SIXTH ANNUAL REPORT

OF THE

AMERICAN

DAIRYMEN'S ASSOCIATION,

WITH TRANSACTIONS AND ADDRESSES AT ANNUAL MEETING,—LIST OF CHEESE FACTORIES,—LIST OF MEMBERS,—REPORTS OF FACTORIES, AND OTHER PAPERS OF VALUE AND INTEREST,

FOR THE YEAR 1870.

PUBLISHED BY THE ASSOCIATION.

SYRACUSE, N. Y.:
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1871.

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FOR 1871.

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GARDNER B. WEEKS, SYRACUSE, N. Y.

TREASURER:

DR. L. L. WIGHT, WHITESBORO, ONEIDA CO., N. Y.

PREFATORY REMARKS.

The Annual Report of this Association now sent out is the eighth issued since the organization of the original society,—the New York State Cheese Manufacturers' Association.

Smaller than the volume issued last year, it is so only because, —for the first time in five years,—the Annual Report of the Ohio Dairymen's Association is not printed in connection.

The Convention held in Utica, in January, seemed to give general satisfaction to those in attendance, and was felt by all to be quite as important in its results as any previous meeting. The officers spared no efforts to elicit general and full discussion of the various subjects brought before the meeting,—and these discussions, added to, and following after, the reading of more exhaustive and elaborate papers, specially prepared by selected speakers, appear to be the best adapted to promote the general interests of our calling. There is yet a large amount of latent talent among the members who annually come up to our meetings which is unproductive of general good to the Association because the many members of the society possessing it are too diffident or reserved to take an active part in the public discussions on these occasions. To develope this talent, and to call out these individuals, is one of the aims constantly held in view by the officers of the society.

We are of the opinion that members will find this Report second to none of its predecessors in general interest and in value, and as showing that step advance-ward which our occupation should exhibit year by year.

It does not become the Secretary to call attention to any particular paper or address found herein, nor to make any invidious comparisons. All are good, and well worthy of the careful reading of dairymen and cheese-makers.

We have no hesitation in saying that a thorough reading of the three most lengthy and important addresses, by the well-known gentlemen to whom the Association was this year specially indebted, will be pronounced by every reader to be, each in their way and bearing, of the utmost importance. In this connection it is but fair to the essayists that the Secretary should state that, in order to save time, and place this Report in the hands of members at the earliest possible date, he has not sent proof to the writers of these papers for correction. Consequently some minor errors have crept into their addresses, in the way of punctuation, etc., which, however, are deemed by the writers of the essays, too trivial to make it necessary to correct them, or to call special attention to them.

The Association is likewise under special obligations to Hon. Harris Lewis, X. A. Willard, Esq., L. B. Arnold, Esq., Alex. Macadam, Esq., S. A. Farrington, Esq., J. R. Chapman, Esq., O. S. Bliss, Esq., Dr. L. L. Wight, A. Holdredge, Esq., and others, for papers prepared for the last convention, and gratuitously presented for incorporation in these minutes.

The Secretary avails himself, throughout the year, of every means within his reach to add to and correct the list of cheese and butter factories in the United States. This list is, however, still very incomplete, and in some cases probably quite inaccurate, though in the main reliable and correct so far as it goes. The Secretary would be glad of the assistance of members in all dairy regions in making this list more full and complete.

The system of associated dairies, both for butter and cheese-making, is every year taking wider root. Very many new factories are being erected this spring at the West, particularly in Minnesota, Iowa, Michigan,—and, to some extent, in Kansas and Missouri.

In this Report the subject of Butter-making receives more attention than in any previous one,—and the just demands of butter manufacturers, and the vast importance of their interests, will, in the future, make it necessary for this society to give far more time and consideration to this matter. If this time and consideration shall result in improving the general quality of butter to the same extent that the character of American cheese has been advanced, it will add millions of money annually to the profits of butter dairymen.

The attention of the late Convention was brought to the subject of Cheese and Butter manufacturing in factories, on the Sabbath.

Former meetings have had the matter brought to their notice, but as yet no definite action has been taken. The source from which the resolution offered at this meeting came, even if there were not a higher law to be heeded, is such as to demand the thoughtful attention of dairymen to this important subject. It is to be hoped that the committee appointed at the late Convention, to consider the subject matter of the resolution, will be able to report to the next meeting some practical and feasible method of doing away with this evil of Sunday labor. That it is an evil is amply proved by the disastrous consequences to churches and communities in some of our rural towns, which have occurred since cheese-factories and Sunday milk-drawing began in their midst.

In making up the Transactions of the Convention contained in this volume, use has been made, to some extent, of the columns of the Utica daily papers, to whom we now express our obligations.

GARDNER B. WEEKS,

Syracuse, N. Y., March 1871. Secretary.

ARTICLES OF ASSOCIATION.

Whereas, It is deemed expedient to merge the New York State Cheese Manufacturers' Association, which was organized in January, 1864, into an American Association, through which, as a medium, results of the practical experience of dairymen may be gathered and disseminated to the dairying community; therefore,

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

Article I. The name of the organization shall be The American Dairymen's Association.

Art. II, The Officers of the Association shall consist of a President, Vice-Presidents, Secretary, and Treasurer.

Art. III. The President, Vice-Presidents, Secretary, and Treasurer, shall constitute the Executive Board of the Association.

Art. IV. The Officers of the Association shall be elected at the regular annual meeting, and shall retain their offices until their successors are chosen.

Art. V. The regular annual meeting shall occur on the second Tuesday in January of each year, and at such place as the Executive Board shall designate.

Art. VI. The payment of one dollar shall admit any person to all the sessions of an Annual Meeting,—and the additional payment of fifty cents shall entitle him to the Annual Report for the current year.

[One dollar constitutes a person not attending an Annual Convention a member of the society for one year, and entitles him to the Annual Report.]

☞ The next Annual Meeting will begin at Utica, N. Y., on Tuesday, January 9th, 1872.

LIST OF MEMBERS

OF THE

AMERICAN DAIRYMEN'S ASSOCIATION,

FOR THE YEAR 1871.

Alvord, Hon. T. G., Syracuse, Onondaga co.
Avery, A. L., Ilion, Herkimer co.
Adams, Clinton, Valley Mills, Madison co.
Ayers, E. A., Watertown, Jefferson co.

Brown, Jas. P., Utica, Oneida co.
Baird, John, Ridge Mills, Oneida co.
Bussey, A. P., Westernville, Oneida co.
Burrell, Harry, Little Falls, Herkimer co.
Burrell, David H., Little Falls, Herkimer co.
Brayton, A. A., Poland, Herkimer co.
Burrell, W. F., Salisbury, Herkimer co.
Backus, Jas., Van Hornsville, Herkimer co.
Bliss, H. M., Mohawk, Herkimer co.
Bruce, B. F., Lenox, Madison co.
Blanding, F., Brookfield, Madison co.
Bass, Julia E., Leonardsville, Madison co.
Bellinger, M. R., Little Utica, Onondaga co.
Buck, A. H., Lowville, Lewis co.
Burr, John, Pulaski, Oswego co.
Balch, Warlstin, Orwell, Oswego co.
Beadle, G. N., Orwell, Oswego co.
Bauder, J., Hallsville, Montgomery co.
Breckenridge, T. Jr., Fonda, Montgomery co.
Burnap, N. C., Argusville, Schoharie co.
Babcock, R. Q., Richmondville, Schoharie co.

Campbell, Hon. Samuel, New York Mills, Oneida co.
Chapman, Wm. H., Utica, Oneida co.
Curtis, T. D., Utica, Oneida co.
Cook, J. W., New Hartford, Oneida co.
Clark, F., Vernon, Oneida co,
Cotes, John G., Holland Patent, Oneida co.
Cande, Elon A., Holland Patent, Oneida co.
Cagwin, Silas H., Verona, Oneida co.
Cass, Joseph, Mohawk, Herkimer co.
Carpenter, O. R., Ingham's Mills, Herkimer co.
Chapman, J R, Oneida Lake, Madison co.
Chapman, Wm. L., Canastota, Madison co.
Cook, C. J., New Woodstock, Madison co.

Dodge, W. S., Verona, Oneida co.
DeAngelis, W. W., Holland Patent, Oneida co
Dertrich, H. V., Lowell, Oneida co.
Dunham, Geo. D., Sauquoit, Oneida co.
Davis, Geo. W., Little Falls, Herkimer co.
Duffy, P. R., Ericville, Madison co.
Dewey, E. P., Turin, Lewis co.
Davis, Wm. C., St. Johnsville, Mont. co.
Davis, Geo. W., E. Ashford, Cattarangus co.

Armstrong, W. A., Elmira, Chemung co.
Ackley, D. C., Belfast, Allegany co.
Allen, M. S., Eddyville, Cattaraugus co.
Arnold, L. B., Ithaca, Tompkins co.

Beardsley, W. H., Coventry, Chenango co.
Blanding, Wm., N. Fenton, Broome co.
Brown, J. O., W. Edmeston, Otsego co.
Brown, Wm. L., Unadilla Forks, Otsego co.
Baker, N. R., Schuyler's Lake, Otsego co.
Babbitt, Chester, Fly Creek, Otsego co.
Bigger, J. M., Dayton, Cattaraugus co.
Bond, E. M., Rushford, Allegany co.
Blair, M. S., Angelica, Allegany co.
Barns, John, Filimore, Allegany co.
Burnham, A., Sinclairville, Chautauqua co.
Baldwin, O. D., Starksboro, Addison co, Vt.
Bliss, O. S., Georgia, Franklin co, Vt.
Boise, W. E., Blandford, Mass.
Brewer, Prof. Wm. H., New Haven, Conn.
Briggs, R. I., Ashtabula, Ohio.
Beal, Wm., Rollin, Michigan.
Banning, O. B., Mendota, Illinois.
Buchanan, E., Carey St'n, McHenry co, Ill.
Bungay, L. F., Norwich, Oxford co C. W.

Crandall, F. P., S. Brookfield, Madison co.
Carr, Ira J., Root, Montgomery co.
Coolman, Peter, Fonda, Montgomery co.
Case, Chas. P., Phœnix, Oswego co.
Caldwell, Prof. Geo. C., Ithaca, Tompkins co.
Crandall, S. W., Gouvernour, St. Lawrence co.
Charles, Willie R., E. Orangeville, Wyoming co.
Carpenter, Isaac, 15 Front St., N. Y. City.
Carpenter, James, New Hope, Cayuga co.
Church, C. C., Elgin, Ill.
Calmes, H., Richmond, Ky.
Chadwick, C. E., Ingersoll, C. W.
Camp, A. R. Stowe, Vt.

