred pounds. Then the two cheese were made up in the general way, and you can see the difference in the sizes, and an expert could tell the difference in the value of the cheese, which were each made up in one sense of one hundred pounds of milk. Prof. Henry has agreed to take specimens from these cheese and analyze them and see how much butter fat is in them. I will say that we tested the milk of which they were made and the fat at that time would have made 4.70 lbs. of butter to each one hundred pounds of milk that it was taken from. I would like to have some expert sample the cheese and tell how much difference there is in the value of it. The gentlemen will understand that the difference between them in the making is that twenty pounds was taken from the top of the vat before coagulating in one instance, and in the other instance twenty pounds was taken from the bottom of the vat.

It was suggested that an expert be called in to test the cheese, and Mr. P. Moran of Chicago was called in and asked to test the cheese and explain the qualities just as he would in his store in Chicago.

Mr. DeLand acting as Mr. Moran's secretary, made the following report:

The cheese where milk was drawn from the bottom, which makes it a little more than full cream cheese, scales flavor, 40; quality, 37; color, 7; salting, 9; total 93, deficiency 7 points in a scale of 100.

The other sample, 20 lbs. drawn from the top, which makes

it practically skim cheese: flavor, 36; quality, 37; color, 9; salting 9; total, 91; deficiency 9 points.

Mr. Hiram Smith — Will Mr. Moran tell us the difference in the market value, the commercial worth of the cheese?

Mr. Moran — This cheese (cream cheese) has the quality in it if it was manufactured right, but there is too much acid in the cream cheese which makes it unsalable, it is sour to me.

Question — Sour from over-ripeness of the milk or holding too long in the cooking process?

Mr. Moran — I should say it would be too long in the whey. The make of this cheese (skim) is superior to the other while the quality is in the cream cheese. The skim cheese is off in quality, but still so manufactured as to be salable for that class of goods.

If they were of equally good manufacture it would improve the value of the larger cheese, full stock from 15 to 20 per cent. That is not a full skim cheese, it shows that it is well made, and that it would come within about two cents a pound of the general run; but it is not salable; it is not as easy to sell 1,000 of that as it would be to sell 5,000 of the best cheese.

Discussion continued on report of J. A. Smith.

Mr. Short — I am not prepared to make a return on the oil test churn yet, but I can say a few words on it. Before we judge on that question there are two questions to ask.

First, is this scientifically correct?

Second, is this commercially correct?

Now, on the scientific part of the question. We are supposed to take a small test churn and put in a small sample of milk and churn it. Then we put that milk in hot water and the fat is supposed to come to the surface. We then measure the fat and that fat bears a relation to the amount of cream gathered. Now, first, do we get all the fat from

milk, secondly, is it all churned out; and thirdly, is the fat that comes to the top, pure fat? I commenced three months ago on those questions.

The first thing that bothered me was what bothered Mr. Smith, getting the fat free from the water. I did not know anything about the effect of sourness on the cream, so all my churning was done at the same ripeness of the cream as in the big churn. I have found out since, that on getting that cream what Mr. Frink calls rank sour, that the fat will raise with about a half per cent. of water. That is near enough for commercial purposes, but if you churn your cream the same ripeness that you churn in the big churn, your fat will come to the surface with about five per cent. of water in it. To make that experiment I used tubes, on the theory of Mr. George. Those tubes were put into this centrifugal churn and whirled at the rate of about a thousand whirls a minute, and in whirling them about five minutes, I found the fat came without any water. Then the question came up: What relation does that bear to the big churn, scientifically considered? I suppose you know the big churn varies more or less, and so does the small one. Now, can we find any comparison between the two. Dr. Babcock told you yesterday that milk varies greatly in viscosity. I made somewhere near forty tests of cream in all conditions and stages of milking. On churning cream from cows in calf about two weeks I churned out seventy-four per cent. of the total fat. On taking that cow later it greatly increased, and on taking a stripper, it fell off in the same way. I think we can say it has been proved that we cannot get all of the fat by the oil test churn. That is the answer to the first question.

Secondly, what relation does this bear to the big churn?

In churning regularly in a large creamery churn, holding, say 400 lbs. of milk, we get much better results than in a small churn. Now, suppose a man brings in a sample of milk. He may have in his herd one or two strippers and one or two fresh cows and his total cream may churn out 80 per cent.

The next man may have no fresh cows and no strippers

and his cream will churn out 85 per cent. of the total, in the big churn. Now, putting it into the small churn, owing to the viscosity of the cream, it is retarded, and much less is churned out than in a large churn. For instance, I can churn 400 lbs. in a large churn and get out 85 per cent. from the same cream that I can get out but 80 per cent. in the small churn.

Now, a creamery man has two samples of cream, from two different patrons, one will churn out 80 per cent. and one 85. On putting them together into the big churn, he churns out 82 per cent. and pays for 82 per cent. of fat in those two lots of cream, and you see the difference. That is the supplier's standpoint. Now, from the dairymen's standpoint, the test churn has been made entirely for experimental work, that is, the men have said this, "We will take a small churn, a test churn, and see what relation that bears to the big churn, we must have some favor somewhere, we cannot pay for everything, or we will go into bankruptcy." And as near as I can make out from what I have seen, the fact is this: That the test churn is the only thing that is now on the market, except one other thing that is in any way competent to judge poor or good cream; but that it divides the money exactly, I can't say at present, the question of the test churn is too big a thing to be settled in three months. I do not think that the oil test churn is in any way competent to judge of the value of individual cows. We found that the amount of fat taken out by the oil test churn ranged from 75 to 99 per cent.

Chairman — This is a matter of grave importance to hundreds of creamery men and their patrons, and we should discuss it from a scientific and from a practical standpoint. I would like to call upon a few creamery men to give us their opinions of the practical workings of the oil test. Let us hear from Mr. H. Z. Fish.

H. Z. Fish — I have not experimented sufficiently to give an opinion of value. I got one last winter and tried it and thought at first it was just the thing to test cream. We tried it a few times and came out within two pounds of butter on seventy odd pounds of what the big churn showed.

tried it from the milk and thought it was very accurate. Then afterwards we tried it and did not come out as near. But I think the oil test churn will get out as much of the oil in the butter as the big churn would, although I do not expect it will get out all there is in it. If it will tell me what the churn will produce, that, after all, is what I want to know.

Mr. Frink—I think the test churn is abused in a great many instances. You can take and make a sample as I have it here, and produce that oil and when you measure that at first it will shrink, the water will come out of it if you take only one, or sometimes even two churnings, but as that sample stands there now, there is less than one-half of one per cent. of water in it, as Mr. Short says. The test churn has been condemned in a majority of cases, because they measure the oil when it is first produced, and then they measure it the next morning, and it has shrunk sometimes one hundred per cent. By repeated experiments, we found that by getting the oil to a condition where it is clear like syrup or olive oil, that after that it will neither shrink nor swell. You can measure that sample to-day and thirty weeks from to-day, it will measure almost exactly the same. The amount of variation is less than two per cent. and it has got to vary two per cent. in order to show in the dividends; under that won't show at the average price.

I think that ninety per cent. of the creamery men who are using the oil test are paying for more than they can work out in the churn, because they do not make the test properly, and pay for ten or fifteen per cent. of water in the oil. They find that out and then they abuse the test churn.

You take the samples of cream and if they are sour enough, that is what we call rank acidity, invariably the curd will go to the bottom from the first churning, and the oil will go to the top, but it will be murky oil, not clear.

When they churn it the second time, while it is from one hundred and twenty to one hundred and forty degrees, that emulsifies the oil back again, so you have virtually got milk again. In churning it the second time, it comes to butter,

we have in shaking it, reduced the curd to a fine flour, and if your sample is sour enough it will go to the bottom; if it is not sour enough, the curd will not be held in solution in the whey. I never have failed in a case where the sample was what we call rank sour, of getting that curd down, and the oil clear, on top. You have got to have the acidity and go through the operation a second or perhaps a third time, you will have it, and it only takes a minute.

Now, on the milk test, which is of later date than the oil test, nearly all the experiments up to the latter part of the last season were made on comparatively sweet milk, and were many of them failures. On the milk sample you have got to raise your cream in the first place. After you have raised your cream, all you can get by any process known to the cold setting, then that must be soured, after you have got your acidity you can go through the same process as for testing cream and you must have the same conditions to work from.

Now, in regard to the accuracy of it, I think just as Mr. Short does, that on individual cows I am not satisfied yet, but in making tests on five hundred cows, I have failed in three instances only.

Some claim the measurement on his glass is too fine, and they say one man will measure four points and another man will measure four and one-half and both intending to do it just right. That is true, but the man who measures with that liberality on one sample will do so on all, and the compaartive result will be the same.

The main question, as I understand it, has been with the oil and the water mixing together. If the sample churns out close to what the churn will turn out, the object of the test is accomplished and the water is very easily got out. Mr. Short has analyzed some twelve or fifteen samples and he found less than one-half per cent.

Mr. Boyd — Do you say you require the cream to be very acid in order to get the tests?

Mr. Frink — Yes.

Mr. Boyd — Suppose the cream you are about to churn is not very acid, what do you do?

Mr. Frink — I would sour the sample afterwards, if I found it did not come out right at first, it won't hurt the sample to churn it, and set it away for a while. You may save a sample three or four weeks and you can get the same result. In the measurement of this oil, we allow fifteen per cent foreign matter in the butter. Creamery butter will average sixteen per cent. of foreign matter, or about that, and the variation on dairy butter is from ten to thirty per cent.

Mr. Boyd — Suppose we have one hundred gallons of cream, with the milk that goes with it in cold settings. Divide that cream and churn one lot in the first acidity and allow the other to get rank acidity as you call it, what would be the difference of weight in the product?

Mr. Frink — According to the measure it would be the same.

Mr. Boyd — My experience is, it will show ten per cent. more butter when you churn it very sour, every time.

Mr. Frink — We only have this oil test for measurement when we churn with the cream in the large churn at a certain acidity, or about what the average butter makers churn it at.

Mr. Boyd — I do not say that the butter made from the very sour cream is as good butter; the cream that makes the finest butter is slightly acid. I say there is not one gallon in one thousand that is churned in the condition that Mr. Frink says is proper for this test.

The Chairman — Mr. Frink says he sours it to that extreme point of acidity in order to get all the oil out of it.

Mr. Hoard — I think I see the drift of Mr. Boyd's question. The oil test sample is made from cream that is in another stage of acidity, than the regular churning of the same cream is in. Now, Mr. Boyd knowing the fact that excessive sourness shows a larger per cent. of yield, asks how an excessive souring shall show the yield on a not excessive souring. I understand the excessive sourness is to secure a complete separation.

Prof. Babcock — It seems to me that this question of what the test churn represents should be brought right back to

how perfect a separation can be brought. I think that the proper point to churn is with a high acidity, because the best separation can be secured. I think that milk or cream should be graded according to the amount of fat. If this test will show the relative amount of fat in the different patron's milk or cream, that is what is desired, and if the dairyman does not succeed in obtaining all of his fat from the milk, it seems to me it makes no difference, that is a question exclusively for the dairyman! When the patron has furnished fat to the factory it is a question of the factory man's skill rather than that of the patron.

Prof. Henry — It seems to me we have lost sight of one important thing. Mr. Frink's various tubes represent the milk of as many different patrons. Now, if he sours the milk of every one of those patrons to the same degree and measures the oil thrown up with the same rule and grades them according to the length of the column, isn't he adjudicating between the richness and the poorness of the different samples of milk? Then he can take any sort of rule that he likes for calculation finally as to the amount he shall pay his patrons. The tube says your milk is four and a half pounds of fat to the one hundred, and mine is only three, and the factory man says, "We will no longer give you as much for your three pound milk as the other man for his four and a half pound milk." Then, the factory man says: "The best I can do with my big churn is so much, and I will pay you in the proportion three, and you in the proportion of four and a half." So that the little churn does go a long way towards solving this question, no matter whether it gets near the big churn or not.

Prof. Babcock — I think the amount of fat to be obtained is very much less before the precipitation of the casein than it would be afterwards. I think there can be quite a range in the amount of acidity after this point is reached, without making any difference in the yield of the butter fat. Butter fats are very stable when brought in contact with any of the weak acids, such as are developed in souring milk. I don't think there is any danger whatever, with proper judgment in this matter, of destroying any of the

butter fats in waiting until there is rank acidity in the sample. The only question, it seems to me is, "Does the oil test show relatively the amount of fat in the sample?" If it does, it makes no difference what the percentage of fat is, the net proceeds of the factory should be divided in proportion to these tests.

Mr. Roe — I think there is one creamery practice that works against the practical working of this plan. It is the practice of a good many to ripen their cream in the cans, and take the ripened cream direct from the cans to the churn. It is very easily seen that the same degree of acidity will not develop in the different cans, so that the relation between the oil as shown in the test and the samples of cream as put into the churn from the cans will not be true. It seems to me in order for this relation to be true, it is very necessary that the cream be ripened in a large vat, something that will permit the development of the same degree of acidity throughout the entire mass. Also, there is no doubt that creamery men have suffered from measuring the oil too quickly before the water is settled from the oil, and have blamed the churn for it.

Prof. Robertson — In using the oil test, we find our safety in having all samples very sour. Then we find if we develop a sufficient acidity in the cream for the large churn that we get a proportionate separation of the butter fat. We find by analyzing the butter milk that if we churn the cream very sour, we leave a loss of three per cent. of the total fats in the butter milk, if we churn the cream sweet we leave thirty per cent. of the total fats in the buttermilk. By taking all the fat from the creams in the test churn, we can have a uniform ratio between them.

Mr. Boyd — What time is required to equalize the acid of the cream.

Prof. Robertson — The Danes find that eighteen hours is about the best time to leave the samples of cream before churning. They also add a certain amount of cream exposed to the air, so as to have the elements of fermentation. And let me say to those using separator cream, that they must add this fermentation to make butter to please the English.

If my cream was comparatively sweet, I would keep it at a temperature of about 45°.

The Chairman — The report of Mr. J. A. Smith will be received and will be spread upon the records with the accompanying discussion.

The award of premiums was then read by the secretary.

AWARDS ON BUTTER AND CHEESE.

Scale of points for judging butter —

Flavor.....	45
Grain.....	30
Color.....	15
Salting.....	10
Total.....	100

Scale of points for judging cheese —

Flavor.....	40
Quality.....	40
Color.....	10
Salting.....	10
Total.....	100

P. MORAN, *Judge*,
Chicago, Ill.

CLASS 1.—DAIRY BUTTER—WISCONSIN.

C. P. Goodrich, 'Ft.' Atkinson, Wis., first premium.....	98 points
A. H. Darrow, Brandon, Wis., second premium.....	96 points

CLASS 2.—DAIRY BUTTER—OTHER STATES.

F. S. Stockwell, Belvidere, Ills., first premium.....	94 points
John Boyd, Elmhurst, Ills., second premium.....	93 points

CLASS 3.—COOLEY SYSTEM—DAIRY BUTTER.

F. S. Stockwell, Belvidere, Ill., first premium.....	95 points
No second premium offered in this class.	

CLASS 4.—GOLD WATCH PREMIUM.

Awarded to Mrs. H. Churchyard, Ripon, Wis.....	94 points
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CLASS 5.—LADY'S GOLD RING.

Miss Mabel Churchyard, Ripon, Wis., gold ring.....	94 points
Miss Rosa Stoane, Beaver Dam, Wis., churn and butter worker..	92 points

CLASS 6.—MOSLEY'S CREAMERY.

Awarded to Stephen Haight, Rockdale, Wis..... 93 points

CLASS 7.—PRINT BUTTER.

C. P. Goodrich, Ft. Atkinson, Wis., first premium..... 98 points

Chester Hazen, Brandon, Wis., second premium..... 97 points

CLASS 8.—CREAMERY BUTTER—OPEN TO ALL.

E. B. Fargo, Lake Mills, Wis., first premium..... 97 points

S. A. Rice, Waterloo, Wis., second premium..... 96 points

CLASS 9.—CREAMERY BUTTER—GATHERED CREAM—OPEN TO ALL.

Lovejoy Johnson, Stillman Valley, Ills., first premium..... 95 points

Ferdinand Borner, Big Foot, Ills., second premium..... 93 points

CLASS 10.—DANISH WESTERN SEPARATER BUTTER—OPEN TO ALL.

Ft. Atkinson Creamery Co., Ft. Atkinson, Wis., first premium.. 97 points

C. B. McCanna & Co., Burlington, Wis., second premium..... 95 points

Frank Bowen, Richland Center, Wis., third premium..... 92 points

CLASS 11.—COOLY SYSTEM—GATHERED CREAM BUTTER—OPEN TO ALL.

Ferdinand Borner, Big Foot, Ills., first premium..... 93 points

H. Z. Fish, Richland Center, Wis., second premium..... 93 points

CLASS 12.—GATHERED CREAM—HANEY AND CAMPBELL—OPEN TO ALL.

Awarded M. H. Church, Walworth, Wis..... 93 points

CLASS 13.—PERFECT DAIRY SALT.

Awarded F. S. Stockwell, Belvidere, Ill..... 98 points

CLASS 14.—M. S. A. SALT.

Awarded F. S. Stockwell, Belvidere, Ill..... 97 points

CLASS 15.—“HIGH GRADE SALT.”

Awarded N. E. Allen, Beaver Dam, Wis..... 96 points

CLASS 16.—CHEESE.

H. Walvoord, Cedar Grove, Wis., first premium..... 94 points

H. Z. Fish, Richland Center, Wis., second premium..... 93 points

E. J. Jenkins, Rosendale, Wis., third premium..... 93 points

A. D. De Land, Sheboygan Falls, Wis., fourth premium..... 89 points

CLASS 17.—PERFECT DAIRY SALT FOR CHEESE.

Awarded H. Z. Fish, Richland Center, Wis..... 93 points

CLASS 18.—HART'S SILVER CUP—CHEESE.

Awarded H. Z. Fish, Richland Center, Wis..... 93 points

CREAMERY BUTTER—SWEEPSTAKE—OPEN TO ALL.

Genesee Salt Co.....	Sweepstake
Hansen's Laboratory.....	Sweepstake
Fargo's.....	Sweepstake
Awarded Ft. Atkinson Creamery Co.....	97 points
And E. B. Fargo.....	97 points
Wis. Creamery Butter.....	Sweepstake
Warsaw Salt Co's.....	Sweepstake
Awarded Ft. Atkinson Creamery Co.....	97 points
And E. B. Fargo.....	97 points

GATHERED CREAM BUTTER—SWEEPSTAKE.