Doxtater, P., Portville, Cattaraugus co.
Doxtater, C. H., Horse Heads, Chemung co.
Dick, J. B., Willink, Erie co.
Dousman, T. C., Waterville, Waukesha co, Wisconsin.
Dousman, H. F., Waterville, Waukesha co, Wisconsin.
Degeer, Walter B., Queensville, C. W.

Ellis, E. G., Utica, Oneida co.
Earl, Geo. T., Vernon Center, Oneida co.
Edson, Alfred, Munnsville, Madison co.
Eastman, W. H., Belleville, Jefferson co.

Foster, N. W., Durhamville, Oneida co.
Fish, A. L., Cedarville, Herkimer co.
Falk, Spelman, Herkimer, Herkimer co.
Foster, R. L., Norway, Herkimer co.
Freeborn, H. A., Pine Woods, Madison co.
Freeborn, P. H., Pine Woods, Madison co.
Foster, A. N., Turin, Lewis co.

Green, C. A., Holland Patent, Oneida co.
Gray, A. M., Herkimer, Herkimer co.
Golden, R., Little Falls, Herkimer co.
Garrline, W. D., Miller's Mills, Herkimer co.
Gaige, A. T., Nelson, Madison co.
Gates, F. H., Chittenango, Madison co.
Griffiths, S., Gilbert's Mills, Oswego co.
Gardner, R. D., Watertown, Jefferson co.
Gardner, S. S., Watertown, Jefferson co.
Grenell, W. H., Pierrepont Manor, Jefferson co.

Howard, L. A., Deerfield, Oneida co.
Haas, Frederick, Jr., Lee Center, Oneida co.
Hodges, W. H., Oriskany, Oneida co.
Howard, F. H., Mohawk, Herkimer co.
Hart, D. D., Canastota, Madison co.
Hunt, S., Hubbardsville, Madison co.
Hopson, E. R., Brockett's Bridge, Fulton co.
Hawley, L. T., Salina, Onondaga co.
Hamlin, D., Watertown, Jefferson co.
House, C. C., Honseville, Lewis co.
Hough, F. B., M. D., Lowville, Lewis co.

Ives, Fred, Salisbury, Herkimer co.
Ingraham, A. W., Adams, Jefferson co.

Johnson, H., Stanwix, Oneida co.
Jones, Charles M., Cassville, Oneida co.
Joslyn, Charles, Coventry, Chenango co.
Johnson, C. M., W. Burlington, Otsego co.
Jones, E. F., Binghamton, Broome co.

Keith, H. P., North Brookfield, Madison co.
Kinney, A. S., Sherburne, Chenango co.
Kinney, J. P., Schuyler's Lake, Otsego co.
Kellogg, S. F., Black River, Jefferson co.

Lewis, Hon. Harris, Frankfort, Herkimer co.
Lewis, A. W., Lowell, Oneida co.
Lehine, J., Van Hornsville, Herkimer co.
Lindsley, L. S., Pratt's Hollow, Madison co.
Lowe, John, Stone Mills, Jefferson co.
Leflingwell, R., Henderson, Jefferson co.
Loomis, George S., Molino, Oswego co.

Millar, H. W., Utica, Oneida co.
Merry, G., Verona, Oneida co.
Meays, J. H., Vienna, Oneida co.
Macadam, Wm., North Gage, Oneida co.
Moon, B. B., Norway, Herkimer co.
Miller, S. T., Constableville, Lewis co.
Merriam, Ela, Locust Grove, Lewis co.
Merriam, C. M., Locust Grove, Lewis co.
Martin, P. J., Pine Woods, Madison co.
Macadam, Alex., Fort Plain, Montgomery co.
Mason, Geo. J., Conewango, Cattaraugus co.
Merrill, R. F., Plymouth, Chenango co.

North, Prof. Edward, Clinton, Oneida co.
Newey, A. G., Lee Center, Oneida co.

Osgood, Wm. B., Verona, Oneida co.
Owen, B. M., 10 Gorman St., Cincinnati, O.

Ehle, A. W., Canajoharie, Montgomery co.
Ellis, E. E., McLean, Tompkins co.
Ellis, S. H., Waterford, Erie co., Penn.

Fox, Geo. A., Lorain, Jefferson co.
Feald, George, Hartwick, Otsego co.
Farrington, S. A., Rock Stream, Yates co.
Fox, G. G., Groveland, Livingston co.
Folsom, M., 157 Chambers St., N. Y. City.
Fairbanks & Co., 252 Broadway, N. Y. City.
Farrington, H., Norwich, Oxford co, C. W.

Gillette, A. G., Gouverneur, St. Lawrence co.
Greig, J., St. Johnsville, Montgomery co.
Greig, Hugh, Fonda, Montgomery co.
Gordon, F. H., Argusville, Schoharie co.
Gillett, Harris, Sidney Plains, Delaware co.
Goodman, R., Lenox, Mass.
Greene, H. C., Woodcockboro, Crawford co., Penn.
Gleason, H. C., Shrewsbury, Rutland co., Vermont.
Gray, R. B., West Salem, LaCrosse co, Wis.

Harison, T. L., Albany.
Hemingway, A. D., Harford, Cortland co.
Hoffman, Geo. W., Elmira, Chemung co.
Harrington, B. F., New Berlin, Chenango co.
Hubbel, J. G., Dryden, Tompkins co.
Horton, J. V., East Concord, Erie co.
Harris, Joseph, Moreton Farm, Rochester.
Hawks, Moses, Dunton, Cook co., Illinois.
Haden, M. J., Versailles, Kentucky.
Hazen, Chester, Ladoga, Fond du Lac co., Wisconsin.

Iron Clad Can Co., 42 and 44 Murray St., N. Y.
Irons, J. W., Fredonia, Chautauqua co.

Jackson, D. A., White's Corners, Erie co.
Johnson, Wm. A., Collins Center, Erie co.
Jerome, Dr. J. H., Saginaw City, Michigan.
Jenne, D. C., Henry, Marshall co., Ill.
James, Charles A., Americus, Kansas.

Krum, H., 2d, Caroline Depot, Tompkins co.
Klippart, J. H., Columbus, Ohio.
Kettle, Robt., Jr., Sussex, Kings co., New Brunswick.

Lamont, A. B., McLean, Tompkins co.
Law, Prof. James, Ithaca, Tompkins co.
Loomis, John S., Augusta, Kalamazoo co., Michigan.
Losee, H. S., Norwichville, Oxford co, C. W.
Long, W. S., Prairie City, Grant co, Oregon.

McKinney, Robt., Virgil, Cortland co.
Macadam, Robt., Hermitage, Wyoming co.
Macadam, J., Springfield Center, Otsego co.
Mason, C. W., Bath, Steuben co.
Marsh, F. I., North Clarendon, Rutland co., Vermont.
Mitchell, Donald G., New Haven, Conn.
Munger, Milo, Shirland, Illinois.
Morris, H. N., Tiskilwa, Bureau co., Ill.
McPherson, D. M., Lancaster, Glengarry co., C. W.

Niles, P. M., Oswego Falls, Oswego co.
Nicholas, W. P., Newton, Sussex co., N. J.

Ostrander, Wm. H., Lansing, Michigan.
Olcott, James B., Hartford, Conn.

Preston, C. B., North Gage, Oneida co.
Potter, Enos, Paris, Oneida co.
Parmalee, Abram, Higginsville, Oneida co.
Peckham, Wm. N., Verona, Oneida co.
Phillips, V. O., Middleville, Herkimer co.
Purvis, Rob't, Harford, Cortland co.
Pawling, Henry, Hagaman's Mills, Montgomery co.

Ralph, Wm., & Co., Utica, Oneida co.
Roberts, T. D., Ridge Mills, Oneida co.
Ryder, William, Oriskany, Oneida co.
Rarbach, Horace E., Herkimer, Herkimer co.
Root, A. P., Norway, Herkimer co.
Rees, John, Glensdale, Lewis co.
Rider, J. J., Schuyler's Lake, Otsego co.
Richer, N., Columbus, Chenango co.
Risley, Chas. H., Hermon, St. Lawrence co.

Seymour, Hon. Horatio, Utica, Oneida co.
Shearman, J. A., Utica, Oneida co.
Schermerhorn, J. M., N'th Gage, Oneida co.
Schermerhorn, L. C., N. Gage, Oneida co.
Steele. G. M., Lairdsville, Oneida co.
Spinning, E. C., Taberg, Oneida co.
Squires, Thomas, Delta, Oneida co.
Scovill, J. V. H., Paris, Oneida co.
Shull, Josiah, Ilion, Herkimer co.
Smith, G. A., Frankfort, Herkimer co.
Smith, Wm. U., Herkimer, Herkimer co.
Striker, W. E., Herkimer, Herkimer co.
Santmier, M. J., Ohio, Herkimer co.
Stephens, L. H., Lowville, Lewis co.
Sheldon, C. L., Lowville, Lewis co.
Smith, James H., Constableville, Lewis co.
Stradling, Thos., Eaton, Madison co.
Stowell, Clinton, Georgetown, Madison co.
Sheldon, Lucy, 33 Plum St., Syracuse, N. Y.
Smith, P. H., Brockett's Bridge, Fulton co.
Street, C. W. F., Pulaski, Oswego co.

Tanner, Levi, Oriskany, Oneidà co.
Thomas, Stephen, Cassville, Oneida co.
Taber, Ira C., Little Falls, Herkimer co.
Tucker, O. J., Mile Strip, Madison co.
Tuttle, R. W., Chittenango, Madison co.

Varson, John, Fairfield, Herkimer co.
Veght, Lewis, Johnstown, Fulton co.
Veght, H. W., Johnstown, Fulton co.

Williams, Hon. George, Whitesboro, Oneida co.
Wight, Dr. L. L., Whitesboro, Oneida co.
Webster, Milton B., Delta, Oneida co.
Whitaker, George, S. Trenton, Oneida co.
Williams, W. L., Remsen, Oneida co.
Winslow, D. S., Holland Patent, Oneida co.
Weeks, Gardner B., Syracuse, Onondaga co., N. Y.
Winslow, E. J., Starkville, Herkimer co.
Wolford, C. H., Corry, Pa.
Watkins, J. H. J., E. Schuyler, Herkimer co.
Willard, X. A., Little Falls, Herkimer co.
Woodman, E. B., Hamilton, Madison co.
Wilson, Frank E., Watertown, Jefferson co.
Webb, Albert, Pierrepont Manor, Jefferson co.

Young, D. G., Cedarville, Herkimer co.
Yops, Casper, Canajoharie, Montgomery co.

Peck, A., Minaville, Montgomery co.
Prentiss, Prof. A. N., Ithaca, Tompkins co.
Pike, Solon, Shingle Creek, St. Lawrence co.
Platt, Zeph. C., Plattsburgh, Clinton co.
Pierce, S. D., Belmond, Wright co., Iowa.
Pelton, Joseph, Lansing, Michigan.
Pearce, J. S., Tyrconnell, Elgin co., C. W.

Russell, W. W., Stockholm & Brasher Depot, St. Lawrence co.
Robinson, H. O., New Albion, Cattaraugus co.
Roe, Henry H., Madison, Lake co., Ohio.
Root, D. C., Cambridgeboro, Crawford co., Pennsylvania.
Ransom, P. A. B., Hempstead, L. I., N. Y.

Simmons, H. S., Ames, Montgomery co.
Snyder, Jonas, Hallsville, Montgomery co.
Sitterly, Josiah, Palatine Bridge, Montgomery co.
Southworth, Wm. B., Fort Plain, Montgomery co.
Sellew, W. A., Gowanda, Cattaraugus co.
Stickney, R. W., Collins, Erie co.
Smith, S. R., Springville, Erie co.
Simpson, Wm., Jr., West Farms, Westchester co.
Sheldon, C. F., Rupert, Bennington co., Vt.
Sheldon, Ira F., Rupert, Bennington co., Vt.
Sheldon, T. L., West Rupert, Bennington co., Vt.
Staples, Edwin, Danby Four Corners, Rutland co., Vt.
Stanbruner, Joseph D., Brookfield, Tioga co., Penn.
Schermerhorn, C., Derby, England.

Tuttle, Wm., Clockville, Madison co.
Talbott, Giles R., S. Brookfield, Madison co.
Thayer, H. J., Turin, Lewis co.
Taylor, Edwin, Franklin, Delaware co.
Teift, Dr. Joseph, Elgin, Illinois.

Vroman, C. W., Rochester, Olmsted co., Minnesota.

Whitney, Frank, Henderson, Jefferson co.
Wilcox, S. F., Smyrna, Chenango co.
Wing, L. J., Unadilla Forks, Otsego co.
Wikoff, G., Richfield Springs, Otsego co.
Warren, R. L., E. Springfield, Otsego co.
Willett, Geo. E., Brant, Erie co.
Webb, John M., Box 2,403, N. Y. City.
Walker, Hiram, Union Square, Oswego co.
Wilder, C. H., Evansville, Wisconsin.
Wire, T. B., Austinburg, Ashtabula co., O.
White, Jas. F. & John E., 107 South Water St., Chicago, Ill.
Willcox, Eben N., Detroit, Michigan.
Wade, Henry, Port Hope, C. W.
Woodfin, Hon. N.W., Asheville, N. Carolina.
Wells, Levi, Spring Hill, Bradford co., Pa.

York, L. C., Brookfield, Madison co.

LIST OF CHEESE AND BUTTER FACTORIES.

NEW YORK.

ONEIDA COUNTY.

			No. of Cows.				No. of Cows.
Rome C. M. A.		Rome,	650	N.W. C.M.A.	Factory	N. Western,	
Excelsior	Factory,	do	600	Crill's	do	do	
Greenfield's	do	do		Bronson's	do	do	
Cady's	do	do	300	Verona Land'g	do	Higginsville,	400
D. D. Carpenter's	do	do	600	Doxtater's	do	do	250
Dick's	do	Rome,		L. S. Davis'	do	Florence,	500
Squires	do	Delta,		Cold Spring	do	do	400
Ridge Mills	do	Ridge Mills,	300	Mad River	do	do	250
T. D. Roberts'	do	do	300	Vernon	do	Vernon,	720
E. Lewis'	do	Deerfield,	900	Clark's	do	do	500
Tanner's	do	Oriskany,	700	M. Snell's	do	do	300
Mitchell's	do	Remsen,	200	Bronson & Co.	do	Vernon Center,	300
Thomas'	do	do	400	W.CanadaCreek	do	North Gage,	500
Star Hill	do	do	100	A. Blue's	do	do	150
Weeks'	do	Verona,	600	J. C. Blue's	do	do	700
Burrell's	do	do	400	Briggs'	do	Marcy Hill,	
Verona Central	do	do	325	Wood's	do	Turin,	
Willow Grove,	do	Trenton,	1000	Shepard's	do	do	
W. W. Wheeler's	do	do	350	Franklin	do	F. Iron Works,	500
J. C. Owen's	do	do	550	Camp's Factory	do	Westmoreland,	400
Powell's	do	do		Cheney's	do	do	350
Whitaker's	do	do	250	HamptonC.M.A.	do	do	500
Wight's	do	Whitesboro,	900	Marshall's	do	Waterville,	700
Bagg's	do	Stittville,	700	Curtis'	do	do	250
Deerfield & Marcy	do	Utica,	400	Shearman's	do	New Hartford,	500
South Corners	do	Vienna,	400	Hampton	do	Stanwix,	500
Vienna	do	do	350	Schuyler's	do	do	300
West Vienna	do	W. Vienna,		Foster's	do	Durhamville,	425
Blossvale	do	Blossvale,	406	J. H. Brook's	do	Steuben,	590
Glenmore	do	Annsville,	500	Chuckery	do	Paris,	450
Bagg's	do	Holland Patent,	500	Wilcox	do	do	
J. G. Cotes'	do	do	400	A. S. King's	do	Sauquoit,	
J. F. Pierce's	do	do	550	A. Session's	do	do	
G. W. Palmer's	do	N. Bridgewater,	600	A. Tucker's	do	do	250
Deansville	do	Deansville,	700	S. Thomas'	do	Cassville,	300
Hill's	do	Westernville,	200	E. A. Palmer's	do	Clayville,	200
Williams'	do	do	200	Union Grove	do	Camden,	150
Waldo's	do	do	350	Harvey,s	do	Boonville,	
Kirkland	do	Kirkland,	300	Reed & Co.	do	do	500
Wallace's	do	W. Branch,	400	Knoxboro	do	Knoxboro,	400
Countryman's	do	do		Rathbun's	do	New London,	400
J. L. Dean's	do	Hecla,	200	N. LondonC. M. A.		do	300
Lowell	do	Lowell,	600	Ray's	do	North Bay,	
Wood's	do	Lee Center,	500	Spinnings'	do	Taberg,	
Saxton's	do	do	300	G. M. Wood's	do	Stokes,	
Charton's	do	do	400	Hurlburt's	do	Ava,	
Capron's	do	do		Jones'	do	do	

CHENANGO COUNTY.

Tuttle	Factory,	Columbus,	230	Lewis Andrews,	do	South Otselic,	
Hiram Brown's	do	do	400	Holmesville	Factory,	Holmesville,	650
A. R. Sage's	do	New Berlin, Center	800	Daniels'	do	McDonough,	600
Holmes & Co's	do	Columbus,	600	Lincklaen	do	Lincklaen,	400
George Buel's	do	King Settlement,	600	Wheeler's	do	do	
Sherburne	do	Sherburne,	700	Harrington	do	do	
Smyrna	do	Smyrna,		Norwich C.M.Co.,		Norwich,	500
Billings'	do	do		Frink's	do	do	
Plymouth	do	Plymouth,		Leach's	do	do	
Buckley's & Co.'s	do	Oxford,		Sages'	do	S. New Berlin,	
Harrisville	do	Sherburne,	350	Rich's	do	do	
White & Son's	do	do		Brown, Sage&Co.,		do	860

CORTLAND COUNTY

Cuyler Village	Factory,	Cuyler,	600	Blodgett Mills	Factory,	Blodgett Mills,	150
Cold Spring	do	do	300	Raymond's	do	Preble,	600
Isbell's	do	do	250	Kilt's	do	do	425
Keeler's	do	do	200	Homer C.M.Co.,	do	Homer,	600
Cuyler Hill	do	do	450	Tuttle's	do	Freetown,	400
New Boston	do	do	650	Cincinnatus	do	Cincinnatus,	400
L. Sears'	do	Deltuyter,	1,000	S. Cortland	do	S. Cortland,	
Kenney	do	Truxton,	400	Meecham's	do	Marathon,	300
Beattie's	do	do	400	Brown's	do	Taylor,	400
Blodgett's Mills	do	Cortlandville,	300	Keeney Sett'mt	do	K. S.,	700
East Homer	do	East Homer,	450	Whitmarsh	do	do	
Wightman's	do	Marathon,		H. H. Smith's	do	Apulia,	
Potter & Barber's	do	Scott,	300	Harford	do	Harford,	

FRANKLIN COUNTY.

Bombay	Factory,	Bombay,		F. C. Center	Factory,	Fort Cov. Center.	
Malone No. 1	do	Malone.		Sargent's	do	South Bangor.	
Fort Covington	do	Fort Covington.		Patterson	do	Chateaugay.	

OSWEGO COUNTY.

M. Pierce's	Factory	So. Richland,	360	Fairdale	Factory,	Fairdale,	
Gilbert Mills	do	Gilbert Mills,	430	McMullens	do	Hinmanville,	
Dick's	do	Pennellville,		Mead's	do	E. Sandy Creek,	
Volney Center	do	Volney,	310	Bauder's	do	Caughdenoy,	
Whittemore's	do	Scriba,	500	Smith's	do	New Haven,	200
Ingell & Smith's	do	Volney,	375	Daggett's	do	do	400
E. Sandy Creek	do	E. Sandy Creek.		Donnelly's	do	North Scriba,	400
Robbins & Co.'s	do	do	600	S. W. Oswego	do		
Suydam's	do	do	400	Vermillion	do	Vermillion,	500
Trumbull's	do	Pulaski,	270	Smith's	do	Volney,	500
Hall's	do	do	300	Hubbard's	do		250
Cold Spring	do	do	300	Jennings'	do	Palermo,	100
Jones'	do	South Richland,	400	East Scriba	do		200
L. Willis'	do	do	300	Sweet's	do	Schroeppel,	200
Blunt's	do	Orwell,	150	Gregg's	do	do	260
Union	do	Colosse,	400	First National	do	Phoenix.	175
Union	do	Mexico,	500	Central Square	do	Central Square,	130
Weygint's	do	Prattville,	530	West Manual	do		250
Banaska's	do	Phoenix,		Granby Center	do		220
Morton's	do	Orwell,	600	Rhodes	do	Scriba,	150
Sweet's	do	Phoenix,		Union	do	Sandy Creek,	230
Smith's	do	Hastings,		Union	do	Scriba,	325
Hastings C.M.Co.	do	do		Amboy	do	Amboy Corners,	200
Oswego Center	do	Oswego Center,	400	Smith's	do	Fulton,	
Bowen's Corners	do	Bowen's Corners,		Loomis'	do	Palermo,	
Wilcox's	do	Oswego Falls,		Clough & Co.'s	do	Constantia,	
W. Monroe C.M.A.	do	West Monroe,		Cold Spring	do	Richland,	
Titus & Wilson	do	Hannibal,		P. Wyman's	do	Orville,	
Gardner's	do	S. Hannibal,		Burr's	do	Molino,	

MADISON COUNTY.