Haney and Campbell.....	Sweepstake
Awarded to Lovejoy Johnson, Stillman Valley, Ill.....	95 points

DAIRY BUTTER—SWEEPSTAKE.

Hansen's Laboratory.....	Sweepstake
Warsaw Salt Co's.....	Sweepstake
Genesee Salt Co.....	Sweepstake
Fargo's.....	Sweepstake
Awarded C. P. Goodrich.....	98 points

BUTTER—GRAND SWEEPSTAKE.

Creamery Package Co.....	Sweepstake
Awarded C. P. Goodrich and F. S. Stockwell, each.....	98 points

BUTTER—EXHIBITION SWEEPSTAKE.

J. H. Brown & Co's.....	Sweepstake
Awarded C. B. McCanna, Burlington, Wis.....	

Note.—For amount of premiums awarded see programme in front of report.

The Convention adjourned to meet at 1:30 P. M.

AFTERNOON SESSION.

President Adams in the chair.

FACTS, NOT THEORIES, CONCERNING THE DAIRY
FROM A FARM STANDPOINT.

By F. A. GEORGE, HALE, WIS.

In the winter of 1885 this Association held a meeting at Arcadia, Trempealeau Co. They came to us and found us discouraged, broken-down grain raisers. At that time there was but one creamery in the county, not very well patronized at that. We were urged by the speakers present to stand by the creameries that might be started and we were shown how to improve our stock.

As the roads were bad, I walked twenty-two miles to attend that meeting, and I went around among the speakers and picked up what knowledge I could. Now, I have been requested to give a little talk on how we manage our cows and what we have got for them. I am a farmer. I patronize a big creamery. On the first of January, we had ten factories in active operation in our county, almost entirely the result of this Association, and we have been paid throughout the county, money received from creameries, this drought stricken year, \$250,000, and I don't know where we would have been if we had stuck to the old ways. We didn't know much about raising calves, we generally leave the calves with the cow two or three days or a week, then take the calf away and put it in a box stall where it is fed skim milk three times a day, about nine pounds at a time, fed warm, blood heat, until the calf is about five weeks old, when we give it a little hay but no grain. We raise only heifer calves. After it is five weeks old we increase the skim milk ration to twelve pounds at a time until eight months, then we feed from sixteen to twenty pounds twice a day. We have some heifers we are feeding milk to at a year and a half, and we are going to continue that till they become cows at two years, and feeding in this way with a little hay, we find that the cost of a two year old grade heifer bred in a dairy line is about \$35 with us.

We put our cows into the barn every night, feed a hay ration and a grain ration, feeding the grain in a little box

while we milk; as soon as it becomes a little cool we begin to warm the water for them to drink, letting them out two or three at a time, and seeing that they get all the water they want. We sell the cream, the man coming twice a week for the cream and bringing us the money the next time. We don't feed our skim milk to the pigs, we can do better to feed the skim milk to the heifer calves up to two years. Up to the time of the convention at Arcadia, I don't remember that I ever received a dollar in cash for my butter product. This year the largest number of cows I have milked is twenty-seven, and we have received in cash brought from the creamery, \$1,405.56, which divided by the largest number of cows milked during the year leaves me \$51.11 in cash for the cream product received at home from each cow, or 276 pounds of butter. The skim milk is worth certainly ten dollars to me or any other farmer. We calculate our cattle will eat two tons of hay at eight dollars. I feed about 2,500 pounds of bran which at the average price is about twenty dollars. The pasture does not cost me over five dollars as part of the unimproved part of the farm is used. I don't think I have had over twenty-five acres of improved land in pasture to carry twenty-seven head of cattle besides the horses I keep. Taking the twenty dollars from fifty dollars leaves quite a margin of profit to pay us for the work. Some of us poor farmers can't be particular about counting the work, but it is certain that the added fertility to my farm pays for the labor employed caring for the cows.

DISCUSSION.

Mr. Bryant—How do you fasten your cows, with stanchions or ropes?

Mr. George—We take no stock in stanchions, we want our cows to be comfortable, we tie with ropes one on each side.

Question—How long do you let your milk stand.

Mr. George—Twenty-four hours before skimming, in water.

Question — How do you warm your water?

Mr. George — Use a Stowell heater, which is simply a large stovepipe twelve inches one end, six inches the other, running through the water with the fire place at one side of the tank. Most any farmer has truck around that he can fix up an arrangement to heat the water.

Question — Have you any choice in the breed of cows?

Mr. George — Yes, we have taken the Jersey cow, simply because she is a dairy cow. We are grading as fast as we can with Jersey cattle.

Question — What do your calves weigh at a year old?

Mr. George — I should say 450 to 500 pounds.

Question — How much bran do you feed in summer while you have pasture?

Mr. George — It depends entirely on circumstances, the condition of the cow and the condition of the pasture, and sometimes the price of the product. We intend to keep the cows in full flow. I think the cows seem to be better contented when you take them in from the pasture to find a little feed in the box for them.

Question — How much warm water do your cattle drink?

Mr. George — I don't know, but it is a great thing to see those cattle come out and drink their fill and go back without a shiver or shake in such weather as we have had, and I know it is profitable to me.

FACTS, NOT THEORIES, CONCERNING THE DAIRY FROM A FARM STANDPOINT.

BY MRS. ADELE M. BRAGG, VIOLA, WIS.

Ladies and Gentlemen: — A wise merchant, when he goes into business, the first thing he generally does is to buy a day book, cash book and ledger. Why does he buy these books? So that he may know just what he is doing. He would have to be a very shrewd Yankee to guess at all of his accounts. Now, is farming a business? or is it just a place where you get your living? If a business, why not go

at it in a business way; if in the dairy business, have a "dairy book."

This is the way I keep my dairy book: At the beginning of the year I get me a book, and at the top of each page I write: first butter churned in 1887; 2d, butter sold and money received; 3d, butter shipped to Kepler and Crosby; number of pounds, cost, sold for, net proceeds, date of shipment. Named each cow, and put her name and age at the top of a page by itself. I set her milk for one day by itself, and churned it by itself. For churning so small a mess I put cream in a slim one gallon jar, take a short stick, put one hand on top of stick and turn it with the other, and you can churn in five to ten minutes, and it is not hard work like stirring it with a spoon. Then I wrote under her name thus: Leo, three years old, calf named Stray, April 18, 1886. Tested her milk May 18th; calf, 30 days old; milk, 20 pounds; cream, 2 pounds; butter, 1 5-16 pounds; making 1 pound of butter from 15 5-21 pounds of milk. Then I wrote under this weight of milk one day each week so that I could get an average of what she would do per day for the season.

Then, knowing that the milk was richer in the fall than in the spring, I re-tested them, and found that, December 20th, milk 13 9-16 pounds; cream, 2½ pounds; butter, 1 5-16 pounds; 10½ pounds of milk to make 1 pound of butter. She made the same amount of butter from 13 9-16 pounds of milk that she did from 20 in the spring. After getting the average weight of milk to make one pound of butter and added up the weights for the season. In this way I found out what Leo was worth.

In this way, as fast as our heifers come in, I test them. I believe that no work on the farm will pay so well as work spent in weeding out unprofitable cows, and the best way to fill their places, is with heifers raised from the best cows in the herd.

The first thing that pays in a dairy, is a good cow, and we find that out by testing. "The Jersey breed of dairy cattle are well known. They have been built up through centuries of selection and have become such a grand type that it cannot be improved by crossing with any race, but it im-

proves every dairy breed upon which it is crossed so, that a good grade can be produced by the use of Jersey sires whatever the breeding of the dam." Now we have eleven grade Jerseys, and I want to tell you just how I found them by testing. Now I am not going to give you a record like Eurotas who gave 778 pounds, one ounce of butter in one year, or like Mary Anne of St. Lambert, who gave 867 pounds, $14\frac{3}{4}$ ounces, in one year, but simply a little record of three cows and eight heifers, two and three year old grade Jerseys with no high sounding names. I tested a Devon cow, and it took thirty pounds of milk for one pound of butter. I think twenty-five pounds is the average for a native cow. Our little Jerseys tested thus: Leo, 10 12-13 pounds; Jersey, 10 14-17 pounds; Bell, 15 3-7 pounds; Line, 15 11-19 pounds; Rose, 15 1-17 pounds; Dolly, 9 7-17 pounds; Maude, 17 1 9 pounds; Blanch, 19 3-7 pounds; Theo, 23 1-9 pounds; Meg, 22 1-6 pounds; Brindle, 18 6-19 pounds; Black, 20 pounds; averaging $16\frac{1}{4}$ pounds of milk for one pound of butter. It not only takes less milk to make a pound of butter, but the cream has more butter in it. I churned the same weight of a native cow, and a Jerseys, and I got sixteen ounces from the native cow's, and twenty ounces from the Jersey's, so in that there is a gain of four ounces. Next, the Jersey is the cow for the poor man to keep, as you can make good butter under very trying circumstances, and with few conveniences. You know we had a drouth this summer, and water was not very plenty, so I fixed up one of my cellars for a milk room. Set milk in pans. Our cellar has a stone wall and the floor is plastered with common plastering; what we had left of plastering the walls. The bottom was sand and it was plastered on that, so it makes a hard floor, and in this room I kept my milk and churned. Besides the drouth it was hot and hoterest.

In this room I made from June 29th to July 18th, the thermometer out-doors some of the time 98° and up to 105° in the shade. Churned some of the butter at 66° , because I had no water to cool it with, most at 63° and 64° , with the room up to 75° . It had no ice and rode fifteen miles in the hot sun, and was seven days in getting to Chicago after it left

me, and sold in Chicago for 17½ cents a pound, \$1.40 a box, five cents less than Fancy Elgin. Not a single churning, but stayed in the grain till salted; did not lump once. The first box was churned June 29 and didn't get to Chicago till July 25, so you see it has keeping qualities. My neighbor with a good spring couldn't make butter from her native cows at that time. Jersey butter is solid, it can stand hot weather; the Gurnsey butter is the same.

Now you all know that this year has been a very poor year to tell what a herd of cows has done, it does not do them justice; cows did not give from 20 to 25 per cent. as much milk during the drouth as they did other years.

These three cows and eight heifers have in the year 1887 done this. Butter churned and sold at 17½ cents net for the year:

Butter.....	1,862 lbs. 9 oz
New milk fed to 13 calves.....	100
Cream used for family.....	100
Total	<u>2,061⁹/₁₆</u>
	Net average.
2,062 lbs. 9 oz., at 17½c.....	\$360 94
30,261 lbs. milk at $\frac{20}{100}$	60 52
Veal calves.....	14 03
11 calves at \$2 a head.....	22 00
Total.....	<u>\$457 49</u>

I have taken out nothing for feed or labor.

WHAT WE FEED.

We have given from three to four pounds of bran and corn mixed a day, and some chopped Hubbard squash and corn fodder; they ought to have four times this amount to do their best.

The three cows and eight heifers have given this 2,062 9-16 pounds of butter on about one-quarter ration as compared with C. P. Goodrich's way of feeding.

It pays to follow what you learn at the Institutes. Last winter we heard fodder corn talked up, so we thought we would try it, so we planted nearly five acres. When we cut our hay we found we had only seven tons instead of fifty

or sixty. Seven tons from forty acres of meadow, and it looked very much as though we would have to sell our stock. I felt as though I could not give up the heifers and cows for we had worked for four years to get them where we wanted them. When I worked for the government in Dakota, in the M. L. B. S. building my work was to deride rice and meat so that the portion they were allowed a month would last the month out, for fifty-four children, each had so many or of bread and meat. So when I looked at our field of fodder corn, I thought that the same plan had better be applied to our cows. I wrote to Prof. Henry to see if twenty hills or forty stalks would be enough for a cow, with grain feed. He said it would, so I counted the hills in the five acres there were, 76,921 hills, twenty hills a day would last one cow 3,846 days, and it would last twenty cows 192 days, or six months and twelve days. Then by cutting down our stock to fit the feed, we trust to have enough to carry us through the winter. I believe in knowing not guessing, and so you see it payed to follow out the teaching of the Institute.

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It pays to make good butter. The milk should be brought in clean and strained, through a piece of flannel, if you use cans at once plunge it in cold water; if pans, set where it is cool in summer, and sixty degrees in winter, skim while sweet.

Do not keep the cream more than two or three days after skimming, put cream in a tin can and keep where it is cool till ready to churn, then bring where it is warm, and ripen the cream, use sufficient butter color to make a bright, June color, stir frequently, and when it shows signs of acidity churn at a temperature of about 62°. Stop churning when the butter is in little grains. Give repeated washings in weak brine until the water runs clear; drain, then take some salt and put in a pail and put boiling water over it, and make a brine as strong as you can. When cold, put in churn and turn a few times. Let it stand till next morning. Turn every time you come near the churn. Draw off the brine; then take a thermometer and try your brine; if too cold,

warm up to 70° by warming some of the brine; add one to two pounds of salt to the brine; put back and turn a few times; draw off the brine and turn the churn and it will lump nicely; if not, warm the brine again to 70°. When in lump, cut a few times with a straight ladle so the brine can run off, then with your fork pick it up and put it in your tub. Boil your brine in a clean tin pail, strain, and it is ready to use next time. Always put in some salt to keep it up as it was at first. Then put your ladle, worker and fork in churn, put boiling water on them; then take out and drop in a jar of strong brine, and they are ready for next time; then wash your churn with the water, and it is all done. I have only washed and dried my ladle twice this summer, and it is clean and sweet.

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There is money in dairying, for you have your money every week or ten days, and can pay cash for what you buy, and in that way save ten or twenty per cent., for you only buy what you need. In raising wheat you have to wait till fall to sell; in sheep you have to wait till shearing time; in raising steers till they are fat; and, unless rich, buy on time till such times as you can sell, and you buy two things where you need one.

THINGS THAT DON'T PAY.

Not to take a paper.

Not to read it.

Not to put it in practice.

Not to follow the institute teachings.

It don't pay to be a one sided man. Let us look at one of these one sided men.

We will call his name John Smith. Look at him, there he sits in Mr. Miller's store. He has keen eyes, an intelligent face, in every way looks like a go-ahead man. As he is about to go home, Mr. Miller says: You keep horses, Mr. Smith, do you not? have you any to sell? I was just reading in my paper of a man that is buying and paying a fancy price, that is if you have such as suit him. He insists on

having their manes crimped, as that is the kind that his market demands. How glad I am that you mentioned it. My business in the main is dairying, but I raise a few horses each year to sell. But who ever heard of crimping a horse's mane, but these rich fellows are often cranky; but if they will come down with the cash, who cares for their cranks—cash is what we are after.

Now please tell me all about it, and I believe I will try crimps. What paper did you say you saw it in? *The Western Farmer*. Where is it printed? Madison. How much a year? \$1.50. But how would you go to work to crimp a mane? The only way I know of would be to do it like the girls do, use tea lead. That's so; have you any tea lead? Yes, here is some. How much? Oh, nothing. Here is a dime, its worth that to me, and I may make some money out of this, thanks. When I get a horse crimped I will bring it around for your inspection. He now starts for home, but as he walks along he suddenly stops, for a thought has come to him, and he thinks thus: Mr. Miller said he saw that in a paper, and it is only \$1.50 a year. Now he may have forgotten just how the crimps are made, I think I ought to read it myself, or he may want to make a profit out of this, so I believe I'll just step over to the office and order that paper. What's \$1.50 to what I will get out of this, and knowledge is worth paying for. So with tea lead in pocket and the paper sent for he goes home a happy man, tells wife and children all about it, gets them interested, so they can hardly wait for morning to commence the crimping, for he has promised that the girls and boys can have a hand at it. (He afterwards tells his wife that he thinks crimps will not be so bad if he can get the children all interested, so that farming will not be such dull work for them, and they will enjoy staying on the farm.)

In due time the paper comes, and they are all eager to see and read it, so the father says now *boys* and *girls*, I will let you take *turns*, each read one evening till the paper is read, and then we can talk about what we read, in that way keep up a lively interest. So in this way they all read and work till the horses are ready for market.

Now see him as he starts to town with his first lot, how he pats the crimps, curls one lock more, another less, brushes dust off here, then stands off to see the effect, and with a satisfied look on his face, he makes his appearance at Mr. Miller's store, calls him out, and says, now Mr. Miller, I want you to examine this horse closely, and tell me just what you think, because you know best what the market wants. After looking him over he says he is all right, only I think if you made the crimps a little larger he would sell better. All right, next time I will make them larger, and the horse goes to market and sells for a good price. Now he is a smart man, an intelligent man, a good business man. You think so! Now are you sure?

Let's go to market with him again, you know he said his business was dairying; has some ten, twelve cows, now this intelligent man doesn't know which of the twelve is his best cow, never has tested one of them.

When he is ready to start he drives up to the door, and ask's for that butter, there is no joy in his face as he takes the tubs and pushes them under the seat (with a kind of get out of my sight look).

The children do not come out to see him off, for they have no interest in cows or butter, they are never asked to come out and see some nice cows, have no dairy paper, the dairy business is only work, work, milk and churn, week in and week out, and an every day wish that they were 21, so that they could leave the farm. Mr. Smith drives up to Mr. Miller's store and take, butter in, puts it on the counter, with a thump, "well what are you paying for butter today?" 10 cts. 10 cents! my wife said that Mrs. Becker got 15 here, only yesterday. So she did; and if you will follow out my directions I will pay you that. In the first place you see your butter is white, it needs a little color, then you want to buy some cheese cloth, and put it on and cut it off even, leave off all this, that dangles at the sides of your tubs." You can weigh this out, but after this I will do my trading elsewhere, buys his groceries and goes home.

His wife meets him with, Did you get 15 cts. for my butter? No! I only got 10, and besides Mr. Miller found lots of fault

with it, said I ought to color it and buy cheese cloth for the top, that thin stuff, I'll not pay 7 cts. for that, as long as I can sell worn out garments at 10 cts. a lb.

I thought Mr. Miller was my friend. When here a few weeks ago he told me how to sell my horses; but I have changed my mind; he only wants to sell goods. "But you paid ten cents for tea-lead," meekly says his wife, "and \$1.50 for a paper, and when he told you to make your crimps larger you didn't get mad; that's a horse of another color; there was money in that. And so he goes on making money with his horses, and as he puts it in at the top of his purse, the cows take it out at the bottom, and he wonders why he does not get rich.