Norton's	Factory,	Eaton,		Chapman's	Factory,	Oneida Lake,	300
Morse's	do	Eaton,	600	Hart's	do	do	250
Ingram's	do	W. Eaton,	500	Morrell's	do	do	150
Pecksport	do	Bouckville,	450	Cole's	do	Munnsville,	350
Erieville	do	Erieville,	700	Lincklaen	do	DeRuyter,	300
Seymour's	do	Lebanon,	400	DeRuyter	do	do	600
Smith Valley	do		600	Kirkville	do	Kirkville,	500
Hill's	do	Oneida Castle,	700	Fletcher's	do	Peterboro,	750
Cazenovia	do	Cazenovia,	600	Valley	do	Stockbridge,	450
C. Bridge	do	do		Adam's	do	do	
Blodgett's	do	do	200	N. Woodstock,	do	New Woodstock,	800
Perkins	do	do		Hunt's	do	Hubbardsville,	200
Canaseraga	do	Canaseraga,	450	Lammnion & Co	do	Morrisville,	400
Elphick's	do	Clockville,	500	Morrisville	do	do	600
N. Cazenovia	do	Chittenango Falls,	300	Nelson's	do	Nelson,	600
Chittenango	do	do		Ellison's	do	Brookfield,	200
Lebanon	do	Leonardsville,	500	Excelsior	do	do	350
Allard's	do	Georgetown,	150	York	do	do	225
Quaker Basin	do	do	300	Union	do	do	200
Torpy's	do	do	150	S. Brookfield	do	South Brookfield,	250
Mack's	do	do	160	Bridgeport	do	Bridgeport,	300
Brown & Co.'s	do	do	500	Lakewood	do	do	273
Beech & Co.'s	do	do	175	Fort Bushnell's	do	Lakeport,	400
Fletcher's	do	do	200	Gifford's	do	do	
Stafford's	do	Fenner,	300	Tucker's	do	Mile Strip,	300
Solsville	do	Solsville,	700	Lenox C. M. A.	do	Canastota,	500
Pine Woods	do	Pine Woods,	600	Merrill's	do	Madison,	
Baker's	do	Earlville,	300	Madis'n C.M.A.	do	do	
Chenango Valley	do	do		Siloam	do	Siloam,	400
Cowasalon	do	Wampsville,	500	Pratt's Hollow	do	Pratt's Hollow,	250
Hunt's	do	Hamilton,		Shedd's Corners	do	Shedd's Corners,	
Keith's	do	North Brookfield,		Downing's	do	Pine Woods,	
East Boston	do	East Boston,					

WAYNE COUNTY.

Walworth	Factory,	Walworth,	300	Macedon	Factory,	Macedon,	300
Butler Center	do	South Butler.	240	Wilbur's	do	Newark,	
Williamson	do	Williamson,		Lincoln	do	W. Walworth,	
Palmyra	do	Palmyra,		Marion	do	Marion,	
Safford's	do	Savannah,	175	Lee & Sheffield	do	Rose,	400
South Butler,	do	South Butler,		Alloway	do	Lyons,	500
				Nangs	do	do	

COLUMBIA COUNTY.

Hudson	Factory,	Hudson,		Chatham	Factory,	Chatham Center,	

LEWIS COUNTY.

Sulphur Springs	Factory.	Lowville,	800	Union	Factory.	W. Martinsburgh,	500
Folts'	do	do	750	Green's	do	do	400
Hall's	do	Barnes' Corners.	300	Kelsey's	do	do	450
Miller's	do	Constableville,	1,000	West Lowville	do	West Lowville,	800
Wider's	do	do		Searles'	do	do	500
McDonald's	do	do		Alexander	do	do	300
Valley	do	do	450	Vary	do	Harrisburgh,	590
High Market	do	High Market,	460	Clark's	do	do	600
Houseville	do	Houseville,	800	Lanphere's	do	do	500
Glensdale	do	Glensdale,	700	Knapp's	do	do	
Sugar River	do	Leyden.	940	Union	do	Deer River,	270
Wood's	do	Turin,	400	Deer River	do	do	450
Bush's	do	do	500	Austin	do	Denmark,	700
Shepherd's	do	do	250	Markham's	do	Collinsville,	400
Williams'	do	do	150	Lyon's	do	Lyon's Falls,	
Evans'	do	do	550	Leyden C. Asso.	do	Leyden,	550
Carpenter's	do	Houseville,	150	Post's	do	Port Leyden,	
Rees'	do	Martinsburgh,	200	Whitney's	do	Copenhagen,	400
Dunton's	do	do	350	Bent's	do	do	250
New Bremen	do	Crogan,					

MONTGOMERY COUNTY.

Charleston Corners	Factory,		525	Root	Factory.	Root,	600
Smith Creek	Factory,	Fort Plain,	1,000	Wier's	do	do	
Dunkle's	do	do		Glen	do	Glen,	
Roof's	do	do		Diefendorf's	do	Amsterdam,	
Empire	do	Burtonville,	500	W. Green's	do	do	
Florida	do	do		Dorn's	do	do	
Hallsville	do	Hallsville,	600	Florida	do	Minaville,	
Freysbush	do	Freysbush,		Switzer Hill	do	Fonda,	
Hessville	do	Sprout Brook,		Schuyler's	do	do	
Cold Spring	do	Stone Araba,	500	Mohawk	do	do	
Waterville	do	Ames,	750	Cold Spring	do	Palatine Bridge,	
Flat Creek	do	Flat Creek,	300	Union	do	do	500
Brookman & Co's	do	Fort Plain,	600	Failing's	do	do	
Ford's Bush	do	Minden,	675	Gatesville	do	Randall,	
Cayadutta	do	Fonda,	800	Mother Creek	do	St. Johnsville,	400
Bates, Snell & Co.	do	St. Johnsville,	350	Buel	do	Buel,	600
Snell, Smith & Co.	do	do		Mapletown	do		
Humphrey's	do	Charleston,		Kilts'	do	Canajoharie,	

DUTCHESS COUNTY.

Sheldon's	Factory,	Stissing,	

CLINTON COUNTY,

Platt's	Factory,	Plattsburg,	Smith Dale	Factory.	Peru.
Rouse's Point	do	Rouse's Point.			

ORLEANS COUNTY.

Cooley & Thompson's	Factory,	Albion.	

STEUBEN COUNTY.

Spalding's	Factory,	Howard,	400	J. Davis'	Factory,	Greenwood,	250
Bennett's	do	do	500	Mason's	do	North Cameron,	400
Kanona	do	Kanona,	300	Spalding & Co.	do	Avoca,	
Wing's	do	Campbell,		Sitterly's	do	Bath	

ONONDAGA COUNTY.

L. H. Webster's	Factory,	Fabius,	500	Belle Isle	Factory,	Belle Isle,	
Delphi	do	Delphi,	450	Sherwood's	do	Brewerton,	
Salisbury's	do	Apulia,	600	DeWitt C. M. A.	do	DeWitt,	300
Alexander's	do	Lysander,		Talbot	do	Fabius,	400
Edwards'	do	Manlius,		Euclid	do	Euclid,	
Hopper's	do	Collamer,	160	Navarino	do	Navarino,	140
Hiscock's	do	Jamesville,		Kirkville	do	Kirkville,	450
Seneca	do	Baldwinsville,	150	Goodrich's	do	Otisco,	200
Spafford	do	Spafford,		Little Utica	do	Little Utica,	300
Loomis'	do	Cicero,		Betts' Corners	do	Betts' Corners,	
Van Bramer's	do	do		Cole Settlement	do	Fabius,	150
Sternberg's	do	Cicero Center,		Block	do	do	
S. L. Vail's	do	Delphi,		Southard's	do	Pompey Center,	
Elbridge	do	Elbridge,	400	Palmer C. M. A.	do	Oran,	250
Abbott & Rodgers'	do	Tully,		Plainville	do	Plainville,	400
Marvin's	do	Jack's Rifts,		Young's	do	Euclid,	

SCHUYLER COUNTY.

Cook & Co.'s	Factory.	Havana,	Alpine	Factory,	Alpine.

ST. LAWRENCE COUNTY.

Olin & Smead's	Factory,	Canton,	675	Beech Grove	Factory,	Russell,	500
Southville	do	Southville,	200	W. Canton	do	Canton,	
Richville	do	Richville,	640	South Canton	do	Crary's Mills,	450
Jones'	do	do		DeKalb	do	DeKalb,	700
Potsdam	do	Potsdam,	500	Gouverneur	do	Gouverneur,	500
Hailesboro	do	Gouverneur	600	Pike's.	do	Shingle Creek,	
Sprague Corners	do	Shingle Creek,	600	W. Fowler	do	do	
Russell Village	do	Russell,	500	Hermon	do	Hermon,	

WYOMING COUNTY.

George Hoye's	Factory,	Attica,		Tozier's	Factory,	Johnsonburg,	
Java Village	do	Java Village,	450	Sheldon C.M.A.	do	Sheldon,	
North Java	do	North Java,		Wyoming	do	Wyoming,	
Stryker & Co.'s	do	do		Champman's	do	Perry,	
Empire	do	Java,	400	Hermitage,	do		
Arcade C. M. A.	do	do		Orangeville	do	Orangeville,	600
Nile	do	Nile,		Wilder & Co.'s	do	do	
Bennington	do	Bennington,	400	Strykersville	do	Strykersville,	
East Bennington	do	East Bennington,	375	E. Coy	do	Pike,	250
Arcade	do	Arcade,	500	Lillibridge	do	do	
Wells'	do	do		Empire	do	East Pike.	
Castile	do	Castile,	400	Oatka	do	Gainesville,	
Gardlant's	do	Attica,		Cowlesville	do	Cowlesville.	450
Chapman's	do	Paris Center,		Java Lake	do		350
Stephens'	do	Dale,					

NIAGARA COUNTY.