Is this our clear-headed, intelligent farmer?

Now what is there about butter that is so precious. A man and woman will take advice on anything else but butter. If a man takes potatoes to market, and the merchant tells him all the small ones must be taken out, he straightway goes home and obliges his wife and children to eat the little ones, and the larger ones are taken to market; or if he is told to put his wheat in black sacks and they will pay one cent more, he would at once buy black sacks. Now, we cannot make dairying pay till we make butter an article for sale, like wheat, potatoes or crimped haired horses. We want to bury all these false notions about butter, as the Welsh woman wanted Satan buried. She said she wanted him buried deep, and face downward, so if he should come to life and want to dig himself out, the more he would dig the deeper he would bury himself.

To make dairying a success, you must make the farm of interest to the boys and girls. Now, to tell May to go and churn that butter, will not give her an interest in butter. But if you tell May to make that butter the best she can, the new way, and if she gets 10 cents more per pound than made in the old way, she can have 5 cents of the profits on each pound, she will have an interest, and you will not have to tell her to look after the butter; you will not lose anything by it, but gain 5 cents too.

Then give John a pen of pigs, tell him to bring them up

St. Louis style, and in the fall, if they are a better lot of pigs than you have raised before, he shall have the best one in the lot to sell and have the money for his very*own.

Let Dick have the care of the calves, let him bring them up like D. W. Hoard's premium calves; give him one for his own.

Tell little Johnny that if he will take a spoon and tin cup, and gather the potato bugs, he shall have 5 cents a 100. You will not have to look after calves, pigs, butter or potato bugs; if you don't believe it, just watch Mary. When you tell her Harry will be there to spend the evening, just see how quickly the dishes disappear, and everything is in order, and she is ready for the evening's enjoyment. Why? Because she has an interest in Harry. Spend a few dollars in books and papers to suit the minds of your farm and children: are you shocked at spending your money in this way?

Knowledge is power said the philosopher. The maxim is true, but here is a greater truth, knowledge is safety—safety amid the perplexing cares of farm life, also safety amid the moral pit-falls that surround the farmer's boys and girls. What are you working for? most of you to lay by something to leave your children ten or twenty years hence. Would it not be wiser to give them \$50 or \$100 a year now, and keep them interested, so that they will learn to love the farm, and have a well trained mind, and a knowledge of farm business, they will not miss the \$500 or \$1,000 that you would like to leave them with a well cultivated manhood, they will earn it faster than you can now, scolding and fretting to keep the boys and girls at work, and they will love you just as much.

Good mothers, when Dick or John comes in, all excited and asks you to come out and see those pigs, or calves, and John says count my bugs, do not say yes, I will, then never go, but drop your work and go, and don't forget to give them the well earned word of praise, just think how you felt when you spent an hour making that nice pudding, thinking your husband would like it, and when he eats it down like a potato and never said a word, how all the courage left

you, and you thought what is the use of trying to please. Little hearts feel the same way. Not the cow, making of guilt edge butter, corn fodder, or the training of the children will make dairying a success, but the combining of all these will make it a success.

FACTS, NOT THEORIES, CONCERNING THE DAIRY FROM A FARM STANDPOINT.

BY C. P. GOODRICH, FT. ATKINSON, WIS.

At the beginning of the year, 1887 I had fifteen cows, twelve of which had arrived at the age of maturity, and three were heifers about two years and four months old. In the spring and fore part of the summer three more heifers came in to giving milk at ages ranging from eighteen to twenty months, making the average number of cows for the year seventeen, six of them being heifers two years old and under, and estimating their product at from one-half to two-thirds as much as the average of the same number of the older cows, makes my herd equal to fifteen mature cows.

The account with these cows is as follows:

4,960 lbs. of butter sold, net proceeds of same after deducting freight and commission.....	\$1,243 45
Estimated amount of butter milk and cream used in family equal to 400 lbs. butter.....	100 00
94,500 lbs. skim milk estimated at 20c per hundred.....	189 00
8 calves sold for veal	37 00
8 heifer calves to be raised.....	40 00
Total.....	\$1,609 45

An average of \$107.29 if you call the number fifteen full cows, but if you call the six young heifers cows, then the average will be \$94.67.

The average number of pounds of butter per cow is 357, calling the number of cows fifteen, and I am very sure the twelve mature cows averaged that and more too; but counting the number seventeen, then the average is 315 pounds. I estimate the cost of food consumed by my cows at \$680, being an average of \$40 each.

Cost of food consumed	\$680 00
Cost of butter packages.....	56 83
Parchment paper to line packages.....	4 50
Dairy salt and butter color.....	6 25
Coal to heat milk room	20 00
Total.....	<u>\$767 58</u>

Leaving a net income of \$841.87, or \$56.12 per cow.

It is somewhat difficult to estimate the amount of labor required to bring about this result as other farming operations are carried on by the same help that do the dairy work. But I estimate that the work of caring for and milking the cows, and making the butter is about equal to the labor of one good man during the year. That is probably worth, including board, \$300. This leaves a clear profit of \$541.87, or \$36.12 per cow.

It will be perceived that this account is not quite complete, as I have not charged the dairy with the interest of the money invested in cows, dairy buildings and utensils, barn room necessary to shelter the cows, etc. On the other hand I have given no credit for the difference between having the food consumed, fed out on the farm, thereby helping to maintain the fertility of the soil, and selling it in the market off the farm. In calculating the cost of feeding the cows I have reckoned the food bought at just what I paid for it, and that produced on the farm at what it could have been sold for. I think the benefit of having this nearly all returned to the soil worth as much as the interest of the money invested. According to this figuring, on an investment of \$1,067.58 in food and labor, I have received an income of \$1,609.45, a profit of over 51 per cent. on the investment. The milk was weighed occasionally, but not all the time, to see how many pounds of milk it took to make a pound of butter. At one time, last winter, it took sixteen pounds, but the average throughout the year was nineteen; the greatest amount being required in May, when it took twenty-two pounds. About two-thirds of my cows are grade Jerseys, the balance are common cows, and all with one exception, raised by myself, and nearly all are descendants of an Ayrshire cow, which was a remarkable good

milker. For many years I have raised the heifer calves from the best cows, then when they came in to giving milk, and were fairly tested, disposed of all except the very best. Several times I have made a serious mistake in the selection of a male, so that all the heifers raised in some years have had to be disposed of. At one time, a few years ago, I thought I could buy cows cheaper than to raise them, but after buying and selling a great many, I found it to be utterly impossible for me to buy cows that I could make any profit on, and they all, with barely one exception, have had to go.

During the winter my cows were fed clover hay, timothy hay, corn fodder and some straw, all they would eat of each, intending to give them as great a variety as possible each day. They were fed bran, middlings and a little corn meal mixed, from twelve to fifteen pounds a day to those that were fresh and giving a large flow of milk. Those that had been giving milk some time and were giving less, had less feed. The intention being to give the ground feed somewhat in proportion to the size of the cow and the amount of milk which could be obtained.

On cold and stormy days they were kept in the stable, only let out twice a day to be watered. On warm and sunny days they ran out in a yard. During the summer they had good clover, timothy and blue grass pasture, and good hay was constantly kept in their mangers so that they could eat what they liked of it when they were put in to be milked. They were also fed all summer—those that were giving a full flow of milk, from eight to ten pounds of bran and middlings a day. For two months, beginning the middle of August, they were fed fodder corn green (B. & W. corn).

About one-half of my cows came in in September, and the rest along through the winter and spring.

The milking is done with great regularity by careful, gentle hands, dividing the time between milkings even.

The milk is set in broad, shallow pans large enough to hold all of one milking. The milk sets from thirty-six to forty-eight hours before skimming. The temperature of the milk is kept as near as may be at 60° by cold water running

under the pans in summer, and by a fire in winter. I have tried deep, cold setting—three different kinds of cans—but am satisfied that these pans, which were made to order after a plan of my own, are best suited to the circumstances of my case.

The churning is done three or four times a week at a temperature of 64 or 65 in winter and 60 or 62 in summer. A 40 gallon Curtis' square box churn is used, run by wind power, unless there is no wind, then hand power.

The butter is washed with water while in the granular state, then taken out on a lever butter worker and salted with Higgin's salt, one ounce to the pound. After three or four hours it is reworked and packed. I have tried salting in the churn, then taking out and working the butter, and have tried salting with brine and packing right from the churn without working. But neither of these ways gave as good satisfaction as the old way. The butter is packed in 8-pound boxes and shipped regularly every week to Merrill & Eldreaz, commission men, Chicago, and as regularly the returns come back; I am informed that the same customers have taken it for years.

The boxes are lined, bottom, sides and top, with parchment paper. This prevents the brine from leaking out, does away with the necessity of soaking the boxes, and, above all, prevents the butter tasting of the wood as it is very apt to do if no lining is used; for the boxes are usually made of elm.

These are my "facts, not theories." The figures are taken from my book, where I keep, for my own information, an accurate account as possible of all my farming operations and other business. I would not dare to do any kind of business without keeping an exact Dr. and Cr. account with each department. I find in looking over the book for years past that dairying has paid me very much better than any other kind of farming.

It is true that in some particular years some crop under extraordinary circumstances has paid a very large per cent. of profit, then in other years there would be a great loss; but dairying has paid a good profit every time in all kinds of seasons.

Mr. Hiram Smith called to the chair.

DISCUSSION.

Question— Mr. Goodrich, give us the cost per cow to keep.

Mr. Goodrich— The average on the whole number was \$40.00.

Question— What kind of pans do you use to set your milk in?

Mr. Goodrich— In broad, shallow pans, five feet long and two feet wide and six inches deep. They hold one milking. We skim by hand after thirty-six to forty-eight hours. The best time to skim is just when the cream begins to sour and thicken a little. We calculate to churn every two days, churning four skimmings, and leaving out the last skimming.

Question— Mrs. Bragg, how can you work your butter when for instance, it is forty degrees below zero?

Mrs. Bragg— We don't keep it where it is forty degrees below, we keep it where it is warm enough to work.

Question— Mr. Goodrich, does the temperature of your butter room vary much winter and summer? How do you keep it cool in summer?

Mr. Goodrich— There is nothing to keep it cool but the water running in there. In warm weather the temperature is twenty degrees lower than in the house.

Question— You said you practiced cold setting. Why did you abandon it?

Mr. Goodrich— I thought I could do with less work and I think so yet.

Question— Did you ever weigh the butter received from the two methods and compare them?

Mr. Goodrich— I don't know that I did.

Mr. Briggs— I have weighed the butter when set in pans and set in cans. From the milk in cans I got five pounds a day. I brought it into the house and set it in pans and I got eight pounds. It was in summer. The cans were set in water at 48 degrees. The pans were five quart pressed tin pans set at about sixty. We pump the water with a

wind mill, and I have a large reservoir. Since I had the wind mill, there have never been two days in succession that I had to pump water for the stock. I also churn with mine. It cost me less than \$5, to fix it up for churning and we very seldom have to churn by hand. I use the lever butter worker, and I work the butter just as little as possible and have the salt evenly distributed. I don't let the butter stand and drain in the churn. I want the moisture in it, I just spread it on the butter worker and sprinkle over one third of the salt, then go over with the lever and press it in, then roll it up and put salt on and work it over once or twice more. Let it stand three or four hours, then work it again three or four times, until you are sure the salt is evenly distributed. We put in one ounce to the pound, but I don't suppose there is over three-quarters left in.

Question — What proportion of butter color do you use?

Mr. Goodrich — That depends on the strength of it, you have to find that out, put in enough to make it a good June color.

Question — Have you ever tried salting in the churn?

Mr. Goodrich — Yes. It did very well, but I was not just satisfied. After I drew off the butter milk and washed it, I put in the salt and took it out of the churn and worked it on the butter worker, but I felt as if I had to work it more than when I sprinkled it on the butter worker.

Mr. John Gould — There are two points I would like to speak of. One is the reputation of the dairy products. I mean that the dairy men in a certain locality try as near as possible to make a certain grade of goods. They try not only to make a large amount of goods at a certain time, but make them as well as possible to build up a reputation for that locality. Over in Sheboygan county, they have got a reputation for full stock cheese, and the result is that Sheboygan county cheese makes its own market wherever it is found, the world over. Every one in Monroe makes Schweitzer cheese, and Monroe county Schweitzer cheese is known all over the United States, and orders come from all over the country. Down here at Fort Atkinson where Brother Hoard comes from, they have a reputation for mak-

ing butter all over the country, and from nine and a half cents, they have brought it up to twenty-two and a half cents. Let us take an example from this and try to get a reputation for some particular thing and when you get a market don't fool with it, go on and do the best you can for that market.

Then another thing I heard a man say: "Why are you discussing this butter question all over the country, if we should make any more good butter, we couldn't sell it." Why, England alone last year, bought on the Continent of Europe two hundred seventy-seven millions pounds of butter and paid for that butter twenty-six and a half cents a pound. Now, why didn't we supply that demand? Simply because we only made just enough to ship across the Atlantic to supply the top of our own markets. We had nine million pounds to send over there, that is all. One hundred million pounds of the butter that we made was sold for soap grease at five cents a pound. Why couldn't we have sense and intelligence enough to divide that plum with the Continent of Europe. Did you ever know when good butter wouldn't sell? But you can always find a market where poor butter won't sell.

There were one hundred million pounds of oleomargarine eaten in the United States last year, and why? Because we couldn't get good butter enough, the good butter will drive the oleo out of the market every time. Let us take a few of these practical lessons and when we come here next year we will compare notes and see if we have not made something of an advancement along this line. First, reputation, then making for the market, instead of what we think the market ought to have.

SECRETARY'S REPORT.

Mr. President and Members of the Association — A meeting of the executive committee was called by the president to meet at Fort Atkinson, April 28, 1888. There were present, President Hon. H. C. Adams, Secretary D. W. Curtis, Chester Hazen, Stephen Faville, Hiram Smith, C. R. Beach,

W. H. Morrison and W. D. Hoard, members of the Executive Board; also R. H. McCutcheon, cheese manufacturer, of Whitewater.

The object of the meeting was briefly stated by President Adams. After a discussion of the matters involved, which were to institute tests of milk, delivered at factories, with a view to ascertain the value of the yield of separate herds in forming the aggregate of the butter or cheese manufactured in each. Hiram Smith formulated the work proposed in the following outlines, and giving the reasons, in part, for the proposed work of the Association:

WHEREAS, Producers, dealers and consumers of milk, have no cheap, certain, satisfactory and established method of determining the amount of solids in milk, or the relative proportions of the ingredients of those solids, whether the milk is for family use, or to be manufactured into butter or cheese, so as to determine its proportion of solids as compared with that of standard composition — that of the average of well-fed, native cows; and

WHEREAS, The aggregate solids in milk have no determined value — as a quart of skimmed milk, beer measure, worth only half of one cent, may contain as much solids as a legal quart of new milk worth eight cents — for true value in the milk cannot be determined by aggregate solids, or by the measured quantity, or by weight avoirdupois, any more than true value can be determined by measuring tea, weighing calico or by ascertaining the amount of coloring matter in a yard of carpet. Like ore, it should be assayed to determine the amount and proportions of its solid elements; and, for the furtherance of the objects of this Association, and the promotion of the dairy interests of the state, determine the amount of such of those elements that enter into the composition of cheese or butter; and

WHEREAS, It is known that great differences exist in the value and composition of milk, as between one cow and another, between that of herds, and localities, between periods of lactation of the same herd and same cow, depending, in addition to these natural causes, upon exposure to heat and cold and storms, and very largely upon the breed and kind and quality of food consumed; and

WHEREAS, Many articles of far less commercial importance than milk have established standards that secure substantial justice and satisfaction between buyer and seller, such as that No. 1 wheat must be free from adulteration and contain 60 pounds to the *measured* bushel, or ordinary woolen cloth weigh so much to the *square yard*, or gold be estimated by its per cent. of fineness; and

WHEREAS, Experts in the manipulation of milk, claim to be able to demonstrate the true relative value of milk, as compared with any agreed upon, or legally prescribed standard, either for domestic uses, or to use in the

manufacture of butter or cheese, and tell the per cent. of value any given quantity can contribute to the production of the aggregate of the manufactured product, with substantial accuracy. Therefore

Resolved, 1st, That the Wisconsin State Dairymen's Association enter upon the work of testing milk at the factories in different portions of the state, with the view of showing the value of milk from herds and cows as compared with that of other herds and cows, and compared with that pooled at the factories, to be manufactured; and show how the dividends, on the basis of proved, just value, compare with pro-rata dividends made on the basis of weight alone.

Resolved, 2d, That the President, Secretary and Treasurer of this Association, be, and are hereby constituted a commission to carry out the work mentioned in the first resolution.

Resolved, 3d, That said commission is hereby authorized, at the expense of the Association, to procure suitable implements and employ or develop a competent person or persons to conduct the said work, at a compensation not exceeding \$100 per month, exclusive of necessary traveling expenses to aid them,—provided said commission is authorized to expend, not to exceed \$1,500 per annum, as they may deem expedient.

Resolved, 4th, That said commissioners report from time to time to the Executive Committee of this Association the progress of the work; and that such portions of said reports as they may deem advisable be embodied in the annual report of the secretary.

Resolved, 5th, That the expenses of said commissioners shall be audited by the Executive Committee, and paid in like manner as other expenses of the Association.

All of which is respectfully submitted.

HIRAM SMITH.

The preamble and resolutions were accepted and adopted.
W. D. Hoard submitted the following, which was adopted:

Resolved, That in connection with this work the commission is hereby instructed to institute certain experiments for the purpose of determining a practical method for keeping whey sweet, or comparatively sweet, till the patrons can utilize it.

Mr. J. A. Smith was employed by the Board of Commissioners and set to work. He was authorized to obtain such implements as he thought he should want from time to time to prosecute his work, also to reimburse those with whom he had to buy milk products for the purpose of making his experiments.

His services were fixed at \$100 per month and expenses.

The work was prosecuted with much zeal throughout the

season, and many valuable facts brought out in regard to milk which will prove of great advantage in the future.

An itemized report of his expenses was laid before the Executive Board and by them approved.

A report in full will be published of his work.

The contemplated work by the Executive Board for this season in looking after adulterated products, and the better manufacture of both butter and cheese, will be carefully considered, and the work commenced, early in the season.

Manufacturers of cheese should comply with chapter 240, laws of 1887, regarding the branding of cheese and not lay themselves open to prosecution.

The laws relating to the dairy industry will be published in the report.

The expense of the secretary's office for the past year has been \$84.40. An itemized bill was furnished the Executive Board and by them approved.

Respectfully submitted,

D. W. CURTIS,

Secretary.

TREASURER'S REPORT FOR 1887.

*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.

	Amount in hands of treasurer.....	\$1,228 04
Feb. 10.	Memberships	99 00
	Entry fees to dairy exhibit.....	13 50
June 10.	From state treasurer.....	2,000 00
	Total receipts.....	\$3,340 54

DISBURSEMENTS.

Feb. 10.	Expenses on Hart Cup.....	\$0 35
	Mrs. Robinson's hotel bill.....	5 50
	Mrs. Robinson's expenses attending Sparta meeting..	2 00
	Mrs. Bragg's hotel bill	5 50

WISCONSIN DAIRYMEN'S ASSOCIATION.

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	Mrs. Bragg's expenses attending Sparta meeting.....	\$3 80
	N. E. Allin, hotel bill.....	5 50
	N. E. Allin, expenses attending Sparta meeting.....	4 05
	John Boyd, hotel bill	1 50
	D. W. Curtis, hotel bill	6 50
	H. K. Loomis, hotel bill.....	6 50
	Mrs. Kelly, hotel bill.....	6 00
	Mrs. Kelly, expenses attending Sparta meeting.....	12 75
	Chester Hazen, hotel bill.....	4 50
	John Gould, hotel bill.....	4 00
	Prof. W. A. Henry, hotel bill.....	4 50
	Stephen Favill, hotel bill.....	6 00
	B. S. Hoxie, hotel bill	6 50
	W. H. Morrison, hotel bill	4 00
	H. B. Gurler, hotel bill.....	5 50
	W. D. Hoard, hotel bill.....	4 50
	J. A. Smith, hotel bill.....	7 50
	W. D. Hoard, printing bill.....	58 20
	H. K. Loomis, expenses attending Sparta meeting... ..	14 81
Feb. 12.	D. W. Curtis, salary for 1887.....	75 00
Feb. 23.	John Gould, attending Sparta meeting	30 00
	John Gould, expenses attending Sparta meeting	3 00
Mar. 4.	Mrs. R. Howard Kelly, reporting Sparta meeting....	65 00
	Stephen Favill, expenses attending Sparta meeting...	4 50
	Chester Hazen, expenses attending Sparta meeting...	6 10
April 9.	W. A. Henry, expenses attending Sparta meeting....	22 00
	H. Z. Fish, premiums.....	23 00
	Burne's Cheese Association premium.....	10 00
	F. B. Fargo, premium	2 00
	Miss Nellie Smith, premium.....	3 00
	N. E. Allin, premium.....	5 00
	J. A. Smith, attending Richland County and Sparta meeting.....	29 25
Apr. 20.	H. B. Gurler, expenses attending Sparta meeting	9 11
Apr. 23.	Telegram, D. W. Curtis.....	40
May 4.	T. J. Laughlin, hotel bill Ex. Com.....	7 00
June 8.	W. H. Morrison, traveling expenses and circulars....	21 47
June 14.	J. A. Smith, experimental work.....	150 00
June 23.	Chester Hazen, attending Ex. Com. meeting at Fort Atkinson.....	5 00
	J. A. Smith, experimental work.....	200 00
July 2.	Stephen Favill, attending Ex. Com. meeting at Fort Atkinson.....	5 00
Aug. 4.	J. A. Smith, experimental work.....	100 00

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Aug. 19.	Guyler Lithograph Co.....	\$10 00
	J. A. Smith, experimental work.....	200 00
	Express on stationery.....	25
Sept. 3.	Express on circulars.....	30
Sept. 7.	J. A. Smith, experimental work.....	50 00
Oct. 20.	J. A. Smith, experimental work.....	300 00
Dec. 2.	Hiram Smith, attending Ex. Com. meeting at Fort Atkinson.....	10 57
	D. W. Curtis, attending Ex. Com. meeting at Madison.	5 21
	H. K. Loomis, attending Ex. Com. meeting at Mad- ison.....	11 68
Dec. 13.	Stephen Favill, attending Ex. Com. meeting at Mad- ison.....	7 17
	W. D. Hoard, attending Ex. Com. meeting at Madison.	5 00
1888.		
Jan. 13.	Express on programs.....	25
Jan. 23.	D. W. Curtis, expense of office of secretary from March 12, 1887, to date of order January 21, 1888...	84 40
	Exchange on drafts.....	2 50
	Postage.....	52
	J. A. Smith, experimental work.....	259 99
	Total disbursements.....	\$1,903 63
	Balance in hands of treasurer.....	1,436 91
		<u>\$3,340 54</u>

Respectfully submitted,

H. K. LOOMIS,

Treasurer.

Report examined and adopted by the Executive Com-
mittee.

THE CARE AND PREPARATION OF MILK FOR
CHEESE MAKING.

BY PROF. J. W. ROBERTSON, GUELPH, CANADA.

I rather misjudged the progress you have made in dairy matters when I said last night that you had a splendid reputation for butter making, but that I had not heard much about your cheese making progress. That was perhaps due to the fact that we in Canada have heard of your dairy pro-

gress, mainly through our esteemed friend Hoard, and he prefers a Jersey cow and good butter to any other article that a dairyman can produce. But to day I have been delighted in examining the cheese on exhibition here, and have been much pleased to notice the excellence of its quality.

Now, although we in Canada have a very superior reputation for our cheese, we are not at all selfish in trying to keep to ourselves the knowledge of how we got there, because we recognize that every pound of poor cheese that is made anywhere on this broad continent is an injury to the man who makes fine cheese, anywhere on this continent. So much is this the case that if any individual in Canada should make a pound of very inferior cheese, it would most likely replace at least five pounds of very superior cheese — perhaps Wisconsin cheese — on somebody's table. In dairy matters, as in most other affairs, live progress is imperative, and success can neither be attained nor maintained in any other way. The philosophy of successful dairying is like the philosophy of successful bicycle riding, the man who does not keep going on will quickly go off. That being so, in order to maintain the reputation we have, we must improve and increase both the quality and quantity of our product. We may thus uphold that reputation against all competitors.

I have been asked this afternoon to speak upon one aspect of dairying that is perhaps less interesting to a general audience than others that I might speak of, but one that is of vital importance to the man who has to deal with making cheese. I have been asked to talk to you upon the care and preparation of milk for a cheese factory.

Before a man is called upon to prepare milk for a cheese factory, he should be very careful that his cows have had a chance to make good milk, because, while a man may be able to preserve a product of milk from injury, he can never make good milk out of that which is poor, in the first place. Hence I urge upon every dairyman the importance and necessity of having healthy cows, of giving them plenty of nutritious and wholesome feed, because the quality of the

feed will always show itself in the milk and cheese. My experience leads me certainly to this conclusion, that unless we have well fed cows we cannot have milk either of good flavor or good keeping qualities. We must also see that the cows are watered with pure water and that only. I have found in my short experience extending over some twelve years, that a great many farmers are careless as to the quality of water their cows drink. They seem to imagine that if their cows drink anything liquid, it cannot be bad for the milk. I have even known farmers to urge that their cows like to drink stuff that is not fit for them, but I do not think that a cow is the best judge. I think that the superior intelligence of the dairyman is always indicated by the special care he gives to his cows' surroundings.

I have examined milk under a microscope and found that in milk, microbes that had been taken into the system of the cows through the water they drank. The outbreak of a terrible epidemic of typhoid fever was traced to that cause. I have found it possible to destroy those microbes by the process of cheesemaking, but I have never found it possible to bring back to that milk the good flavor that the milk would have had, had the water been pure; neither have I found it possible to make such cheese keep as long as if the cows had good pure water. It is not possible to make good cheese unless the milk supplied for the cheese is good milk.

Another requirement is that the cows should have access to all the salt they care to lick as often as they like to take it. Frequently I have been told that if cows had access to all the salt they want, they will take too much and thereby hurt themselves. I believe if cows are denied access to salt for a great length of time, that they will swallow too much when they have a chance. I had a short experiment at one time under my care in regard to the effect of salt on cows. I divided twelve cows into four groups. I arranged it so that the cows of group number one had no access to salt, while the cows of the other three groups had access to all the salt they wanted to take. Within two days the cows of group number one had fallen off in their milk

yield no less than seventeen and one-half per cent., on the same feed, in the same pasture, and with the same conditions and care. This was continued for twelve days; then I withdrew the salt from group number two, and had an almost similar experience. I tried it then with group number three. The average yield in these three groups was brought down to fourteen and a half per cent., less milk. The effect upon the quality of the milk for cheese-making was also to be shown. I found that the milk from the cows that had not access to salt turned sour in twenty-four hours less time at the same temperature than the milk from the cows on the same feed that had had all the salt they wanted to lick. In my experience I have frequent occasion to refer the taint in milk to the lack of salt fed to the cows. The salting of cows, especially for cheese-making, as often as once a week is not sufficient. Over in Canada, we are said to be the most church-going and religious people on this continent. That is our reputation; but we have one religious practice over there that is all too prevalent. Many dairymen salt their cows only on Sunday afternoons. I don't know that you do that here, but too many of us do, and I have found it an injurious and harmful practice—no better for the man than for the cow.

There is another thing that is essential to the production of good milk, and that is that your cows should be kept in a pasture free from all foul odors. There are many people who do not understand the delicate sensibility to smells that cows possess. Several years ago I had occasion to reject the milk from a patron owning twenty-five cows. He could not locate the cause or explain the trouble. I visited his farm and traveled over his pasture and found in the woods the unburied carcass of a horse he had hauled there that spring. Cows sometimes pastured in the field near by, and the milk from those cows was positively offensive both to the smell and taste; so much so, that the smelling of it made me quite sick. I had that carcass buried at once and had no further trouble with that milk.

Now let me fix in your minds an idea of the necessity for having your animals under such conditions of location that

the air is absolutely pure—free from all contaminating taints. Especially at this season of the year is it important to have the stable well ventilated.

I was trying to point out some of the defects as well as the excellencies to some good friends who were showing me their samples of butter to-day. I did not like to tell them then of all the faults. I found some of the butter to have been made from cows breathing foul air in stables. There was an absence of that delicious rosy flavor that will actually make a man pay his baker twice as much, by using the kind of butter that has it. I have found this to result sometimes from the generosity of the man owning the cows. He will feed his cows so often and so much that every cow in the building has the dyspepsia with all its accompanying disagreeable odors. There is little success possible by the person who has the care of a cheese factory being very solicitous about the keeping qualities of the product if the owner of the cow is not solicitous about the comfort of the cow herself. If the cow is abused in any way, then she inflicts the only punishment that she can upon her owner. She reminds him of his duty to be kind and good to her by withholding from him that which he requires from her. If the cow is abused, she does not give him so much milk; while the cow that is kindly treated will make milk that will nourish and comfort any individual who uses it. I have found in cheese-making particularly that the flavor of the milk depends very largely upon the disposition of the man. Our good friend Hoard has given us some good illustrations as to how the fat in the milk is the product of nervous force. We often see what we call splendid nerve power in cows, but we also need what we call splendid men with splendid heart and head power to be the owners of these cows.

I have had trouble with inferior milk because the cows have been chased home by that useless dog. He is more expensive to keep on a dairy farm than a first-class cow. I have also oftener than once had to return great canfulls of milk to patrons who were simply great stupid boors of men. Some have taken it kindly to be advised, and are now better

citizens because they have learned the secret of treating those lowly animals, the cows, in a far better way.

Now, having spoken for the cow, let me state a few things that I have learned from experience and observation as to how the milk can best be prepared for cheese-making.

It is very necessary that the milk should be protected against all contamination from any foul odors that may be adjacent to the place of milking, and which may come through the air. Taint may also come from the vessels that are used by the milkers and oftener in our country from the hands of the milker. I am not fastidious at all in my tastes, but I would not like to have my breakfast served up by hands that I have seen used for drawing this very susceptible liquid from the cows. Now this is no sentiment. He that hath not clean hands can never make fine butter nor cheese. When I was in Denmark two years ago, I took special pains to study the methods of one excellent farmer who keeps no less than 250 cows in one stable. One of the regulations of the stable was that every milker should wash his or her hands after milking two cows. That was an invariable rule, and the butter from that herd of cows brought no less than ten or twelve shillings per cwt. more than the price of first-class Danish butter. The owner of those cows told me that he attributed a measure of his great success to the enforcement of this one regulation in his dairy.

Having drawn the milk, and the pails being clean (as I believe they generally are — because the women folks look after that), the milk should be thoroughly strained. I have found a good deal of trouble by the use of strainer pails simply because there is often an accumulation of milk which is liable to be hidden from the eyes of the washer. I have taken pains to examine the nature of that yellow accumulation on the inside of the wire or strainer pails, and I find that that foulness is almost identical in nature with the peculiar growth which comes in the throats of persons when attacked by diphtheria. I have known where children got the worst kind of attacks from contact with that kind of stuff. The germ it contains can be killed with lactic acid, but prevention is better than cure. The milk

should be strained *immediately after milking*, because some foulness may have fallen into it, and the sooner it is removed the less danger there is of its being made soluble in the milk.

After the straining is attended to, next comes the aeration of the milk in the proper way for cheese-making. Too often the milk is poured into one large can and left there just as the cows have given it. Now, that neglect means, perhaps, three things that are very injurious to the milk. It means first, that the peculiar odor which the cow imparts to the milk is left there until it becomes fixed in the flavor of the milk.

Then the germs of fermentation that come from the air have the best chance for growth and multiplication if it be left undisturbed. Then that milk will become partially directed towards souring, and will become almost unfit for proper and thorough coagulation by rennet. So you see, we aerate the milk for three purposes:

First, by evaporation, by washing the milk with air, by either pouring or stirring or by trickling it over some exposed surface, we try to eliminate from the milk any objectionable volatile element that may be in it.

Then we aerate the milk for another purpose. I have mentioned to you that the milk contains germs of fermentation. Even the best chemists like Pasteur of Paris do not know how to describe these minute microbes. He calls them vibriones, and the strangest thing about these vibriones is that they are active only in the absence of free oxygen. If we leave the milk still, carbonic acid gas is generated, and that makes the best condition for the action of these microbes. The absence of free oxygen leaves it in such a condition that the germs become active, multiply and begin to do their work. Then it is impossible to coagulate that milk completely so as to yield the finest quality of cheese. Coagulation can never be perfect unless the milk is thoroughly aerated immediately after it is taken from the cow.

Then we aerate the milk for another reason. It seems to give vigor to the fermentation that brings about lactic acid. It gives vigor to the fermentation without producing the

acid. So much is this so, that I have found it almost impossible to make a first class cheese from milk that had not been aerated, or from milk that had not sufficient age before I commenced the operation.

I am not going to discuss cheese-making, but I want to fix this point. Cheese-making can be followed, and the process can be performed with the best results only when we can get a rather rapid development of lactic acid in the absence of too much moisture. Now, we cannot get the rapid development of lactic acid in the dry curd, unless we have imparted a degree of vigor to the lactic ferment in the early stages of the milk. The proper aeration should be first attended to.

The subsequent cooling of the milk delays and retards the operation of the process that makes the milk sour. Milk turns sour simply by a certain kind of germ or microbe multiplying itself. In the reproduction of itself it splits one molecule of sugar of milk into four molecules of lactic acid. You have sweet milk in the one case and you have sour milk in the other. Thus by the delay in this operation, the milk stays sweet longer. The cooling of the milk should never precede the aeration; it should always follow it.

Again, the milk requires special protection against any foulness of the air. You have all observed that if a pitcher of cold water stands on the table in a warm room, it will immediately condense on its outside surface drops of water from the air. The colder the pitcher and the warmer the air, the greater the condensation on its surface. Now, the colder you make the milk, the greater the condensation on the surface of the milk. The cream on the surface of such milk is often very foul, and it is even more so if it has not been thoroughly aerated before cooling.

When the whey is drawn to the farm, a common practice is to empty the whey right out at the milk stand. Having done that, the owner thinks nothing at all of the impurities he is importing into his milk, impurities that are sure to get into his cheese.

I would like to say this also, that I would not recommend the practice that seemed to be almost supported by what

was said here this morning. In Canada we think we have won our reputation by adhering strictly to the policy of making full cream cheese, and full cream cheese only. While it is possible to take very rich milk and make very bad cheese, it is never possible to take poor milk, poor in fat, and make from that as good cheese as you can make from milk rich in fat made in the best way. It is quite impossible by any manipulation to put quality into the cheese. We cannot create quality—richness—we can merely preserve it.

I have investigated the effect of skim cheese upon the consumption of cheese in England. I have spent lots of time and some money trying to discover the best method of making a skim cheese without adulteration, that would deceive the quickest and best judge. I think I could do it; but I do not believe it would be good for my country or for myself. In my investigations I found this, that when that kind of cheese is cut and exposed to the air for one day, the absence of quality becomes very evident even to the consumer who does not know much about it. A person buys a piece of that skim cheese and eats it, and by-and-by he concludes that cheese does not agree with him, he doesn't care for it. In that way one pound of that cheese will prevent the sale of four or five pounds of good rich cheese, and thus curtail the demand. It does not pay in the long run.

I have heard of ladies who were so nice in the handling of their milk that they objected to send to the factory "that nasty, yellow scum" which rises upon the milk after standing, saying that it will not do for the cheese makers to be troubled with the surplus fat in the milk. I say without fear of contradiction that a cheese-maker who knows his business can incorporate nearly the whole of the fat in the cheese—that is, he can incorporate as large a proportion of the fat in the cheese if there be four and a half or five per cent. of fat in the milk, as he can incorporate if there be only two pounds of fat in one hundred pounds of milk. If he does not know his business fully, he should learn a little further, because it is possible to incorporate the fat even of very rich milk.

By following these suggestions I have given you, I think it will be quite possible for you dairymen here to make cheese a little finer than you have been making, and, I dare say, by and by, a little finer than *we have been making*, but I doubt very much if you will make it *finer than we will be making*.

I am delighted to have been with you, and I have learned much in one direction — I have learned that you make your cows give more milk than our cows give. We have been fortifying ourselves in the direction of the production of a splendid article, and making a splendid reputation, but I am convinced that we shall have to come to make our cows do so at less cost.