Sanborn C. M. Company,		Sanborn,	300	Middleport	Factory,	Middleport,	
Johnson's Creek	do	Johnson Creek.		J. C. Francis'	do	do	

BROOME COUNTY.

Maine	Factory.	Maine,	250	Squires Cr.	Factory	Kirkwood,	275
Aawleyton	do	Hawleyton,		Page Br'k Val'y	do	North Fenton,	500
Killawog	do	Killawog,					

WASHINGTON COUNTY.

North Bend	Factory,	N. Granville		S. Granville	Factory,	South Granville,	
North Bend	do	Middle Granville	250	Middle Granv'e	do	Middle Granville,	500
Granville	do	Granville,	450	Greenwich	do	Greenwich,	135
Fort Ann	do	Fort Ann,		Hawley's	do	Fort Edward,	

JEFFERSON COUNTY.

Adams,	Adams,	Heath's	Adams Center,
Alexander's,	Henderson,	Hamlin,	Rutland, 325
Antwerp,	Antwerp, 950	Harper's Ferry,	Rutland Center,
Ayers,	Watertown,	Henderson,	Henderson,
Babcock's,	Champion,	Howard,	Stone Mills, 300
Barber's	Philadelphia,	Lorraine Central,	Lorraine, 300
Bonfoy & Bettinger,	Mannsville,	Limerick,	Dexter, 300
Belleville,	Belleville,	Leffingwell's,	Henderson,
Bent,	Antwerp,	Mannsville,	Mannsville, 775
B. P. Smith,	Black River,	Maple Grove,	Lorraine,
Brownville,	Brownville, 400	Moscallonge,	Dexter,
Brown,	Watertown,	Muzy's,	Smithville,
Benjamin & Co.'s	Camp's Mills,	Pillar Point,	Dexter,
Carter Street,	Stone Mills,	Philadelphia,	Philadelphia,
Cascade,	Rutland,	Pitkins,	Lorraine, 250
Champion Village,	Champion,	Rodman,	Rodman,
Cooper's	Evans Mills,	" Branch,	Burrville,
Cold Spring,	Watertown,	Rogers',	Ellisburgh, 700
Cold Spring,	Belleville,	Rogers,	Lorraine,
Cold Spring,	Roberts' Corners,	Rutland Valley,	Watertown,
Campbell's,	South Rutland, 150	Sherman's,	Watertown,
Dry Hill,	Watertown,	Springer's,	Redwood,
Davis'	Smithville,	Smithville,	Smithville,
Eames'	Rutland, 250	South Champion,	South Champion, 450
East Rodman,	East Rodman,	Springside,	Dexter,
Earl,	Carthage,	Sterlingbush,	Antwerp,
Ellisville,	Ellisburgh,	Tift's,	Lorraine,
Evans Mills,	Evans Mills, 1000	Timmerman's,	Orleans 4 Corners,
Excelsior,	Perch River,	Warner,	Adams Center,
Excelsior,	South Champion,	Wescott,	Watertown, 375
Farr,	Pierrepont Manor, 225	Whitesville,	East Rodman,
Foreman's	Woodville,	Wicks,	Antwerp,
Griswold & Reed,	Lorraine,	Wilson,	Watertown,
Gardner's	Watertown,	Wright,	Depauville,
Grinnell & Co.	Pierrepont Manor, 300	Woodville,	Woodville
Hadsall's,	Felts Mills,	Worth,	Worthville, 500

ORANGE COUNTY.

Circleville	Factory.		400
Collabargh	do		225
Rockville	do	Middletown.	200
Unionville	do		250
Walkill Assoc.	do		375
D. Mullock's	do	Middletown,	250
Orange Co. M. A.	do	Michigan,	550
do do	do	Chester,	325
Gonge & Co.	do	Hamptonburgh,	600
Bates & Co.	do	do	250
Gonge & Youngs'	do	Florida,	400
T. J. Taylor's	do	do	175
Carpenter Howell	do	Amity.	415
do	do	Warwick,	350
Sanford & Smith	do	do	300
H. Milbnrn	do	do	250
T. Durland	do	do	150
Brown, Bailey & Co	do	Edenville,	400
Foster Clark's	do	Wickham's Pond,	350
W. H. Clark & Co.	do	Minisink,	300
Barton Spring	do	Monroe,	100
Parlor	do	Blooming Grove,	
Wood's	Factory.	Chester.	200
Kidd's	do	Walden.	
J. F. Vail & Co.	do		450
Brown, Lane & Co.			250
Wawanda	do		375
J. B. Halsey & Co.	do		300
E. Bull's	do	Chester,	159
Bankers Bro.'s	do	do	200
F. Davis'	do	do	225
P. Holbert's	do	Middletown.	275
Mapes & Co.	do	do	425
Jas. Hulse	do	do	250
Wm. Mead & Co	do	do	250
Christee & Co.	do	Unionville,	300
O. F. Green	do	Greenville,	300
H. Reamey	do	do	125
Finchville	do	Otisville.	375
J. A. Wood	do	Slate Hill,	200
Howell & Co.	do	Monroe,	400
Sugar Loaf	do	Sugar Loaf,	550
Union Coud'd Milk Co.		New Milford.	

GENESEE COUNTY.

Batavia Union	Factory.	Batavia,	
do C. M. A.	do	do	500
Byron	do	Byron,	
Richville	do	Pembroke.	
Linden	do	Linden,	
Stafford	do	Stafford,	
Darien Center	Factory,	Darien Center,	400
Oakfield	do	Oakfield,	200
W. Bethany	do	West Bethany.	
East Bethany	do	East Bethany.	
Foster's	do	Batavia,	

FULTON COUNTY.

Stuart's	Factory,	Oppenheim Center.	
Fulton	do	do	
Cross Roads	do	Johnstown.	350
Stoller's	do	do	
Cold Creek	Factory,	Brockett's Bridge	
Brockett's B.	do	do	
Perth Center	do	Perth Center	200
Slate Hill	do	Ephratah,	600

SARATOGA COUNTY.

Ballston	Factory.	Ballston Center,	
Empire	do	South Galway,	250
Galway	Factory.	Galway.	
Charlton	do	Charlton.	

SCHENECTADY COUNTY

Mariaville	Factory.	Mariaville,
Rotterdam		

GREENE COUNTY.

Towner's	Factory,	Jewett,	
Hunter's Cream'y	do	do	
Smith's	Factory,	Ashland,	
Kirkland	do	Durham,	

ALLEGANY COUNTY.

Simpson's	Factory,	New Hudson,	600
Reservoir	do	Seymour,	670
Rushford	do	Rushford,	1,000
Forsythe's	do	Whitesville,	200
S. Sherman & Co.	do	Nile,	125
Richburg	do	Richburg,	100
Curtis'	do	do	
D. T. Burdick's	do	Alfred,	400
Greene's	do	do	
Friendship	do	Friendship.	400
Centerville	do	Centerville.	400
Ackerley's	do	Rushford,	600
Barns'	do	Fillmore,	700
Andover	do	Andover,	350
Black Creek	do	Black Creek,	400
Oramel	do	Oramel,	450
Niel	do		250
Wellsville	do	Wellsville,	300
Lyndon	do	Cuba,	700
Pettibone's	do	Alfred,	
Dodge's Creek	do	Portville,	
Jackson's	do	Belmont.	
Morley's	Factory.	Whitney's Crossing.	
Flanagan's	do	Cole Creek.	
Crandall's	do	Dodge's Corners.	
Belvidere	do	Belvidere.	
Rice's	do	do	
Granger	do	Granger.	
Little Genesee	do	Little Genesee,	
Carr Valley	do	Almond.	400
A. Congdon's	do	West Clarksville.	250
Babbit's	do	Hume.	350
Philips Creek	do	Philips Creek.	450
Vandermarsh	do	Scio.	275
R. Smith's	do	Cuba,	350
West Almond	do	West Almond.	
G. West's	do	Alfred Center.	
J. Wilcox's	do	Wirt Center,	150
Wiscoy	do	Wiscoy,	200
Genesee	do	Little Genesee,	120
Elm Valley	do	Andover,	150
Angelica	do	Angelica.	
Olean	do	Olean,	350
M'Henry Valley	do	Alfred Center.	300

YATES COUNTY.

Italy Hollow C. M. A.,	Italy Hollow.	

ERIE COUNTY.

Stickney's	Factory,	Collins,	1,100	Boston	Factory,	Boston,	400
W.G.Huntington	do	Pontiac,	800	Concord Center	do	Woodward's Hol.	500
North Concord	do	Concord,		Wales	do	Wales,	450
First Collins	do		800	Paxton's	do	Eden,	600
Collins Center	do	Collins Center,	1,100	Sisson's	do	Shirley,	600
Brant Center	do	Brant,	550	North Evans	do	North Evans,	500
Marshfield	do	Collins Center,	1,100	Angola	do	Angola	360
Morton's Corners	do	Morton's Corners,	600	Brant	do	Collins,	400
Richmond & Co's	do	Sardinia,	500	Springville	do	Springville,	1,200
Glenwood	do	Glenwood,	400	Blakeley's	do	East Aurora,	
Dick & Co.'s	do	Willink,	350	Jackson's	do	East Hamburg,	300
North Collins	do	Shirley.		Hamburg	do	Hamburg,	300
Kirby's	do	Shirley.		North Evans	do	North Evans,	250
Young's	do	Alden,	300	East Evans	do	East Evans,	300
Wheelock's	do		300	Eden Corners	do	Eden Corners,	350
Gowanda	do	Gowanda,	400	North Concord	do	North Concord,	600
Staffin's	do	Collins,	200	Sardinia Valley	do	Sardinia Valley,	450
W. Smith's	do		300	Newton	do	Sardinia,	250
Ballard's	do		350	Hosmer's	do	do	
Hensler	do	Grand Island,	150	Wales Center	do	Wales Center,	400
Cotesworth	do	Grand Island.	100	Fuller's	do	do	
North Boston	do		450	South Wales	do	Wales,	450
Boston Center	do		350	Elma	do	do	300
Colden	do	Colden,	300	Burroughs & Co	do	do	
Marilla	do	Marilla.		Francis	do		
Kimball's	do	Lancaster.		Farrington's	do	Holland.	
Cheese M. A.	do	Spring Brook.		Moulton's	do	Protection.	