Now, Mr. President, in Canada we have some croakers who are saying that the bottom is just going out of the dairy business.

I shall take back from this convention a lesson for their benefit, telling them that they need to lay a better foundation in the bottom of their business by producing milk as cheaply as you are producing it. Then if we both keep on producing goods as fine as we can, each will help the other to get a better demand, a better consumption for our goods, and thus make the profits both in Canada and Wisconsin greater for all in the business. And as we make our profits greater, we shall make of ourselves better men, better women, better boys and better girls, not because the money accumulates, but because the requirements of the dairy business are such that the men and women engaged in it need to be better men and better women in every sense of the word before they can make that money.

Such a splendid record I expect for you and wish for you, and I am sure my brother Canadians heartily agree with me in what I have said.

DISCUSSION.

Mr. J. A. Smith — I wish Professor Robertson would tell us how he retains all the fat in even very rich milk, as he says he does.

Prof. Robertson.—When the fat is separated from the milk in the form of cream there is a reason for the cream becoming clotted; it is merely an accumulation of the globules into particles. These particles can easily be separated back into the original state by warming and straining the cream properly, so that you have no clots of cream. Having no clots of cream, you have merely to mix back with the milk the fat globules in the original state, and if the milk is properly coagulated, it will retain its globules, held each in its place by the structure of the curd. It requires more rennet to make a proper coagulation of rich milk, and I have used as high as eight ounces standard rennet extract for one thousand pounds of milk with the best results and with no injury to the flavor when I made the curd dry enough. I intend this summer to make an experiment, using twenty-four ounces of rennet extract to the thousand pounds of milk. You must have *enough rennet to make a perfect coagulation of the milk, and no more.*

Mr. De Land—There is a question connected with the ventilation of barns that I want to ask a question about. We are all building silos, many of us building in the barn or near the barn. Now, I want to know if the air which we get from those silos, having a very sharp smell, would affect the secretion of the milk. Could you find it in the milk afterwards?

Prof. Robertson— I would not fear any consequences from the taint that might be imparted to the milk from any such cause. I think I could remove that almost entirely afterwards by evaporation. What I do fear most is the taint imparted by some decomposing substance. If the ensilage were advanced to the sour stage, I would expect some injurious results. At any rate, I would do this. I would have the stable thoroughly ventilated, so that the odor there was no more objectionable than the odor of my parlor, and that can be done easily by putting air shafts from the ceiling upward, and by using land plaster in the gutters.

Mr. Hoard— It is a very serious matter how to keep a stable warm with the bodily heat and also to keep it pure, and I have discovered a very marked difference in the character

of my own stable since I commenced to use land plaster freely. The ammoniacal gases that come up from the deposits in the stable I am sure must injure the milk if we force the cow to breathe this foul air. Prof. Arnold told about cows that were fed near a heap of onions and the milk was flavored with the onions, showing that the odor of the onions which was breathed by the cows went through to the milk.

Mr. Monrad — I would like to ask the Professor, if I understood right, that he wants to ærate the milk before cooling it.

Prof. Robertson — I do. I would recommend the æration of the milk while it is warm, and I would prefer to do it without any complicated apparatus, because if a pump be used to force air into the milk, there is danger of accumulating impure milk upon the valves of the pump. We have in Canada an ærating contrivance which is simply a double cylinder of tin. The milk is poured into the upper cylinder and trickles out through small holes all around and down the sides. These minute streams as they pass down, pass over and outside of this bottom cylinder, which is filled with cold water, to the receptacle below. That is a device prepared by my friend D. M. McPherson, who is a cheese king, and has some seventy-six cheese factories.

Mr. Monrad — I want to ask you, supposing I had one hundred pounds of milk that would turn out four pounds of butter, and I have another hundred pounds of milk that will turn out six or seven pounds of butter, would you be able to incorporate that excess of two or three pounds of butter, all of it, into the cheese?

Prof. Robertson — When cheese is to be made from milk having, say four pounds of butter to the hundred pounds, there is usually as much as three-quarters of one pound of fat sent off with the whey by the best process of making known. If I have milk to operate upon which has six per cent. instead of four of butter fat, I should add just one-half more to the amount of fat lost in the whey, and then I lose the same proportion of fat I commenced with. If I lose three-quarters of a pound from four pounds, then I

would lose one and one-eighth pounds from six, or in the same proportion. But then, I would never think of making cheese from milk having as much as six pounds of fat per hundred pounds, because cheese is usually worth not over eleven cents per pound. Butter is worth at the same time, say twenty-five cents per pound. I do not think I could get any more per pound for cheese with six per cent. of fat than four per cent. of fat. I believe the best proportion of ingredients for the perfect cheese is when perhaps only four per cent. of fat is found in the milk, with the total solids thirteen. Anything beyond that is better for making butter.

Mr. Monrad — That is to say if I have Jersey milk containing six pounds, you would advise me to skim off two pounds?

Mr. Hoard — Could you trust him to skim off two pounds?

Prof. Robertson — That is just it. I am very much afraid that if he was skimming, that by accident, the skimmer would dip rather deeper and he would take off more than two pounds. Then, another thing, if we allow one patron to skim, no matter how good his milk is, we must allow all the rest. Every person believes his milk is as good as his neighbor's, and if one skims the rest must; so I would rather run the risk of putting the extra fat in. I would prefer making all the fat of so rich milk into butter.

Question — If it was honest cheese, would there be any danger in mixing water in the fat?

Prof. Robertson — I don't think there would be any advantage, and there would be danger, because as water is mixed with the milk, the structure of the curd is more delicate than if no water is added.

Mr. Hoard — I want to say a word. Canada has come to the reputation of making the finest cheese on the American continent. She has made it through a very close and thorough organization of her dairy interests. Prof. Robertson has had as much to do with the dissemination of knowledge and understanding as any man in the Dominion. He is considered an expert. His talk here to day shows that he has a very deep discernment into the philosophy of milk and its character. Now, we have none too good a rep-

utation for cheese, and I want this little talk here to sink deep into the heart of every man who is furnishing milk to a cheese factory. My experience has been that I never yet have seen the patrons of a cheese factory squarely and fairly convinced of being in the wrong, and I guess every cheese maker has had that experience with patrons. The patron never likes to bring the question fairly and squarely to himself, "How stand I on this question, am I right or am I wrong?" And this matter of the care of milk is the foundation of this whole business. It is that which can and ought to add dollars and millions of dollars to the wealth of Wisconsin, and these very suggestions made by Prof. Robertson point to the starting point in that direction. I know there are still many who stick to the old methods, and neglect these things, which make for their own good, milk with dirty hands and in dirty stables.

I don't know that I am talking to any such people. If I am not, I hope you will convey it to some people that you know.

NOTES ON DAIRYING.

BY PROF. JAS. W. ROBERTSON, ONTARIO AGRICULTURAL COLLEGE,
GUELPH, CANADA.

The business of dairying, when intelligently and carefully followed, insures to the farmer a safe and steady income. The Province of Ontario is favored with all the natural advantages needed for the production of cheese and butter of the finest quality; and as the permanent success of the dairy industry depends upon the quality of the product, every dairy farmer is, or should be, interested in its improvement. To help in that direction is the purpose of these notes. In producing and supplying milk to cheese factories and creameries the following points require attention in order that the best results may be obtained.

GENERAL RULES.

1. Milk from healthy cows only should be used, and not until at least four days after calving.

2. Any harsh treatment that excites the cow lessens the quantity and injures the quality of her yield.

3. Cows should be allowed an abundant supply of wholesome, suitable food, and as much pure water as they will drink.

4. A supply of salt should be placed where cows have access to it *every day*.

5. Cows should not be permitted to drink stagnant, impure water, nor to eat cleanings from horse stables, leeks, turnip tops; nor anything that would give the milk an offensive taint.

6. All milk vessels should be thoroughly cleaned; first being well washed, scalded with boiling water, and afterwards sufficiently aired to keep them perfectly sweet.

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

8. Milking should be done and milk should be kept only where the surrounding air is pure and free from all objectionable and tainting odors. Milking in a foul smelling stable or yard imparts to the milk an injurious taint. Sour whey should never be fed, nor should hogs be kept in a milking yard nor near a milk stand.

9. Tin pails only should be used.

10. All milk should be properly strained immediately after milking and for that purpose a detached strainer is preferable to a strainer pail.

For Cheese Factories.

11. In preparing milk for delivery to a cheese factory it should, immediately after straining, be thoroughly aired by pouring, dipping or stirring. This treatment is as beneficial for the morning's milk as for the evening's, and it is even more necessary when the weather is cool than when it is warm.

12. In warm weather all milk should be cooled after it has been aired, but not before.

13. Milk kept over night in small quantities — say in tin pails — will be in better condition than if kept in larger quantity in one vessel.

14. When both messes of milk are conveyed to the factory in one can the mixing of the morning's with the evening's milk should be delayed till the wagon reaches the milk stand.

15. While the milk is warmer than the surrounding air it should be left uncovered, but when colder it may with advantage be covered.

16. Milk pails and cans should be protected from rain; and milk stands should be constructed to shade the cans from the sun.

17. Only honest milk with its full cream and full share of strippings should be offered; violation of this requirement leaves the patron liable to a heavy penalty.

For Creameries.

18. In preparing milk for delivery once a day to a creamery where the whole milk is received, the treatment should be similar to that recommended for cheese factories.

19. For creameries receiving cream only, the milk should be well aired but not cooled before setting.

20. Milk should be set for the separation of the cream, where no impure air will reach it.

21. Cream rises best with a falling temperature, and the separation of cream from milk is promoted by cooling, after setting to at least 40 degrees Fahr.

For Butter Making at Farm Dairies.

22. When the cream is used for butter making at the farm, the foregoing treatment and conditions may be observed with profit.

23. Good ventilation for a milk-house, milk-cellar or dairy room is most essential, and may be provided for by leading an air drain underground, for say 200 feet. Through it a supply of pure, fresh, cool air may be admitted. The foul, or warm air may be allowed to escape through ventilators, or windows in or near the ceiling.

24. Cream should invariably be removed from the milk before the milk is sour.

25. The cream for each churning should be gathered into and kept in one vessel.
26. The whole of the cream should be well stirred every time fresh cream is added.
27. In summer, cream should not be left longer than three days before churning, and should be slightly soured.
28. The best churning temperatures are between 57 degrees and 60 degrees, during the summer, and 60 degrees and 64 degrees during the winter.
29. Butter can be more thoroughly washed free from butter-milk while in the granular condition than after it is gathered or pressed into a roll.
30. Only the best pure salt of medium and uniform fineness of grain should be used, and from three quarters to one ounce of salt per pound of butter will be found satisfactory for the summer.
31. The utmost cleanliness in milking, in vessels, in utensils, and in all surroundings must be observed to preserve the flavor and body of milk, cream, butter and cheese from contamination.

HINTS ON CHEESE MAKING FOR CHEESE MAKERS.

1. Use every endeavor to educate your patrons how to produce milk of the best quality, with the most profit.
2. Give each one a copy of "Points for the Attention of Patrons of Cheese Factories."
3. Carefully inspect the milk cans, especially the seams inside the covers, once every week; any offensive matter appearing yellow when wet with milk is most dangerous to the flavor and keeping qualities of the cheese.
4. Insist on a careful straining immediately after milking.
5. Send a circular or note to every patron two or three times a year, urging care in the airing of all milk.
6. Visit promptly the farm, pasture, stable, milking-yard, milk-house and milk stand of every patron whose milk comes tainted, after he has been notified of its bad quality; some apparently trivial matter that has escaped attention will generally be found as the cause.

7. Where whey is returned in the milk cans, urge the owners to empty them as soon as received, and not to feed the whey near a milk stand, milking-yard or other place where milk is kept.

8. Examine carefully the inside and outside of the opening from the weighing can into the milk conductor; and just after using look into the conductor very closely for any traces of the yellow matter referred to in No 3.

9. Do that every day.

10. Entertain a "creepy dislike" for the use of a strainer, cloth, dipper, pail or thermometer which feels greasy, or that has a miser's store of matter-out-of-place in the corners.

11. Lift the pans of the milk vats out of their place for a thorough cleaning of the water-pans once a fortnight.

12. 84 or 86 degrees Fahr. are satisfactory setting temperatures when the milk is in good condition.

13. Over-ripe or acid milk may with advantage be set as high as 96 degrees, according to the degree of its ripeness. See also 31.

14. Let the milk be well matured by the retention or application of heat before the rennet is added.

15. If the milk is delivered to the factory in too sweet a condition, it should at once be heated to 94 degrees and frequently stirred.

16. According to the degree of its sweetness it may be left to gradually cool down to 88 degrees during 2 to 4 hours.

17. The addition of sour whey to hasten the maturing is most objectionable and should never be resorted to.

18. Old milk which has become well ripened, and nearly sour to the taste, may be added, but loppered or thick milk should never be used.

19. In the use of coloring, the annatto extract should be diluted to the extent of one gallon of water to every vatful of milk, and then thoroughly stirred in.

20. Pure rennet extract or powder of *known* strength is indispensable.

21. The quantity used should be regulated according to the condition of the milk.

22. Rennet should be diluted to the volume of at least one

gallon of liquid for every vat before being added to the milk.

23. The first discernible action of rennet is to coagulate the milk into curd.

24. To perfectly coagulate the milk from fresh calved cows, more rennet is required than later in their milking season.

25. The more rennet there is used the more moisture will there be retained in the cheese under similar conditions of making.

26. The more moisture there is retained in the cheese the more quickly will it cure under equal condition of temperature and atmosphere.

27. For spring cheese as much rennet should be used as will thicken for cutting in from fifteen to twenty minutes at a temperature of 86 degrees.

28. For summer and fall cheese forty-five minutes should be allowed for the same process, with milk in good condition.

29. The second evident action of rennet is to effect a separation of moisture out of the curd particles.

30. The raising of the temperature up to 98° Fahr. provides increasingly favorable conditions, and thus promotes the rennet action.

31. When milk is over-ripe or acidy, a proportionately increased quantity of rennet should be used to effect a sufficient separation of the moisture from the curd (often termed "cooking") before the presence of lactic acid is perceptible to the taste or smell, or is discernible by the hot iron test. See also 13.

32. Observation of the foregoing would remedy many so-called mushy curds and avoid the danger of leakers.

33. Rennet should be diluted to the volume of at least one gallon of liquid for every vat before being added to the milk.

34. It should be thoroughly mixed by vigorous stirring, otherwise coagulation will be very imperfect.

35. The results of late investigations recommend an allowing of the curd to become fairly firm before commencing to cut, except in the case of a quick curd.

36. More moisture is retained in the cheese, and a better yield is thus obtained. See also 26.
37. The horizontal knife should be used first, lengthwise, and then followed by the perpendicular knife, crosswise, after the whey has separated to half cover the curd.
38. The mesh of the knives should be so close that three cuttings would suffice, except in the case of a quick curd, which should be cut unusually fine.
39. The knives should be moved fast enough to prevent much disturbance of the curd by pushing.
40. After coagulation is perfect, the curd should be cut finer during the late fall than during the summer months.
41. Gentle and slow stirring should begin immediately after the cutting is completed.
42. The hand should be used to free the sides and bottom of the pan from any curd that may have adhered.
43. The application of heat should be delayed for fifteen minutes after stirring is commenced.
44. The heat should be applied through the medium of warm water to avoid scorching of the curd.
45. The temperature should be gradually raised to 98° Fahrenheit at a rate not faster than one degree every four or five minutes.
46. In the case of a quick curd, Nos. 43 and 45 may be disregarded.
47. Pains should be taken to make the curd particles so dry, before the development of acid is perceptible, that after being pressed in the hand and released they fall apart when slightly disturbed.
48. Stirring should be continued till the curd is properly "firmed" or "dried."
49. The temperature should be maintained at 98 degrees until the whey is drawn off.
50. When the hot iron test shows fine hairs, from $\frac{1}{4}$ to $\frac{1}{8}$ of an inch long, the whey should be removed.
51. If acid is discernible by the hot iron test before the curd is so properly "firmed," the whey should be immediately removed and the stirring continued till that firm condition is brought about.

52. In both cases the dry curd should be kept at a temperature above 92 degrees Fahr.

53. The presence of too much moisture in the curd *while the acid is developing* is the cause of tenderness of body and pastiness in cheese.

54. If the temperature be allowed to fall below 92 degrees the development of acid is retarded and excessive moisture is retained in the curd during its development.

55. The presence of such extra moisture in the curd at this stage will leave the cheese with a weak or pasty or talloxy body, according to the degrees of acid development permitted.

56. A rack placed in the vat seems the simplest and most effective provision for keeping the curd warm without risk of scorching.

57. Just after the removal of the whey the curd should be hand-stirred till the free moisture has drained off.

58. *After the curd is dry or firm enough, but not before,* it may be allowed to mat into one mass.

59. It should be frequently turned and packed close, till the layers of curd are four or five deep.

60. Whey should never be allowed to gather in small pools on the curd at the stage.

61. The close packing in layers four or five deep with frequent turnings prevents the outside of the matted pieces from becoming chilled or more deeply colored than the rest of the curd.

62. The conditions of the curd, as to when ready for cutting and salting, are best ascertained by the use of the senses. The usual order of reliability for that purpose is by touch, smell, taste and appearance.

63. The proper degree of change has taken place when the curd feels mellow, velvety and greasy; smells like new-made butter from sour cream; tastes aromatic rather than sour, and shows a texture passing from the flaky or leafy into the stringy and fibrous.

64. When the curd is gasey or very porous, souring should be allowed to go further before it is arrested by the cutting and salting.

65. If the curd be too moist or soft it should be cut or ground at a rather earlier stage, and hand-stirred some time before the addition of salt.

66. In both of these cases it should also be well aired by stirring before being salted.

67. It is generally beneficial to stir the curd for ten minutes after cutting or grinding before the salt is applied.

68. The results of the tests made last season (1886) for the Western Ontario Dairymen's Association, indicate that Canadian salt is better for cheese-making purposes than English salt.

69. One pound and three-quarters of pure salt per 1,000 pounds of milk is a maximum quantity for April and early May cheese.

70. From two pounds to two and three-quarters pounds of salt per 1,000 pounds of milk is the range for summer use on fairly dried curds, and from three pounds to three and one-half pounds during October and November.