MONROE COUNTY.

Genesee Valley	Factory,	Sonyea,	300	Mendon	Factory,	Mendon.
Riga	do	Riga,		Perington	do	Fairport.

ONTARIO COUNTY.

Cold Spring	Factory,	West Farmington,	450	E. Bloomfield Factory.	East Boomfield.
Flint Creek	do	Flint Creek,			

HERKIMER COUNTY.

Herk.Co. Union	Factory,	Little Falls,	700	Richardson's	Factory	W. Schuyler,	
Manheim Center	do	do	600	Skinner's	do	So. Columbia,	
Manheim Turn	do	do	500	Kling's	do	Paine's Hollow,	
Newville C.M.A.	do	do	860	Middleville	do	Middleville,	750
Rice,Broat & Co's.	do	do	900	Northrup's	do	Litchfield,	300
G. W. Davis'	do	do	600	Kinney's	do	do	600
Cold Spring	do	do		Walrath's	do	N. Litchfield,	300
Top Notch	do	do	450	Van Hornsville	do	Van Hornsville,	215
Van Allen's	do	do		Young's	do	do	
Fairfield Assoc.	do	Fairfield,		Lackey's	do	W. Winfield.	300
Old Fairfield	do	do	900	H. C. Brown's	do	do	400
No. Fairfield	do	do	600	Wadsworth's	do	do	200
Eatonville	do	Eatonville,	600	W. Palmer's	do	do	
Locust Grove	do	do	150	Edick's	do	Mohawk,	225
Mohawk Valley	do	E. Schuyler,	450	Mort's	do	do	
Richardson's	do	do	360	J. Clark's	do	Winfield,	500
Budlong's	do	W. Schuyler,	300	B. Bartlett's	do	do	300
Warren's	do	Warren,	400	N. Winfield	do	N. Winfield,	700
Fort Herkimer	do	Fort Herkimer,	400	Moon's	do	Russia,	300
Bellinger's	do	do	400	Poland Cheddar	do	Poland,	450
Beckwith's	do	Cedarville,	300	Herkimer	do	Herkimer,	600
Cold Spring	do	do		Herkimer Union	do	do	250
Stewart's	do	do		G. W. Pine's	do	do	600
Howard's	do	do		Newport	do	Newport,	
Cedarville	do	do	300	Morey's	do	do	800
Smith's	do	Frankfort,	800	Cook, Ives & Co's.	do	Salisbury,	400
A. G. Norton's	do	do		L. H. Carr's	do	do	
Frankfort Center	do	do		W. Peck's	do	do	159
Russell's	do	Russell's Hill,		Old Salisbury	do	do	600
Wetmore	do	do		Avery & Ives'	do	Salisbury Center,	500
D. Hawn's	do	Starkville,	800	Norway Assoc.	do	Norway,	600
Snell's	do	Russia,	600	J. D. Ives'	do	do	
Nash's	do	Frankfort Center,		Columbia Center	do	Columbia Center,	
Rider's	do	Cedar Lake,		J. Russell's	do	Graefenberg,	300
Stuart's	do	Cedarville,					

CAYUGA COUNTY.

Throopsville C.M.A.	Factory,	Auburn,	450	Ira,	Factory,	Ira,	
Moravia	do	Moravia,	250	Lincoln's	do	Conquest Center,	400
Sennett	do	Sennett,	400	P.Byron C.M.Co's	do	Port Byron,	200
Carpenter's	do	New Hope,		Meridian,	do	Meridian,	

OTSEGO COUNTY.

Wykoff's	Factory.	Richfield Springs,	500	RussellBower's	Factory.	Exeter,	300
Bush's	do	do		Perkins'	do	do	
E. D. Lamb's	do	Unadilla Forks	350	Hind's	do	Cooperstown,	
Center Brook	do	Otsego,	200	Hoxie's	do	do	
Stocker & Fox's	do	East Springfield,	600	Hoxie's	do	Unadilla Forks,	
Casler &Andrews	do	Springfield Cent.	450	R. L. Warren's	do	East Springfield.	
Hartwick	do	Hartwick,	200	West Burlington	do	West Burlington,	300
Pitt Cushman's	do	Edmeston Center,	200	Parker's	do	S. Edmeston,	400
Col. Gardner's	do	Burlington Flats,	150	Pope's	do	do	306
Ed. Gardner's	do	do	150	L. N. Brown's	do	W. Edmeston,	600
Benj. Smith's	do	Spooner's Cor's,	4 0	Ed. Loomis'	do	Richfield,	150
Brockway's	do	Richfield,	400	L. O. Vebber's,	do	Exeter Center,	600
Smith & Wilber	do	West Exeter,	400	H. & S. Smith's	do	West Exeter,	300
Fly Creek	do	Fly Creek,	200	J. H. Pratt's	do	do	400
Park's	do	Burlington Green,	350	Lyman Johnson,	do	Burlington Flats,	500
Parley Phillips'	do	Unadilla Forks,	200	Colman's	do	do	200
Wm. L. Brown's	do	do	200	Newel N.Talbot's	do	do	105
Clark's	do	Schuyler's Lake,	200	Hartwick Union	do	Cooperstown.	
Edmeston Center	do	Edmeston Center,	750	Chamberlain's	do	Richfield Springs.	
Warren Chase's	do	W. Edmeston,	250	Cherry Valley,	do	Cherry Valley,	300
Joseph King's	do	Burlington Green,	200	Tuttle's	do	South Edmeston,	250
George Clark's	do	Hyde Park,	300	Rider's	do	Schuyler's Lake,	100
Nearing & Co's	do	Butternuts.		Baker's	do	do	600

CATTARAUGUS COUNTY.

Welch's	Factory,	Dayton,		Farmersville	Factory.	Farmersville	400
Perrysburgh	do	Perryburgh,	550	Cook & Brothers'	do	do	
Ticknor's	do	Versailles,	500	Napaer	do	do	
Slab City	do	Slab City,		J. K. Button's	do	do	
Leon Center	do	Leon Center,		Ischua	do	Ischua.	
Randolph	do	Randolph,	200	Portville	do	Portville.	
First Collins	do	Gowanda,	700	Olean	do	Olean.	
Stebbin's	do	Cattaraugus.		Hinsdale	do	Hinsdale.	
Waverly	do	Waverly.		Cady's	do	Franklinville.	
Safford	do	East Otto.		Union	do	Ellicottville,	600
Union,	do	do		McMahon's	do	do	
Tiffts'	do	do	400	Meadow Valley	do	do	
Crump's	do	do		Little Valley	do	Little Valley.	
Ashford	do	Ashford,	600	Great do	do	Great do	
Westville	do	Westville.		Merrilly's	do	Napoli.	
West Ashford	do	Ashford Hollow.		Lyndon	do	Lyndon.	
Machias Corners	do	Machias Corners.		Cadiz	do	Cadiz.	850
Woodworth's	do	Yorkshire,	450	New Ashford	do	New Ashford,	400
Maple Ridge	do	Fairview,	660	Yorkshire Center,	do	Yorkshire Center,	500
Gowanda	do	Gowanda,	550	New Albion	do		600
Dwight's	do	do		Jenk's	do	Gowanda,	1,000
Allen's	do	Eddyville,	350	Pigeon Valley	do		369
Maple Grove	do	Ellicottville	200	West Valley	do	West Valley.	400
E. Ashford	do	East Ashford,	550	Ballard	do		400
Follett's	do	Machias,	400	Bigelow's	do	Ashford.	
Lewis &Haskell's	do	Sandusky.		Vedder's Corners	do	do	
Elton	do	Elton,	400	Gamp's	do	Ashford Hollow.	
Rawson	do	Rawson.					

CHAUTAUQUA COUNTY.

Hamlet	Factory,	Hamlet,	1,100	Brainard's	Factory,	Hamlet,	650
J. E. Robertson's	do	Busti,	660	Coon's	do	(3) Mina,	1,250
Clear Spring	do	Fredonia,	700	do	do	Sherman,	457
Burnham's	do	Sinclairville,	1,049	Canadawa	do	Arkwright,	680
J. S. Hulbert's	do	Forrestville,	400	Gerry	do	Gerry,	500
Villanova	do	Villanova,	400	Cassadaga	do	Cassadaga,	400

CHEMUNG COUNTY.

Bunnell & Horton's	Factory,	Millport,	750	VanDuzer&Son's	Fact'y	Horseheads	
				Rundle's	do	do	

TIOGA COUNTY.

Speedsville	Factory.	Speedsville.		Jenksville	Factory.	Jenksville.	

SCHOHARIE COUNTY.

Sharon Center	Factory,	Sharon Center,	250	Argusville	Factory,	Argusville,	600
Seward Valley	do	Seward,	200	Carlisle	do	Carlisle,	300
Hindsville	do	Hindsville,	200	Barneyville	do	Barneyville,	200
Gardnersville	do	Gardnersville.		Esperance	do	Esperance.	
Cobleskill	do	Cobleskill.					

RENSSELAER COUNTY.

Matteson's	Factory.	South Berlin.

TOMPKINS COUNTY.

Dryden Union	Factory,	Etna,	600	Freeville Union	do	Freeville,	700
Groton	do	Groton Hollow,	500	Slaterville	do	Slaterville.	
Ellis Hollow	do	Ithaca.		Peru	do	Peruville.	
Arnold's	do	Ithaca.		RidgwayCream'y,	do	Caroline Depot.	
McLean Assoc.	Factory.	McLean,	700				

OHIO.

GEAUGA COUNTY.

Rocky Dell	Factory.	Bissell's,	250	Colton & Co.,	Factory.	Nelson,	
Andrews'	do	do	800	Spring Brook	do	Welshfield,	300
Bartlett's	do	Chester X Roads,	800	Grove	do	do	300
Bartlett's	do	Mulberry Corners,	300	Munson's	do	Fowler's	400
Hood's	do	Auburn,	500	Pope's	do	Welshfield.	500
Odell's	do	do	600	Randall's	do	Burton,	700
Smith's	do	Ford,	600	Hall's	do	Claridon,	400
Freeman's	do	South Newbury,	500	Armstrong's	do	East Claridon,	700
Hall's	do	Fowler's Mills,	600	Smith & Co.'s	do	Parkman,	600
Murray's	do	Chardon,	800	Armstrong's	do	Huntsburgh,	800
Randall's	do	Chardon,	700	Randall's	do	Montville,	800
Pope's	do	Welshfield.	500	Murray's	do	do	500
Russell,	do		500	Smith's	do	Thompson,	500

PORTAGE COUNTY.

E. B. Higley, Windham.
Horr & Risden, Shalersville.
H. S. Johnson, Garrettsville.
Hurd & Bro., Aurora.
Harmons & Root, Aurora.
T. C. Bradley, Mantua.
I. C. Scram, Ravenna.
H. F. Hudson, Ravenna.
Beman Spring, " 250
Hinkley's Mantua. 400
Burrows, Freedom.
Aurora Grove, Aurora. 500
Anderson's Ravenna, 300

LAKE COUNTY

S. E. Carter, Leroy, Painesville P. O.
H. N. Carter, Perry.
R. Freeman & Co., Madison.
Hitts, Willoughby, 300
Bartlett & McKee, South Kirtland.

ASHTABULA COUNTY.

S. E. & H. N. Carter, Windsor. 500
Lattimer's New Lyme.
Osborn's Morgan.
G. C. Dolph, West Andover.
Austinburgh, Austinburgh.
Morley Bros., Andover.
J. Pelton's Wayne.
Wire's, Austinburgh.
Weldon & Brown, Conneaut. 400
Pierce's Eagleville.
Harrington & Randall, Morgan.
Alderney, New Lyme.

TRUMBULL COUNTY.

J. M. Trew, Farmington.
B. H. Peabody, Kinsman.
Cold Spring, do
Caldwell & Lewis, W. Farmington.
Farmington Center.
E. C. Cox, Mesopotamia.
" " N. Bloomfield.
Baldwin's Fowler.
Cortland, Bazetta.
Raymond's, Mesopotamia.
Cowdery & Craft's, Bazetta.
Sager & House, Bristolville.
Harshman & McConnell's Southington.

HENRY COUNTY.

Ridgeville Factory, Ridgeville Corners.

FULTON COUNTY.

Royalton Factory, Royalton.

LORAIN COUNTY.

Camden Cheese Company, Kipton.
Mussey & Viets, Elyria.
Horr & Warner, Huntington.
Magraugh & Whitlock, Wellington.
Snow's Huntington.
G. H. VanWagnen & Co., North Eaton.
Corning & Hanee, Grafton.
Penfield, Wellington.

MEDINA COUNTY.

McDowell Bros's, Medina.
Fellows, Chatham.
Benedict & Brooker, Litchfield.
Crane & Co., Sharon.
Colbetzes & Co., Spencer.
Chatham, Chatham Center.

SUMMIT COUNTY.

Twinsburg Cheese Assoc., Twinsburg.
Wm. Wilcox, Twinsburg.
S. Straight & Co., Twinsburg.
" " " Hudson.
Richfield, W. Richfield.
S. Straight & Co., Streetsboro.
Oak Hill, Peninsula.
M. D. Call, Hudson.

ASHLAND COUNTY.

Drake, Eaton & Co.'s Sullivan.
Clark & Bailey, Sullivan.

HURON COUNTY.

Haviland & Conant, Greenwich.
J. W. Jenne, New London.
Wakeman Cheese Co., Wakeman.

CUYAHOGA COUNTY.

A. J. Lockwood, Bedford.
J. Q. Lander, Solon.
Wyatt's, Brecksville.

ILLINOIS.

Hainesville	Factory,	Hainesville.	Lake Co.	Gould & Hammonds,	Factory,	Elgin,	425
Burchard's	do	Sumner,	Kank'ee Co.	Tuttle's	do	Lodi,	350
Patterson & Mix,	do	Momence,	do 800	Barber & Co.	do	Polo,	300
Wm. Keeney's	do	Mantino,	do 800	Albro & Co.	do	Wayne.	600
W. C. Richards	do	Momence,	do 100	Winslow	do	Shirland,	400
W. A. Clark's	do	Sherburnville	do 200	Kilbor's	do	Richmond.	
Wanzer & Co.	do	Herman,	Kane Co.	Buckland's	do	Ringwood.	
R. R. Stone's	do	Richmond,	Mc-Henry Co. 800	Jones'	do	Hebron.	
do	do	Spring Grove.		Conn's	do	Hebron.	
Thompson & Abbott	do	Greenwood,	do 500	Woodstock	do	W'dstock, M'H'nryCo	
Huntley Grove	do	Huntley,	do 250	Riley	do	Riley,	do
Marengo	do	Marengo.	do 200	Buena Vista	do	Huntley,	do 350
Greenwood	do	Woodstock	do 300	Spring Grove	do	Richmond,	do 300
Marsh & Jackson	do	Union,	do 500	Garden Prairie	do	Garden Prairie.	
Boies	do	Kingston,	DeKalb, 200	Mead's	do	Hebron,	300
Sugar Grove	do	Aurora,	300	Milk Condensing Co.		Elgin.	
Dunton	do	Dunton,	250	Rockton	Factory,	Rockton,	400
Kennicott	do	do	200	Stuart Bros.	do	Hebron, M'H'ryCo.	500
Cameron	do	do	200	Oneida	do	Rockford.	
Perry	do	do	150	Belvidere	do	Belvidere, Boone Co.	
Williams	do	do	150	Hale	do	Hale, Ogle Co.	500
Gould & Hammond's	do	Hanover.	425	Wanzer's	do	Hanover.	
				do	do	Elgin.	
				Cameron	do	Northfield.	

WISCONSIN.

C. H. Wilder's	Factory,	Evansville.	Rock Co. 100	Johnson's	Factory,	Kenosha.	
Springvale	do	Nanaupa.		Long's	do	do	
Eldredge	do	Afton,	200	Pierce & Simons	do	do	
Elkhorn	do	Elkhorn,	200	Truesdell's	do	do	
Rosendale	do	Ros'le, F. du Lac Co.	600	White's	do	do	
Hazen's	do	Ladoga,	do 459	Ft. Atkinson	do	Fort Atkinson.	
Sparta	do	Sparta,	200	Spring Mills	do	Somers.	
Favil's	do	Lake Mills,	Jeff. Co.	Bullock's	do	Rockton.	
Barrett's	do	Barnett Station.		Cold Spring	do	Whitewater.	
Coolidge	do	Windsor,	Dane Co.	Coburn's	do	do	
Waterville	do	Wat.	Waukesha Co.	Drake's	do	Lake Mills.	
Boynton's	do	Waupun,		Gilbert & Co.'s	do	Hazel Green.	
Howard's	do	do		Tappan's	do	Morrison.	
Johnson's	do	do		Wilbur & Co.'s	do	Wilmot.	
Downey's	do	do		Strong & Co.'s	do	Oakfield.	
Carpenter's	do	Kenosha.		Cochran's	eo	Trenton, Dodge Co.	
Holt's	do	do		Reigart & Ross	do	Beloit.	

MASSACHUSETTS.

Worcester Co.,	Factory,	Warren,		500	New Lenox Factory,	Lenox.	
Union	do	Hardwick,			Cheshire Factory,	Cheshire.	
New Braintree,	do	New Braintree.		542	Petersham Cheese Company,	Petersham	
Barre Central Cheese Co.,		Barre Center.			Cheshire do	do	South Adams.
Barre Cheese Co.,		Barre,		375	Westboro' do	do	Westboro'.
South West Factory,		Barre.		125	Lewis Milk Condensing Fac.,	W. Brookfield.	
Hardwick Center Factory,		Hardwick,		500	Coy's Hill Cheese Company,	Warren,	300
Boise's	do	Blandford.			South Williamstown Fac.,	S. Williamstown.	
Williamstown Factory,		Williamstown.			Walker's Factory,	Greenwich.	
West Brookfield Factory,		West Brookfield.			Dana C. M. C.	Dana.	
Lanesboro'	do	Lanesboro'.			Putnam's Factory,	Belchertown.	
North Marlboro'	do	North Marlboro'.			Slater's do	Tyringham.	
Lenox	do	Lenox.			Greylock do	South Adams.	

VERMONT.

East Berkshire Factory,	East Berkshire,	400	
Enosburgh Factory Co.,	Enosburgh,	600	
N. Enosburgh Factory,	N. Enosburgh,	400	
East Franklin do	East Franklin,	600	
Middletown do	Middletown,	600	
Rose do	West Rupert,	625	
West Pawlet do	West Pawlet,	475	
Hill do	Middletown,	100	
West Tinmouth do	West Tinmouth.		
Norton's do	Wells.		
Valentine's do	Tinmouth.	125	
Otter Creek do	Center Rutland,	200	
Billing's do	Rutland.		
Sheldon's do	West Rutland.		
Wickham's do	Pawlet,	800	
Camp's do	Stowe.		
Missisquoi Factory,	North Sheldon.		
Gleason's do	Shrewsbury.		
Mason's do	Richmond,	80	
Valley do	Hinesburg,	650	
East Poultney do	East Poultney,	300	
Wallingford do	Wallingford.		
Williams do	Danby.		
Rutland do	Rutland.		
West Orwell do	Orwell,	450	
East Orwell do	Orwell,	350	
Hosford's do	Charlotte,	350	
Milton do	Milton.		
Milton Falls do	Milton Falls.		
Ferrisburgh do	Ferrisburgh.		
New Haven do	New Haven.		
Shoreham do	Shoreham.		

MICHIGAN.

St. Clair Factory,	St. Clair.	450	
Fairfield do	Fairfield,	700	
Horton's do	Adrian,		
Hoadley's do	Oakford,		
Saunder's do	Trenton,		
Smith's do	Augusta,		
White's do	Ceresco,		
Maple Grove do	Farmington,	600	
Canton do	Canton	400	
Beal's do	Rollin,		
Clayton do	Clayton,		
Spring Brook Factory,	Farmington,	400	
Gilt Edge do	do	400	
Ionia do	Ionia,		
Reading do	Reading,	450	
Fowler & Co.'s do	do		
Adrian C.M.Co. do	Adrian,		
Ames' do	Hudson,		
Sawin's do	Mattison.		
Utica do	Utica,		
Welton's do	No. Adams.		
Hillsdale do	Hillsdale,		

PENNSYLVANIA.

Springville Factory,	Springville, Susq. Co.	158	
Bridgewater do	Bridgewater, do	200	
Gage do	do do	80	
Worth's do	Marshallton, Chester Co.		
Damascus Creamery,	Damascus, Wayne Co.		
Woodcock First Premium Factory,	Woodcock, Crawford Co.		
Woodcock Boro' Creamery,	Woodcock Boro', Crawford Co.		
Keystone Factory,	N. Richmond, Crawford Co.		
Venango Factory,	Venango, Crawford Co.		
Cambridge Factory,	Rockdale, Crawford Co.		
Ellis & Smith's Factory,	Waterford, Erie Co.		
New Milford Creamery,	N. M., Susq. Co.,	200	
Spring Hill Factory,	S. H., Bradford Co.,	150	
Earl's Factory,	Carthage.	360	

IOWA.