71. Where extra rennet has been used, or where the curd is sloppy, a corresponding increase of salt should be applied.

72. One important action of salt is to dry the curd and cheese, and thus retard the curing.

73. The curd should be hooped and pressure applied within twenty to forty-five minutes after the salt is stirred in.

74. Delay at this stage, or coldness of curd destroys the desirable rosy flavor and imparts to the cheese the bitter taste of the salty white whey.

75. Immediately after the application of salt the pieces of curd become harsh and gritty on their surface; then in from fifteen to twenty-five minutes the harshness gives place to mellowness and the salt causes the whey to separate freely.

76. Pressure in the hoops should be continuous, at first light and gradually increasing.

77. The followers should be loose-fitting, and canvass press rings used.

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

79. Greasy water is sure to percolate into the body of the cheese and leave nasty flavors.

80. The curd-cutter or grinder must be thoroughly cleaned every day; wretchedly bad flavors are frequently sown into cheese from neglect of this.

81. Curd sinks should be furnished with racks having slats bevelled to an edge from both sides.

82. The racks need thorough scrubbing on both sides every day, and should be turned out for airing over night.

83. A sink cloth that shows clogging by yellow matter should be burned at once.

84. Occasional soaking over night in a strong sal-soda solution is beneficial.

85. The curd whisk has been a fruitful scatterer of bad flavors; a hair brush is more easily kept clean.

86. The hoops and press tables require to be rinsed with hot water every day, and scrubbed on both sides.

87. All cheese should be turned in the hoops in the morning to give finish to the shape and body.

88. The press cloths should be left on for a fortnight, or till within a few days of the time of shipment.

89. No cheese should be taken to the curing room till the shape is true and the edges well made.

90. The cheese should be turned on the shelves once a day till at least three weeks old.

91. The curing room floor should be frequently swept, the shelves thoroughly cleaned after each shipment, and the air kept pure by suitable ventilation.

92. The curing is effected by fermentation, while heat up to 70° makes a favorable condition, and cold under 60° an unfavorable condition for its operation.

93. A temperature of from 70° to 75° Fahr. should be maintained for curing spring cheese.

94. From 65° to 70° Fahrenheit is the best range of temperature for the curing of summer and fall cheese.

95. In the curing room a temperature of from 65° to 70° should be maintained continuously.

96. Where the room is heated by a stove the following simple device will help to equalize the temperature over the whole and save fuel.

97. A tin jacket should be placed so as to surround the stove at a distance of eight inches all around.

98. Let the jacket stand eight inches from the floor and extend eight or twelve inches above the stove according to its size.

99. A light rope attached to the jacket and then passing around a pulley fixed to the ceiling will provide for its being lifted out of the way when fresh fuel is being added.

100. The air between the stove and the jacket on being heated at once ascends; the colder air from below is drawn up, and a continuous movement of warm air along the upper part of the room is established away from the stove, with the complementary circulation of colder air, near the floor, towards the stove.

101. When press cloths are stripped off, use warm (but not hot), pure sweet flavored grease on the rinds.

102. Just before boxing summer cheese grease them, and apply scale-boards while the grease is still soft.

103. Mark the weight of each cheese in neat figures on the hollow side of the box.

104. Let there be two scale-boards on each end of the cheese in the box.

105. The edge of the box should be level with the cheese and the cover should fit close.

106. The band of the box cover should be at least one-quarter of an inch thick to give additional strength to the package.

107. Insist on the teamsters using only clean wagon or sleigh boxes in which to take cheese to the railway station.

108. See that the flues of the steam boiler are cleaned out every week.

109. *Finish all of every day's work each day, in the very best way you can.*

110. Keep everything in and about the factory scrupulously clean.

111. Keep a correct and detailed record of every day's make.

112. Occasionally compare the working of your factory in all its details with the foregoing recommendations.

EVENING SESSION, JANUARY 27.

The convention met pursuant to adjournment at 7:30 P. M.

A SEARCH FOR PEARLS.

MRS. H. W. KELLOGG, RIPON, WIS.

Tupper, the poet, tells us that "Words of wisdom are chance pearls which Diligence loveth to gather and hang round the neck of Memory."

Words of wisdom! Pearls, thrown up from the waters of Life's great turmoil and gathered by the hand of Diligence. Let us, therefore, take Diligence for our guide and make search for these goodly pearls.

First and foremost of all things to-day, we find the subject of dairying, and the Association here convened is the good angel that has come down to disturb the waters for us. Let us haste ere we be too late. Now, I see standing upon the brink hundreds of men, all over this great domain, owners each, of one, two, four, eight or more cows, bringing up their wives, asking them to plunge in and be purified of all their old, low-priced ways of butter making, and take on the new and more lucrative way. It is enough for them to keep the cows, and feed and milk them. Nine-tenths of the men all over the land think when they have set down their pail, overflowing with rich, warm milk, they have done their whole duty toward the manufacture of farm made butter, and leave the rest to their wives and the Fates.

The Fates immediately commence active work, and for the lack of conveniences and modern butter making utensils, the pains-taking wife makes a failure, and the Fates make the butter.

I do not infer by this that farmers' wives as a rule, are not good butter makers; for, if you want good bread and good butter, there is no better place to find them than on the average farmer's table.

It is the thoughtless way of handling and disposing of a

product that brings such meager returns, when it might be made to take the lead among our bread-winning productions.

It is not enough to produce the milk, without making any provision as to how that milk shall bring us the best returns for our labor.

The best methods should be sought after and obtained. Science is trying to teach us that the new warm milk must be subjected to a falling temperature to get the best results; and this falling temperature must continue until the cream is all out of the milk; for, as soon as the temperature ceases to go down the cream ceases to come up. Rapid refrigeration cannot be produced in warm weather without the free use of ice. In an abstract from a paper read by Prof. L. B. Arnold at a dairyman's convention in the state of New York recently, he says: "At the dairy exhibition May last in New Yoak the expert judges found three samples of perfect butter, these perfect butters were all made the same way. The cream was raised by intense refrigeration."

Without some refrigerating or cooling method an ever changing temperature, will make a product without uniformity, which is the bane of good prices. With modern equipments, and a pains-taking effort, we will find that uniformity in butter making on the farm is possible and even easy; and good prices will inevitably follow a good uniform product; for, it is not the market price that makes the butter; but the butter that makes the market and the price. Good butter and good prices, are the pearls we are looking for; will Diligence reward our search?

The state of Iowa with her one million two hundred thousand cows, is flooding that state with an ocean of milk, which should hold within its lacteal depths, pearls of wisdom, which should send forth flashes of light, to illumine the pathway of all benighted dairymen.

In a paper read by H. D. Sherman, dairy commissioner for Iowa, at Mason city about a year ago, we quote the following:

"I make the declaration, without fear of successful contradiction, that one-half of the market value of the butter contained in the entire milk product of the state, as

it is taken from the cow, is lost by mismanagement of milk, cream, and butter before it reaches the butter tub."

Oh, fair Iowa! you may flaunt out the dairy banner of the north-west, but Mr. Sherman has dived down and brought up the dairy product to our view, and where are your pearls? Now, is there Adam enough left in the present generation, to say that women are to blame for this condition of things.

I have read of an expert in judging butter, who says, he can tell "by running a trier into a package of butter, when the lady who made the butter, had her last new bonnet.

If that expert should be on duty here, and he makes the age of our butter, equivalent to that of our bonnets, then woe be unto us.

Will some one kindly point him out to us, and tell us his name, for we would like to have him rise, and tell us what kind of dairymen our husbands are. I think he would be apt to tell, "they are a sort of a 'side issue' in the dairy business."

I have just been culling out four pearls from that valuable casket, Hoard's Dairyman, which he says are necessary for every dairyman to understand, or he will be left behind in the race.

"1st. For each dairyman to improve his understanding as to what is meant by the term 'a dairy cow,' so that he may secure an animal that will yield from 250 to 300 lbs of butter a year, instead of 100 and 150 as does the present average cow.

"2d. To so improve his understanding as to make one dollar's worth of land, furnish double the feed it ever did before.

"3rd. To so improve his understanding, as that ten pounds of fine butter shall be made where one was made before.

"4th. How to feed for butter, and select food that shall have a direct bearing on the butter product of the cow."

And I would like to add, to take such an interest in the manufacture and marketing of his butter, that it shall stand second to none in quality and price.

Again, Prof. Henry gives us many choice pearls; among them are the following:

"1st. "In dairying he who sells butter at common prices, which is made from milk produced from common cows, fed the common way, will never rise to comfortable circumstances, but lead a hard life of toil all his days.

2nd. Get out of the deep worn rut of your old prejudices, stand up and look the problem of better success squarely in the face, like a man of pluck and brains. Think of a farmer trying to make money by taking milk to a cheese factory from a lot of cows that yield him only 3,000 pounds of milk a year, and he, not knowing or caring anything about improving that yield.

Think of him, going along year in and year out and not knowing how to feed a good cow, even if he has one, so as to bring a little profit from his hard labor.

Think of him, making butter that costs him every bit of 16 to 18 cts. a pound and swapping it at 10 to 12 cts. a pound for groceries, paying high for his groceries, and getting nothing for his butter.

Think of a man blindly plunging along in these confounded old ruts of farm practice for years, and never caring to read what other men are doing, who are successful, and make money in the dairy business.

Think of all these things, and then remember that success, like charity, begins at home.

Remember that in the dairy business you can not make money by keeping forever at the tail of the procession. Lastly: Nothing pays so well as keeping posted. Nothing costs so much as indifference and a lack of knowledge.

The old darkey preacher said, "If you want to make friends with the Lord, change your crowd."

Do not all these things teach us that we give too little attention to details in farm management, and constantly suffer greater or less loss thereby. When we get poor enough (and we are rapidly getting there) to look after the small things our average wealth will begin to increase, and with these little important things put into practice, the state of Wisconsin will come to the front in the dairy business, and though Iowa, with her numerous cows must be all the time

stripping, we shall out-strip her in the amount and value of our dairy products.

The gems of thought that come to us daily through the press and otherwise, give the thinking man and woman an incentive to more thorough work. Much has been said about the increasing toil of woman's domestic work; but into her life is daily growing an ambition for advancement, far ahead of that of the cool-headed deliberate man.

In a paper read before our institution a year ago, one of able and worthy farmers said to his workers, "Let us draw nearer home." With what interest had we listened to the discussions about the dairy, the raising of clover, the filling of silos, and now they were drawing nearer home. Can we not look back and see how our hearts thrilled within us? How majestically they came up the walk, how they commented on our front yard, how the trees had been too thickly or too sparingly planted; and then the halt at the back door, the unseemly appearance of the back yard, the unanimous verdict that it should be planted with vegetables up to the very threshold, to hide its unseemliness, then the retreat back to the fields again.

And woman pased and listened. Was not her will paramount at the back door? If the yard had an untidy appearance, would it improve it by turning up the soil? on the other hand, if it presented an attractive appearance and the walks were neat and clean, was it not her vigilance that made them so;

Shakespeare has said "Nor more can you distinguish of a man, than of his outward show." Likewise do not the surroundings of the home bespeak the mind within.

How true it is, that the pursuits of man are so engrossing to his mind, that it become entirely indifferent to all other surroundings.

If we are planning some agreeable surprise, or have made up our minds to go into the poultry business or some other money-making pursuit on our own hook, and ask advice quite timidly, fearing some great objection may be raised, we will tell you our husbands greatest virtue is indifference.

If we want a little money just for ourselves, and wish we

could have a better way of taking care of the milk during the hot weather, then we will tell you, his worst fault is indifference. It is not the increasing toil, nor the daily self-sacrifice, that brings the unrest in woman's heart; but it is that peculiar malady found everywhere, in city and country, affecting all mankind alike, indifference, I can better illustrate this point by giving a little anecdote from a paper.

"A reporter encountered a boy at work one early morning before others were astir, and thus accosted him.

Reporter: Well my lad you are out early this morning.

Lad: Oh, yes! we get up early at our house.

R.: Do you always commence work so early in the morning?

L.: Yes, father and I go off to work and mother stays at home and works for us all.

R.: How do you manage to get away so early?

L.; Well! you see, mother gets up in the morning and gets my breakfast, then she gets me up and I get off to work. Then she gets father's breakfast, and he gets up and goes to work. Then she gets the children up to breakfast and gets them ready for school; and after that she tends the baby and gets her own breakfast.

"R.: It must be you all get well paid for your labor.

"L.: Yes, I get two dollars a week, and father gets two dollars a day.

"R.: And how much does your mother get?

"L.: Mother! she don't work for anybody.

"R.: I thought you said she worked for you all.

"L.: Oh! she does, but there isn't any money in that."

The labor of love is accepted with so much indifference, that even a thought of recompense comes with a surprise.

After the late war, when fortune changed hands so rapidly, and poverty sometimes overtook those whose wealth had always shielded them from labor, it was found that woman could work and earn money, where men despaired.

From that point started the putting forth of woman's unused talent; and to-day, who can tell the possibilities of woman. The doors of the professions have opened to her

knock, and she has proven herself capable of mastering their intricacies.

Dairy farming and stock raising have been proved a successful occupation for her, and still in the old home life she bears her cares with the same benignity.

She studies the value of the clover and finds that with the extermination of the bumble bee the fertilizing of its blossom is gone.

She is seeking education in politics, in government, in finance, in farm dairying and butter making; but the choicest pearl of all she seeks, aside from that pearl which can be had without money and without price, the love of the Savior, the foremost and holiest of all, is where she labors with love, truth, and unswerving fidelity to make a happy home.

No wisdom that forms the laws of nations, can ever be half as precious, as the wisdom that builds up and forms a united household. It is right and proper that we should reach out after new experiments if we will, but let us hold fast to that "love that suffereth long and is kind," and with forbearance and endurance, with all that is pure and noble in thought or aspiration, may all center round this sacred altar — home.

CO-OPERATIVE DAIRYING.

BY JOHN BOYD, 199 LAKE ST., CHICAGO, ILL.

An eminent attorney (I believe Daniel Webster) was once approached by a young aspirant for honors at the bar, with the remark, that the profession seemed to be over crowded. The great man replied, "You will find plenty of room at the top, it will never be crowded there."

What was true of the legal profession then is literally true of the dairy business to-day. There is plenty of room at the top of the ladder; there is no crowding there and never will be, while the bottom is always overcrowded. We must remember one thing, if we ever expect to get to the top, or anywhere near the top, that we must commence at the bot-

tom and work up; there is no royal road to the top at one jump; first we must be perfectly sure of our foundation; all the skill in the world cannot rectify the damage done in handling milk carelessly or negligently, when it is first drawn from the cow. That is the time the irreparable losses are made, and they are immense. If I could figure out and place before your eyes this day the actual losses sustained by the farmers of Wisconsin every day by the bad handling of milk, you would be appalled. You would at once conclude to either give up the business or make a change in the management. Simple as the dairy business is supposed to be, there is no branch of agriculture that has been so generally mismanaged or so little understood. If the farmers of the west should attempt to handicap other branches of farming as they have and do the dairy industry, they would bankrupt themselves in three years, if not in less time.

We have gentlemen here from far and near, from Canada, New York, Ohio, and others from nearer home, well versed in farm economy, they tell us how to raise great crops, to build silos and feed at a much reduced cost, and this information is of great value, it is however of most value to the farmer who, if not at the top of the ladder is making his way there. Those at the bottom, the crowded lot, should first learn how to take care of what we have already before reaching out for more; this I believe will be found true economy. What I mean is this: We are producing, say 100 pounds of milk, for which we get from 75 cents to \$1 for; by taking better care of the 100 pounds of milk we realize from \$1.25 to \$1.50 for it. After we have gone so far, then comes in the question of cheaper production. The farmer who learns so save the first is sure to gain the latter. In reaching out for what we think are great things, we are too apt to overlook items of far greater importance that have the appearance of being commonplace.

The creamery system as it has and does to a great extent exist to-day, has done much to improve the dairy butter of the country, but the recent developments in New England

show most conclusively that there is yet great room for improvement, that the best results are not attained by the present method in the west. It is exaggeration to state that not fifty per cent. of the actual value of the milk produced in Wisconsin converted into butter is realized by the farmers throughout the state.

Within the past few years the farmers of New England have been establishing co-operative creameries on a new plan and their success has been so great and they have in consequence become so numerous that within the last two years, their butter product has become a very important factor in the great markets of the east, and is beginning to have a perceptible effect on the prices of the best western product. From a small beginning a few years ago the co-operative creamery in the eastern states, has now become a formidable competitor in the New York and Boston markets. The number of creameries are not only increasing with unprecedented rapidity, but those already established are extending their business with astonishing strides, an unmistakable indication of success. They are from the nature of the system adopted, disclosing new avenues of economy in the dairy business heretofore unthought of, or wholly neglected. You may form some conception of their success from the fact that within the last three years considerably over 100 co-operative creameries on the plan I speak of have been established in New England alone and they are giving better satisfaction than anything that has preceded them in that line. This last year the fever has extended to New York and Pennsylvania, and a number are now in operation in these states. The business of every one of them is largely on the increase, in most every case the annual product has been doubled and tribled. They are in every sense of the word co-operative, they return to the patron the full value of his cream less the actual cost of manufacturing the butter. The secret of their success is in having adopted one uniform method of handling the milk and producing the cream. No buttermaker can be expected to produce fine butter unless he is furnished uniform cream. The foundation of the business lies here. Unfortunately for the western

farmers this matter has been too much overlooked by our creamery men, they have been going it blind in this respect to a very great extent.

The co operative creamery commends itself to all classes of producers of butter, for the reason that it equalizes the value of all contributions, with perfect justice to each one, it gives to the superior butter-maker the full value of his milk, with less labor expended on his part, while it insures the inferior butter-maker a return greater than he can realize any other way from his milk. It enables the farmer to utilize the skimmed milk on the farm to the best advantage without the labor and expense of hauling it a considerable distance every day, in fact nothing is lost to the producer. The consequence is the cash returns are large and immediate. They give so much satisfaction to the co operators that the dairies in the east are being largely increased, where they have heretofore been neglected under the impression that dairying in the east could not compete with the west on account of the difference in the cost of feed.

It looks now very much as if it was only a question of short time, when the west can no longer count upon New Englanders as consumers of western butter.

A well organized co-operative system is our remedy in the west. Co-operation properly directed means strength, stability, and success. The good effects of the co-operative creamery are seen in the patrons, herd of cattle, as a natural consequence the cows are improved in quality, because the farmer measures the worth of his cows by the quantity of cream they produce, he can measure his cows by spaces of cream, and the first thing he does is to discard the unprofitable cows and replace them with better stock. There is more in this item than may appear at first sight, it affords the dairyman an easy method of testing his cows, with no increase of labor, in fact it compels him as a matter of business to do what he otherwise would consider an unmitigated bore.

The co-operative creamery is to the dairy farmer, the best educator of modern times. To a farmer of ordinary observation, every good or bad effect of the dairy management .

of his cows and their product can be (in fact is of necessity) seen in his returns from the creamery. It is impossible under the system for him to shift the responsibility on to someone else, his education comes directly home to him through his pocket, a wonderfully sensitive medium to us all.

There are some questions of vital importance that come up in the economy of dairying, that are made apparent by this system of gathering cream, which do not appear in following the whole milk method, or that of cheese making. For instance, how is a farmer to learn by taking his milk to a cheese factory, and pooling his milk with Tom, Dick and Harry, what breed of cows, or which individual cow of his herd is best adapted to the purpose of making cheese. Or how is he to learn by taking his milk to a whole milk butter factory, what breed of cows or which individual cow of his herd is best adapted to the purpose of making butter, or how is he to satisfy his own mind as to the best course to pursue in feeding for the special purpose to which he devotes the milk of his herd, or in fact we may ask the question, what would it profit him even if he did know. There is in reality no inducement for him to find out, or try to improve, even if he were fully posted as to the actual value of every pound of milk he produces. All these questions are a blank to the seller of whole milk. The only one point visible to him is quantity, and this is the simple object plain to him that he can or does work to.

On the other hand these questions are all an open book to the farmer who patronizes the gathered cream factory, operated on the Cooley system. Twice every day he can read its open pages. Every time he skims his milk, he notes the yield of his cows; the improvement or falling off in butter value, if he changes his course of feeding he can estimate the effect on the yield of cream, every individual cow in the herd can be called to account and condemned or approved as the case may be. There is no manner of doubt but that we are feeding year in and year out, cows that do not pay for the hay they eat, and it is equally as true that so long as we continue the old system so long will we continue to keep some cows at a loss and feed them at a loss. The

truth is we do not farm on business principles. We strain at a gnat and swallow a camel.

What merchant would lay in a stock of promiscuous wares at their regular market value, and mark them all at one selling price? How long would he continue to do business? Only long enough to exhaust his cash capital, for such a merchant could command no credit in any market in the world.

In many sections tenant farmers are restricted by the terms of their leases from selling hay or straw from the lands they occupy, but they are not restricted from selling the whole milk, yet in doing so, they are as surely selling the fertility of the soil. Skimmed milk divested of every particle of butter fat contains 10 per cent. of plant food, made up of lime, magnesia, nitrogen, phosphoric acid, potash, and other substances which have their place in the vegetable economy, as against 12 per cent. or 13 per cent. in full milk.

Now take it for granted that no dairyman should be satisfied with a less yield of milk from each cow on the farm than 5,000 pounds per annum, which is equivalent to 500 pounds of plant food contained in the skimmed milk of an average cow for one year. Multiply this amount by the number of cows in the herd and you have the annual drain upon your land from this source. Continue this for a series of years and you can no longer wonder at the exhausted condition of the soil. The fact is, selling the milk is equivalent to selling the fertility of the land.

The capital stock of a co-operative creamery usually runs from \$1,500 to \$3,000, according to surrounding circumstances. The organization consists of a President, Secretary and Board of Directors, who are elected annually from the stockholders, and no person is allowed to hold stock who is not engaged in agriculture. The business is first chargeable with interest on the capital stock before any dividends are declared.

Here in the west where lumber is cheap, a creamery can be built and fully equipped, with the best modern implements with a capacity of 1,000 lbs. butter daily for \$1,500.

Of the value of the system you can form your own conclusions from the following figures which are taken from the books of a few of the co-operative creameries in the east. They may be counted as reliable for they were the basis of the settlements made between the co-operators. They have no object in concealing them and nothing to gain by publishing them.

The following are the returns made by seven co-operative creameries, operated on the Cooley system of gathering cream, for eleven months of the year 1887, commencing January 1, and ending November 31, 1887, showing the net payments per pound of butter during that time made to the patrons of the different creameries mentioned.

In every case the skimmed milk was left on the farm, and the amounts given are the net prices actually paid to the farmers for the cream alone, after deducting all expenses, including interest on the capital and provision for a sinking fund:

1887.	Ipswich, Mass.	Wapping, Conn.	Canton, Conn.	Ellington, Conn.	Contoocook Val., N. H.	Windsor, Conn.	Amherst, Mass.
January.....	27.32	28.09	26.81	26.00	25.20	25.55	25.59
February.....	27.75	26.95	26.65	25.72	27.30	24.41	24.58
March.....	27.54	28.09	25.82	24.11	24.40	24.15	23.76
April.....	27.54	26.00	24.76	24.60	23.40	24.07	23.12
May.....	24.22	24.32	21.70	22.78	21.00	21.94	21.33
June.....	21.69	21.93	18.60	19.17	18.30	18.84	19.48
July.....	22.71	21.19	18.78	19.70	18.60	20.76	19.79
August.....	25.22	24.33	22.22	22.66	21.70	22.36	22.55
September.....	25.34	26.00	25.33	25.09	22.60	23.70	22.98
October.....	26.29	27.64	26.07	25.97	23.70	25.76	24.58
November.....	26.78	26.95	26.11	25.90	28.51	24.85
Av. for 11 mo....	25.67	25.59	23.90	23.80	22.62	23.63	22.96

ESTIMATED VALUE 100 POUNDS MILK.

The facts show that it required in these creameries from 15 lbs. to 20 lbs. of milk to make one pound of butter, but to be within bounds, we will take the larger estimate and say it required 20 lbs. of milk to every pound of butter.

The average payment of the seven creameries is a fraction over 24c per lb., then we have 100 lbs. of milk represented by 5 lbs. of butter at 24c per lb	\$1 00
And 75 lbs. of skimmed milk at 35c per 100.....	26½
Making an av. return per 100 lbs. milk for 11 mo	\$1 26½

HOW IT PAYS THE FARMER.

The better the cow, the more spaces of cream, and consequently the greater the profit; some dairies furnishing cream to the N. Brookfield creamery averaged fourteen spaces of cream per can of milk for the eleven months ending December, 1886, when it required an average of 6.50 spaces for one pound of butter. There were instances of 21 spaces of cream per can of 17 quarts of milk.

At the Ipswich, Mass., creamery, during nine months ending November 30, 1886, W. F. Kigsman was paid \$592 for the cream from ten Jersey cows. For the same time, W. B. Kinsman was paid \$347 for the cream from seven common mixed grade cows.

J. P. Gardner kept ten Jersey cows, made fifteen pounds of butter per week for his own use and sold the balance of his cream for \$536 during the nine months. J. F. Gwin kept five cows, the cream from which brought \$276. The town farm sold from seventeen very common cows \$742 worth of cream. If these parties had as much cream during the remaining three months of the year as they had in March and November, or at that rate, they would have had \$90 apiece for the cream from Jersey cows and \$75 each for the commonest kind of cows. C. D. Sage of N. Brookfield, averaged 14 spaces of cream on each Cooley can of 17 quarts from grade Jerseys during the first eleven months of 1886; the average price paid per space during that time was 3.52 cents, so that Mr. Sage received 49.28 cents for the cream from 17 quarts of milk, besides having the skimmed milk left; this is equivalent to 1.45 average per 100 pounds for his milk during the entire eleven months, without allowing anything for the skimmed milk.

Amherst, Mass., Co-operative Creamery—Operated on the Cooley system of gathering cream, from December 1, 1885, to November 30, 1886.

Total number spaces of cream received.....	1,383,533
Total number pounds butter made.....	215,788
Average number spaces cream for 1 pound butter.....	6.47
Average sum paid per space of cream	3.64
Average sum paid per pound of butter.....	23.66
The business of three years.	
1884.....	97,159 pounds butter.
1885.....	160,004
1886.....	215,788

North Brookfield, Mass., Creamery—January to December, 1886.

Average number spaces of cream on each Cooley can of milk....	10.54
Average paid per space of cream.....	3.59
Average paid for cream on each Cooley can of milk.....	37.71
The capital stock of this creamery is \$2,000, held by ninety-three stockholders, in \$10 shares.	

Wapping, Ct., Creamery; Wapping, Ct.—From January 1, 1886, to November 30, 1886, inclusive.

Total number spaces cream received.....	903,752
Number pounds butter made.....	136,170
Average number spaces required for 1 pound butter.....	6.64
Average amount paid per space of cream.....	3.74
Average amount paid per pound of butter.....	24.76

Canton, Ct., Creamery—From January 1, 1886, to November 30, 1886.

Total number spaces cream received.....	823,847
Number pounds butter made.....	130,668
Average number spaces required for 1 pound butter.....	6.34
Average amount paid per space of cream.....	3.66
Average amount paid per pound of butter.....	23.23

Ipswich, Mass., Creamery—From March 1, 1886, to November 30, 1886.

Total number spaces cream received.....	218,398
Number pounds butter made.....	34,519
Average number spaces required for 1 pound butter.....	6.32
Average amount paid per space of cream.....	3.85
Average amount paid per pound of butter.....	23.33

North Brookfield, Mass., Creamery.—The Business for Two Years.

	1885.	1886.
Number spaces cream received.....	235,063	616,540
Number pounds butter made.....	37,098	94,155
Number spaces to 1 pound butter.....	6.36	6.58
Expenses per pound butter.....	5.20	4.40
Average paid for space.....	3.38	3.56
Average paid per pound butter.....	21.52	23.47
Average number patrons.....	35	65

Including a reserve fund amounting to \$111 in 1885, and more in 1886.

CO-OPERATIVE BUTTER SALES—CREAMERY REPORTS, 1887.

Cummington, Mass., Creamery.

Received in November, 1887, 40,070½ spaces cream.

Made 6,134 pounds of butter, which sold at 28@30c. per pound. The average cost of making was 4.1c per pound, including freight and interest. Patrons received 3.55 per space of cream, equivalent to 23.18 per pound butter. A dividend of 6 per cent. on the capital stock, \$2,500, has been declared payable January, 1888.

Ipswich, Mass., Creamery.

Received in November, 1887, 33,950 spaces of cream; made 4,915 pounds butter, all of which sold at 32@33c. per pound. Patrons received 3½c. per space of cream, equivalent to 26.78 per pound butter. The average cost of manufacture was 6.33 per pound.

Easthampton, Mass., Creamery.

Received in November, 1887, 31,402 spaces cream; made 4,991 pounds butter, which sold at 28.86c. per pound; cost of manufacture 4.47c. per pound. Patrons received, 3.8c. per space of cream, equivalent to 24.38c. per pound butter.

Glastonbury, Ct., Creamery.

Received in November, 1887, 33,704 spaces of cream; made 4,973 pounds butter, which sold at 30@32c. per pound; average cost of manufacture was 5.2c. per pound. Patrons received 3.8c. per space of cream, equivalent to 25.84c. per pound butter.

Canton, Ct., Creamery.

Received in November, 1887, 71,272 spaces of cream; made 11,252 pounds butter. Patrons received, 4½c. per space for cream, equivalent to 26.11c. per pound butter.

La Grange, New York, Creamery.

Received in November, 1887, 20,215 spaces of cream; made 3,140 pounds butter, which sold for 30c. per pound; average cost of manufacture was 5½c. per pound. Patrons received 3¼c. per space, equivalent to 24.15c. per pound.

Windsor, Ct., Creamery.

Received in November, 1887, 42,435 spaces of cream; made 6,237 pounds butter, which sold at a net average price of 34c. at creamery; average cost of manufacture 5½c. per pound. Patrons received, 4¼c. per space, equivalent to 28½c. per pound butter.

Wapping, Ct., Creamery.

Received in November, 1887, 77,932 spaces of cream; made 11,906 pounds butter; the average cost of manufacture was 5.16c. per pound. Patrons received 4½c. per space, equivalent to 26.95c. per pound butter.

No doubt many of you thought when I made the statement, that not 50 per cent. of the actual value of the milk converted into butter was realized by farmers throughout the state, that I made an extravagant statement which could not be sustained. I might with perfect safety have said not one-third and have included the entire west. Don't imagine, however, for one moment that this great loss is all attributed to farm or dairy butter, not by any manner of means. The creamery, the boasted creamery, is responsible for a very large proportion of the loss. I will give you one instance which covers the entire ground and you may imagine the rest. Here is the published report of the Fremont creamery, recently published in the agricultural press, being published, it becomes public property. We are to presume that the managers of the creamery who make it public are not ashamed of it. It reads as follows:

"The Fremont creamery paid out during the year \$65,000 for cream, \$16,000 for hauling and \$8,000 for labor. The total amount of butter manufactured was 491,696 lbs. There are in operation forty cream routes and the number of patrons average over 600, having reached as high as 725."

According to these figures the 491,696 pounds of butter netted the patrons 13.22 cts. per pound, and the cost of manufacture was 4.88 cts. Now, if we compare these figures with the

returns of the Contoocook Valley creamery which is the low- of the seven New England creameries I have quoted, we find that the patrons of the Fremont creamery lost on a business of \$65,000, the enormous sum of \$46,219.42. That is, if the patrons of the Fremont creamery had taken as good care of their milk and cream as the patrons of the Contoocook creamery did, they would have received \$111,221.63 instead of \$65,000, for the quantity of cream they furnished. This loss is entirely confined to the grade of the butter, which means, in plain language, bad handling of the milk and cream. How much more they lost by imperfectly separating the cream from the milk, we are left to conjecture. This latter must, however, have amounted to a very considerable sum more, as every creamery man who understands the first rudiments of his business knows that the two go together. The more perfect the separation of the cream from the milk, the better the condition of the cream, and *visa versa*.

THE PIG AS AN ADJUNCT OF THE DAIRY.

By THEODORE LOUIS, LOUISVILLE, WIS.

We have come down to-night from gilt edged butter, from the lowing cow, and the full cream cheese, we have come down as you might say, to the hog. I am not a dairyman, but I realize that the pig is naturally an adjunct of the dairy. The paper read a few minutes ago, demonstrated to us clearly that the skim milk which was lost upon the farm and lost as a fertilizer to the farm, could be profitably used so far as the pig is concerned.

In speaking upon the pig I can merely give you the experience which I have gained in feeding milk.

However little we may esteem the pig, the census of 1885 shows that in Fon du lac county, in that year, 33,300 pigs were sold for \$335,722, or at the average price of \$10.08. Your entire dairy product the same year amounted to \$403,660, so the dairy product has not excelled the pig very much in this county. But here comes another question. The

same year you wintered 31,694 pigs and the question arises, does it pay to winter the hog.

We advocate early maturity in all our domestic animals. Early maturity at the same time means what?

Early decay or in other words, that we may not have an animal of the same vigor, and I think that I can show that we make a mistake when we breed our domestic animals for early maturity, and I think that we must give the same care to the pig as the dairyman does to his cow.

I have found by traveling ovey the state of Wisconsin, as an Institute worker that where the most hogs are raised in any of the counties, such a La Fayette, Grant, Dane and Dodge, I find that there is a great deal of selfishness, that there is less intelligence how to handle an animal, not because we don't know, probably I am not able here to-night to say anything new, but probably I am able to say something that we don't do and already know.

I found in these counties that from the accumulation of herds, that we give the animals less care. Now, an animal so valuable to the farmers of this state as I have shown even in Fond du Lac county, how are they wintered? As a general rule, the animal is dirty. How are they wintered? They may seek their own shelter, the canopy of heaven is the roof over them, they crawl into a straw stack, they must lay in their own mire, and a man does not think himself cruel when he gives an animal that kind of treatment, and he wonders why they become afflicted with disease, why they are lame in their loins, and why their constitution or vigor is run down from year to year, and he begins to say, our hogs are bred too fine. No, they are not bred too fine, the man has kept them too coarse, that is what is the matter. These mornings, when the thermometer goes 34° below zero in this county, the man goes out with his overcoat on and goes to the corn crib and gets a basket of corn, and if he has a feeding floor, all right, but if he has not, he halloos, "Pig, pig," and out goes the corn on the snow and the animals come from the straw stack where they have been laying three or four thick heaped up in a perspiring state, they come out in that condition to where the thermometer is forty

or sixty degrees below the temperature where they have slept, and stand there shivering, to eat the corn, not to masticate it, but to swallow it, then to void it, and then eat their own excrements, and if they have disease they have a right to have it.

I believe it my duty to caution the farmers of our state that I find disease is slowly traveling to the southern counties of our state, and we cannot take too much precaution in regard to it, and it comes by downward breeding and downward feeding.

Then, on the other hand, what does the farmer do? He breeds from probably, immature stock, he breeds downward and feeds downward.

Speaking of the wintering of an animal, Professor Sandborn last year demonstrated in the state of Missouri that it cost two and one-half per cent. of the live weight of the animal to sustain its life during twenty-four hours.

It takes three per cent. of the live weight in the state of Wisconsin to sustain life. In other words, it takes three pounds of feed to sustain the animal's life during twenty-four hours and the question arises, when hogs in Fond du Lac county have been sold for ten dollars and eight cents, has it paid to winter these hogs? On my own farm, it costs \$3.67 to winter my brutes, and remember, that the cold does not penetrate the larger animal in the degree that it does the small one, and the more the animal is penetrated by cold, the more feed it takes to sustain the live weight of the animal. Then it naturally follows that it costs almost four cents to winter the animal. The question arises, can we profitably do it? and I can see but one way out of the dilemma, and that is to winter the animal on a cheap feed, as cheap as we summer him, equal to the clover feed. If we can winter the animal on ensilage, with an addition of middlings, in order to make a balanced ration, then there is a possibility that we might winter him and give him a gain of one hundred pounds. It is a common occurrence for a man to winter one hundred hogs and then have them weigh precisely as much in May as they did in November, and his corn cribs as a general rule, are empty. If we can winter the animal on

a cheaper feed, we will have gained this much, that we can breed in the season where it is by far safer than early breeding in order to put the animal in the same market, in other words we will have the market right by the throat, because the animal will gain one hundred pounds in the first season upon clover for cheap feed, in connection with the milk of the dam, and during the winter again, another hundred weight on cheap feed, ensilage, and we will have an animal of two hundred pounds, ready to be put in the market at our option, and the market never would be glutted any more in the months of November and December.

Breeding from immature stock. I cannot too highly caution men to abandon the practice. I know from experience that it has been profitable upon my place to retain the breeding sows. Remember that the breeding sow, takes the same place that the cow takes, and the place she has kept for profit and for profit only, and it ought to be the aim of every intelligent breeder to see how much he can gain by retaining the dam. Remember that a good breeding sow, a good feeder, and a good milker will give in comparison during the time of milking or nursing, as much milk as one of the best dairy cows. Young pigs will weigh at birth from fifteen to twenty-eight pound, at six weeks they will weigh from two hundred and fifty to three hundred pounds, and excel the weight of the dam, and where has the animal gained this growth, but merely from the milk of the dam. So it is well deserving consideration. In premature breeding, the animal is often subjected to the severe trials of maternity at the age of eight months and cannot raise the young because she must raise her own self; therefore, I say let us retain the animal. Another thing, the farmer goes to work and winters his pigs at four weeks old. The dairyman may do so, because he has the milk to feed the pigs, but the farmer that has not the milk to spare from his calves, he must keep the sow in place of the cow, and when he winters his pigs at the age of four weeks, he forgets that the animal has only its nippers and two tushes and has no grinders to grind its food and he will very often give it raw feed. At three months of age the pig has a full mouth and not until

after it sheds its teeth at six months are the grinders formed. And now comes the question of warm or boiled food.

At the present low prices of pork we have to practice the greatest economy. Although Prof. Henry has demonstrated to us that it does not pay to cook food for fattening hogs, still there are conditions which would make it profitable. When we speak about the young animal without grinders if we have to put the food into a state where they need not masticate it, and where it becomes more easy of digestion. I believe that it pays to boil the food and in connection with this I will say, that no farmer can afford at the present day, to go without squash and pumpkins. On my farm I raise at least forty tons of squash with my corn and use them in connection with my hog feeding. If I steam them the profit is so much greater; as I develop the sugar in them by steaming them.

But here is another question, in regard to the breeding sows. I have found upon the majority of farms they are wintered just as the other hogs are on the farm, they sleep in the same unhealthy quarters, full of carbonic acid gas. I was in a stable in Grant county where there were one hundred hogs all piled together in a small building and I do not believe that a man could have existed there twelve hours alive with the carbonic acid gas and the man thought he was doing the only right thing for them, because they were warm in there. I think that breeding sows should be cared for with the same care as any other breeding animal. I care for them on my farm, the same as I do my cows, I regard them with the same tender care, and they obey me at the wink of my eye.

The general farmer merely breeds pigs on one principle, and that is luck, if he has a lot of pigs come in the spring, he had good luck, if he had a lot die he had bad luck. If the dairyman says that in order to make a success he must do this way or that way, it stands the farmer in hand in any other animal industry that he must do the same way. If we feed a breeding sow warm feed during the winter, suitable feed, and not feed her on corn, we will have that which we call success, the great trouble is where the animal

is fed on a highly concentrated feed, like corn there is trouble at the farrowing time, the animal is in that heated condition that she will run at her young and chase them into a corner of the pen and they will think it is not a very pleasant place they have come to and will look you pitifully in the face.

It is only by feeding them under the right conditions that the trouble can be avoided, the animal has a caked udder and it gives her tremendous pain, that almost crazes her. If she has been that trained animal she should be, you can make her lie right down on her side and take a pail of hot water and bathe her udder, and the next morning the little fellows are all eating. On the other hand, John generally goes in, and he says, "Mary, she is the craziest sow I ever saw, she will eat up all the pigs." And she will, and she ought to, really.

Here is another consideration. When we lose the early litters we lose the product of the season, we cannot replace them the same season, so we want to raise those litters. If we have milk it is an easy matter, dairymen can easily make out of thirteen pounds of skim milk, a pound of pork, especially if he feeds corn meal too; but the farmer that is not a dairyman, why it becomes a question with him how to raise and feed the animal. Then there is the sour swill; every farmer must have the swill barrel at the back door, and everything out of the household must go into that swill barrel, to stand there and ferment and spoil. The milk which is put into it has fermented and lost all its sugar! it has become highly acid. I have found by feeding such sour feed for a month that my old sows have at last refused that feed entirely, and as soon as a sow gets off her feed that is the time your animal stops growing, and it often takes from two to three weeks before we bring her to her feed again, so I say, sour swill is poison. If you don't believe it, take your hog which you have been feeding with sour feed and throw it and put a stick in its mouth and take the tongue out, and you will find it white and flabby; that animal, as I call it, has been acidated. With the sow on carbonaceous

food, you will find the tongue is a little red, a slightly acid food will remedy that.

Then, I couldn't help but think while Mr. Robertson was speaking about salt for his cows, why, there's but very few farmers that ever think that a hog must have salt.

Remember that the hog is an animal with the smallest stomach and the quickest digestion, consumes the greatest amount of feed in a given time, and if it gives us the greatest return we must assist the digestion of the animal, and the hog should have all the salt it will eat. It should have salt constantly before it or where it may easily find it. But it should be in a dry place. If you put the salt into troughs out doors, where the younger pigs are drinking, they will drink too much and die, but the older animals have been accustomed to it, and you should give them all they want. On my place I have made a trough for forty-eight hogs in which I feed eight pounds of salt. They were under my system of feeding, I was fattening them, and the higher you feed the animal the more salt it needs. They ate eight pounds of salt every twenty-four hours, the forty-eight hogs.

Another thing: A great many men think that a hog roots merely for mischief; that is not the case, the animal roots for alkali which it finds in the soil, and which aids him in digestion. Nature helps him out this way when man is foolish enough not to help him. I believe that I am right and I hope science some day will come to my assistance; I believe that in the great quantity of carbonaceous feed, that we feed the animal, it is too little phosphate for the hog. I find that anything I give my hogs that contains a great amount of phosphate such as oyster shells, and bones, they will readily eat, and that it always aids them in their digestion, and that there will be a regular war in the camp if I throw a lot of bones out in my yard. I have written once to Professor Henry to see if I could not buy bone meal, but I asked him the question if there was any danger that I might receive the cholera germ in the importation of bone meal, and he answered me that he thought there might be danger in this respect.

Dr. Miles connected with the Farmers' Institute of Wis-

consin two weeks ago, coming from the state of Massachusetts, said that he had traced hog cholera to the fresh pork which had been sent from Chicago and was there used in a boarding house. Farmer John, as I will conveniently call him, went to Farmer Jim two miles distant and told him he had lots of swill that he had got in a boarding house or hotel, and he took the barrel home with him, and in nine days from that time his hogs had the hog cholera. He called on Dr. Miles and had him examine the case, and they could find nothing in the surroundings, all the conditions were natural. In a week after that he returned to his neighbor Jim and he found his hogs were sick, and he asked where the swill came from and he said from the hotel, and they went to the hotel and asked the hotel man what he had put in the swill. He said he had received the pork from Chicago, and the mystery was solved. So I say let us beware of importations, distance is nowhere, what is in Chicago to-night is here to-morrow.

Now, let me return once more to the pigs. In order to grow them there must be proper trough room; as a general thing, the farmers' trough room is of such dimensions that the sow and her pigs can get right in there, and the pigs be drowned. The trough room should be in length and not in depth. It should be made of planks two by six or two by eight in a "V" shape, seven feet is generally long enough for a sow and her litter, then by giving her such feed as will be readily eaten and digested we can avoid bringing her off her feed, and there is no danger but we may grow the pig right along so that at ten months of age the farmer may have hogs that weigh 250 or 275 pounds, and the dairyman having plenty of milk ought to at least have hogs that weigh 300 pounds. I thank you for your kind attention.

Mr. Hoard took the chair.

REPORTS OF COMMITTEES.

Report of Committee on Resolutions:

Resolved, That the thanks of this Association in a most emphatic manner are tendered to the citizens of Ripon, for their warm sympathy and active efforts in promoting the splendid success of this convention, and we hope that the good work done here may grow to grand size in this community as a justification of their faith and energy.

Resolved, That this Association recognizing the power of the local press as a grand means for the diffusion of knowledge and enthusiasm in the progress of agriculture, as well as all of the arts of peace, hereby tender its acknowledgments to the press of Ripon, for the generous spirit in which they have treated this convention.

Resolved, That we desire to heartily thank the ladies of Ripon for the sympathies, bouquets and other courtesies they so gracefully and lavishly provided for the pleasure of this Association.

Resolved, That the thanks of this Association are most cordially tendered to the officers for the zeal they have manifested in the welfare of the Association.

Resolved, That Ripon has, in the opinion of this Association, a very useful organization in the Business Men's Association, and we desire to acknowledge its efficient aid in behalf of the success of this convention.

Resolved, That the thanks of this Association are tendered to the railroads of the state for the usual courtesies extended to this convention.

WHEREAS, The rapidly increasing dairy products of this state, amounting annually to a cash value of \$20,000,000, calls for the utmost vigilance in preserving the purity of our butter and cheese, whereby the consumer may be protected in his demand for an honest product; and

WHEREAS, It has lately come to light that certain parties in the state are manufacturing what is called "filled cheese," a fraudulent product, in the eyes of the law; therefore, be it

Resolved, That in the opinion of this Association, the time has arrived in the history of the state for the passage of a law similar to that in existence in Minnesota, Ohio, New York and other states, and the providing for a Dairy Commission, whose duty it shall be to ferret out and prosecute all adulterations of butter and cheese, and the sale of the same, as well as other foods, and we respectfully ask the next legislature to enact such a law and establish such a Dairy Commission.

Resolved, That this Association would respectfully urge upon the senators and members of congress from Wisconsin that they strenuously oppose all efforts to weaken or in any sense modify the efficiency of the present National Oleomargarine law, and this resolution is based upon the conviction

tion that the present law has done a great work in reducing the manufacture and sale of an unwholesome imitation of the lowest butter of the cow.

W. D. HOARD,
HIRAM SMITH,
W. H. MORRISON,
Committee.

Resolutions adopted.

Report of Committee on Nominations:

Your committee beg leave to submit the following names for officers for the ensuing year: For President, H. C. Adams. For Secretary, D. W. Curtis. For Treasurer, H. K. Loomis.

Respectfully submitted,

C. R. BEACH, Whitewater.
I. J. CLAPP, Kenosha.
H. S. WEEKS, Oconomowoc.

Report adopted.

Report of Committee on Dairy Utensils:

Your committee beg leave to submit the following:

We found on exhibition a great variety of articles and utensils needed in the dairy, creamery and cheese factory.

Cornish, Curtis & Greene, Fort Atkinson, Wis., exhibited rectangular churns, lever butter workers, thermometers, etc., etc.

L. S. Howard, Friendship, N. Y., had a milk cooler for cooling milk as drawn from the cow.

F. B. Fargo & Co., Lake Mills, Wis., exhibited butter and cheese color, dairy cloth, circles, thermometers, and a variety of useful articles for dairy use.

John Boyd, 199 Lake St., Chicago, exhibited his Cooley creamery and Cooley cans for co-operative dairying.

Genesee Salt Co., F. A. Tripp, Chicago, Ill., exhibited Genesee salt for both butter and cheese.

Davis Warehouse Co., 200 La Salle St., Chicago, had a fine display of the perfect dairy salt for butter and cheese.

Warsaw Salt Co., Warsaw, N. Y., had on exhibition their "High Grade" dairy salt for both butter and cheese.

Chr. Hansen's Laboratory, 17 Dearborn St., Chicago, exhibited Hansen's butter and cheese color, Hansen's Rennet extract, and tablets.

H. W. Kellogg, Ripon, Wis., exhibited his cans for raising cream by rapid refrigeration.

Report adopted.

President Adams being presented to the convention by the chair, spoke as follows:

When I say that I had rather be President of the Wisconsin Dairyman's Association than to be President of the United States, it is not an exaggeration. I don't have half so hard a time of it as the President of this great nation does. The President of the United States is between two great parties; one party is trying to get all the offices away from him, and the other party is trying to get all the offices away from each other, and I sympathize with him most heartily because I am in a more enviable position. I am glad to belong to an association in which there is only one party and that party stand together like brothers and do what they can for the people of the land, and help along those things in this country which we love and honor. It seems fitting and proper that the gentleman who responded to the address of welcome three days ago should also in behalf of the Association say the good by words for us. Mr. Hoard.

Mr. Hoard — In other words, pronounce the benediction. The best benediction that I could pronounce for you would be to repeat the Rev. Mr. Burchard's blessing at a big dinner of noted clergymen. He said, "Oh Lord, bless this food set before us, may good digestion wait upon good appetite, for Christ's sake, Amen." That's one of the most practical sort of blessings I ever heard. Appetite and digestion. We have had a wonderful exhibition of both. During the present week here in Ripon, we have seen a wonderful intellectual appetite manifested for the acquisition of knowledge upon these practical subjects, subjects that make together for peace and prosperity. We have seen also what to us who have attended every convention of this Association since its inception in 1872, is a most remarkable ability for digestion, and as a consequence, scarcely a word has been thrown aside here that has not been duly considered for what it is worth. It is a great thing to take an association like this, project it into a community like this, and see it surrounded by the faith and sympathy and assurances that we have met here in Ripon, to go into a community which has such fine schools, which has a strong pulpit which

is full of energetic and cultivated thought and intelligence, and to find that excellent catholicity of spirit of which Emerson speaks when he says, that culture is a failure which has not sympathy with the common things of life.

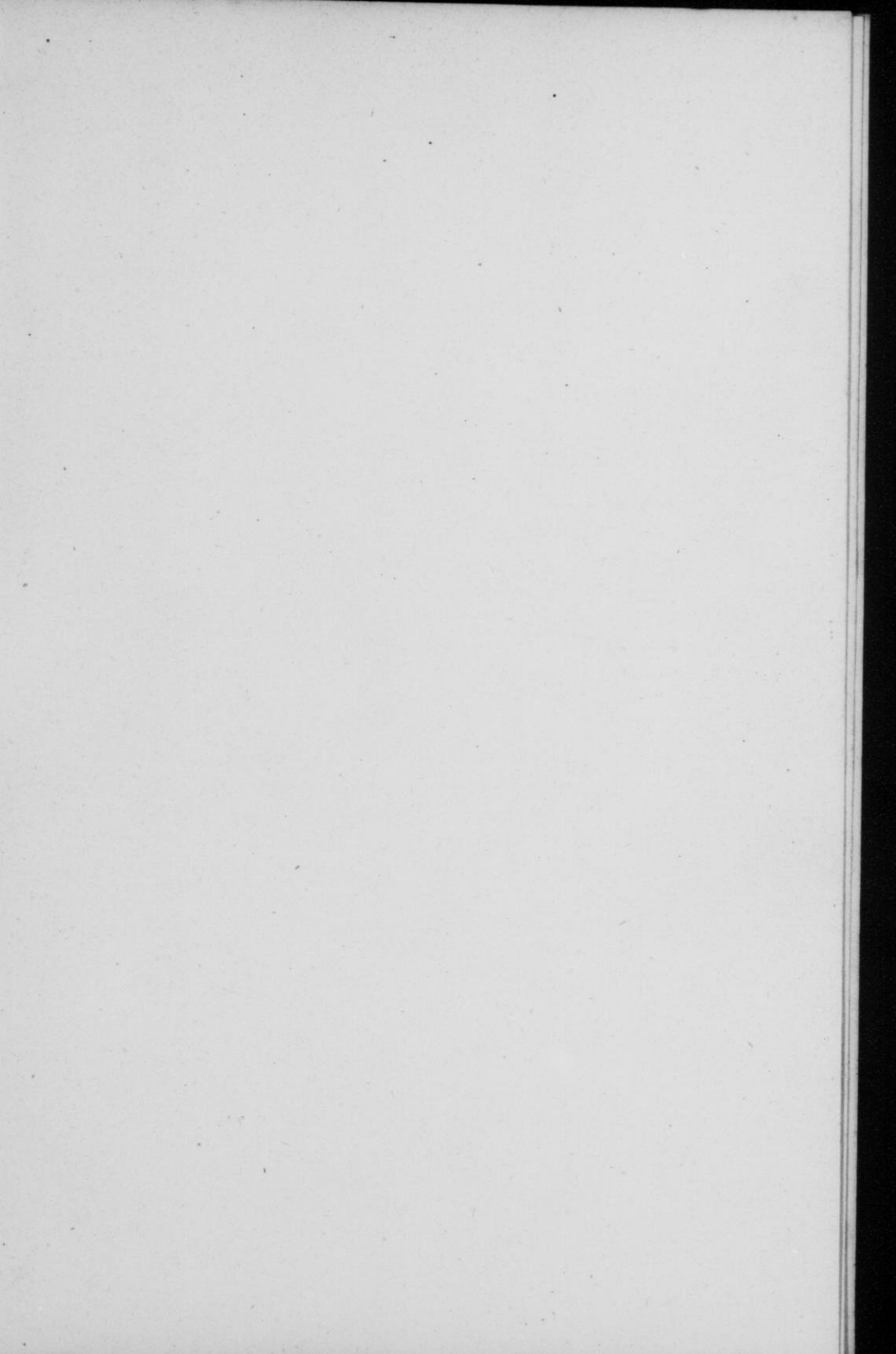
I often think about this oft repeated thought, this word, common-sense. The best definition of common sense that I ever heard, was "The widest understanding possible of the relation of common things." We want to remember always that the common affairs of life when investigated with an earnest care and an earnest search for the truth instantly become clothed with the highest sanctity. A great many people have an idea that the discussion of these questions is not cultured, but that is because they have no understanding of real culture, or of the best things of life.

I do not believe we could have brought this convention to any town in the state, where it would have been more royally received than here, I am glad of the faith you have shown us. The people in the Wisconsin Dairyman's Association believe in the strong idea of knowledge, its regenerating and uplifting power on the agricultural thought of the state, believe that the spirit which it seeks to imbue will be an excellent good to the people of Wisconsin.

I don't want you to have an unreasoning faith in us, but do want you to have faith to believe that the Wisconsin Dairymen's Association, by virtue of its contact with you, goes on with its work another year with renewed strength and that it bids you as hearty a God-speed in your work as you have it, by your kindly sympathy.

The convention adjourned *sine die*.

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