Smith's Factory,	Mason City.		
Hicklng's do	Mason City.		
Wyoming do	Wyoming, Jones Co.		
Clear Lake do	Clear Lake.		
Strawb'ry Pt. Fact'ry,	Fayette Co.		
Kidder's do	Epworth, Dubuque Co.		
Pierce's do	Belmond.		

KENTUCKY.

Chilesburg Factory,	Chilesburg, Fayette Co.	300	
Clark Factory,	Winchester, Clark Co.	300	
Shelby City Factory,	Shelby City.		
Versailles Fac'ry,	Versailles, Woodford Co.	200	
Madison Co., C. M. A.,	Richmond.		

MINNESOTA.

Anderson Factory.	Mower City.		
Wells do	Wells.		
Star Factory,	Rochester.		
Owatonna do	Owatonna.		

VIRGINIA.

Holston Factory, Saltville, Smith County.

NORTH CAROLINA.

Elk Mountain Factory, Asheville, Buncombe County, 230 Cows.

TENNESSEE.

Stratton's Factory, Crossville, Cumberland County.

KANSAS.

Americus Factory, Americus.

CONNECTICUT.

Eagle Cheese Company, North Colebrooke.

INDIANA.

L. B. Merrill's Factory, Merrillsville.

Brookman's Factory, Crown Point.

CANADA.

Smith & Son's, Norwich,	Oxford Co.	C. W.	400	E. Nissouri	Factory,	Ingersoll.		
Galloway's, Ingersoll,	do	do	150	People's	do	Norwich.		
Josiah Collins, Mount Elgin,	do	do	350	Lossing's,	do	Durham,	C. W.	250
Moyers, West Zorra.	do	do	100	Kearn's,	do	Oxford,	do	200
Adams' Nissouri,	do	do	450	Dodge's,	do	do	do	200
Wade's, Coburg,	do	do	450	Silverthorn's,	do	do	do	70
James Harris, Ingersoll,	do	do	400	Tho. Abram's,	do	Norwich,	do	275
do Branch,	do	do	200	G. Dunkin's	do	do	do	200
H. Farrington's, Norwich,	do	do	300	Wm. Bailey's,	do	do	do	175
do Branch,	do	do	200	Andrew Pickert, Lowville, Halton Co.			do	150
Chas. Banbury's, St. Mary's,	do	do	300	Richard Carter, Brampton, Peel Co.				175
Harris & Adams, Mt. Elgin,	do	do	250	Wilmot's, Milton, Halton Co.				250
Scott's, Lobo,		do		Cambell's,	do	do		200
Ballard's, Norwichville,	do	do	300	Smith & Cochrane's, Compton, C. E.				250
Ballantyne's, Sebringville,	do	do	400	Lawson's, Salford, Oxford Co., C. W.				450
Ontario, Norwich,	do	do	300	Degeer's, Queensville.				
Pioneer, do	do	do	550	Pearce's, Tyrconnell, Elgin Co.				
				Middlesex Factory, Bowood, C. W.				

The following is the Law in the State of New York, bearing upon the subject of Butter and Cheese Factories:—

Whoever shall knowingly sell, supply or bring to be manufactured to any butter or cheese manufactory in this State any milk diluted with water or from which any cream has been taken, or milk commonly known as skimmed milk, or whoever shall keep back any part of the milk known as "strippings," or whoever shall knowingly bring or supply milk to any butter or cheese manufactory that is tainted or partly sour from want of proper care in keeping pails, strainers, or any vessels in which said milk is kept, clean and sweet, after being notified of such taint or carelessness; or any butter or cheese manufacturer who shall knowingly use or allow any of his employees, or any other person, to use for his or for their own individual benefit any milk or cream from the milk brought to said butter or cheese manufacturer, without the consent of all the owners thereof, or any butter or cheese manufacturer who shall refuse or neglect to keep or cause to be kept a correct account (open to the inspection of any one furnishing milk to such manufacturer) of the amount of milk daily received, or of the number of pounds of butter and the number and aggregate weight of cheeses made each day, or of the number cut or otherwise disposed of, and the weight of each, shall, for each and every offence, forfeit and pay a sum not less than twenty-five dollars nor more than one hundred dollars, with costs of suit, to be sued for in any court of competent jurisdiction for the benefit of the person or persons, firm or association, or corporation, or their assigns, upon whom such fraud or neglect shall be committed.

AN ADDRESS

DELIVERED BEFORE THE AMERICAN DAIRYMEN'S ASSOCIATION, AT UTICA, N.Y., ON

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BY

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METHODS OF CHEESE-MAKING IN EUROPE.

From the earliest times it has been the practice to convert a part of the perishable milk, obtained by man from some one or another of his domestic animals, into the less perishable form of cheese, by an operation that consists in converting the casein, in solution in the milk, into a solid and insoluble form, in which, by giving it more or less solidity and firmness, it is more easy to control the action of those atmospheric influences that speedily render the milk itself unfit for consumption; thus the profitable utilization of great quantities of milk has been rendered possible that could not otherwise have been advantageously produced or consumed, while by the proper regulation of the very same influences which would have ruined the milk, and which would, if not kept under control, make the solidified casein itself worse than worthless, it is formed into a palatable, nutritious, digestible, and, if all these, then a wholesome article of

food. The Egyptians, the Greeks, the Romans, the ancient Gauls, made habitual use of this kind of food. A variety of cheese which has almost the highest reputation in France now, the Roquefort cheese, it is said was mentioned by Pliny 1800 years ago, for its good quality. Indeed, whenever and wherever milk has been, or is used, as an article of food, we may find the preparation of some form of cheese, not only in civilized countries, but even among half-barbarous people. Clark, in his account of travels among the Laplanders, describes a dairy which was shown to him as consisting "of a shelf between two trees, supported by their stems, and overshadowed by their branches, neatly set out with curds and cheeses as white as the reindeer's milk, from which they had recently been made; the cheeses were placed in wooden frames, or on splinters of wood, or in nets hanging from a pole placed longitudinally over the platform." Cheese is in fact so eminently fitted for an article of human food, that even when as in China, milk is not consumed because no animals are kept that give milk,—the essential principle from which cheese is made, the casein, is extracted from vegetables, and manipulated by salting, pressing and ripening, in a way somewhat similar to the treatment which we give to the casein after we have it in the solid form; a product is thus obtained, called ta-foo, between which and some of the European cheeses there is no greater difference, I venture to say, than may be found between some two styles of cheese made in the ordinary way from the milk of animals. We should expect to find, then, as a matter of course, that cheeses are made by every one of the civilized nations of Europe. In the French Exposition, or World's Fair, at Paris in 1867, nearly every European nation was represented by exhibitors of cheeses. From various parts of France there were twenty-one exhibitors, representing all the most famous cheeses of the country, made from the milk of cows, sheep or goats. Holland sent seven exhibitions of cheese from cow's milk, and Prussia four; from Austria there were six samples of cheese from sheep's and cow's milk. Switzerland had twenty-four representations, of which one kind, the Gruyere, took a gold medal and ten bronze medals. From Spain there were eight samples and from Portugal one. Norway sent two samples of cheese from goat's milk. Sweden seven, mostly, if not all, from cow's milk, and Russia nine, made from the milk of cows, sheep and buffaloes. Turkey sent even as many as twenty-one samples of cheese, and Greece nine samples, made from the milk of cows, sheep and goats. If the number of

exhibitors could be taken as a safe indication of the quantity and quality of cheese made, Italy might be called the land of cheeses, *par excellence*, for she sent no less than fifty-three samples made from milk of cows, mares, sheep, goats, and even buffaloes. But it does not necessarily follow that a country does not make good cheeses if it was not represented at the Paris Exhibition, since neither England nor the United States had a single specimen there; nor in the face of the well-known excellence of the cheeses produced in large quantities by both these nations, would it be safe to say that the nation most largely represented there was the largest and best producer, over all other nations in the number and variety of cheeses of excellent quality, that she exhibited.

It is unfortunate, at least for my own purposes in preparing this paper, and I think for much more important reasons, that our own country was not represented in this respect at either of these great fairs; and that we have no reliable comparison between the quality of the produce of our factories and that of French or Swiss households, or cheese making associations.

Of the European countries, especially England, Holland, Switzerland, France and Italy, manufacture cheeses whose reputation extends beyond the bounds of the country that produces them, and of these, without doubt, England and Holland export in largest quantity, and most widely; not necessarily because English or Dutch cheeses have a better flavor than Swiss, French or Italian, but because means for exportation are in better command, and because their cheeses will keep better, and bear transportation to great distances, while a Brie cheese of France, or the Gruyere cheese of Switzerland, like a fully ripe peach, is too soft and delicate for a long journey and particularly a journey by sea; and like a fully ripe peach too, it does not need to travel far to find eager consumers. As to the character and methods of manufacture of English cheeses, you have been sufficiently informed by the papers that have been read before you, or printed in your own transactions or those of the State Agricultural Society. I could add but little to what most of you undoubtedly already know about them. But with respect to continental processes and products, and particularly those of Switzerland and France, the case is different; on this ground, I trust I shall stand a better chance of presenting you with something new.

We find an almost endless variety of cheeses in the markets of these

continental countries, and I should far exceed the limits of the time allotted me, and weary you besides, by an attempt to give an account of all the different methods of cheese-making that are followed, or even of those by which all the more important varieties are produced; therefore, I must confine myself to the consideration of the one or two leading varieties of each of the four countries, Holland, Switzerland, Italy and France; and even then, I shall have to leave you to get many of the less important details of these methods of cheese-making from the printed report, for to give them in full now would take too much time. You will see as we proceed, that while everywhere the same general sequence of operations is followed, everywhere the casein is precipitated out of the milk by rennet, separated from the whey, salted and ripened,—in filling out the minor details, each process is characterized by one or more marked features, the result of which is the peculiar flavor that enables an expert, or even an amateur cheese-taster, to distinguish one variety from another.

Since all the methods of manufacture which I shall describe are such as yield cheeses of the first quality, it may not be unreasonable for me to hope that the experienced, practical cheese-maker who hears me may get some hints that he can apply with advantage in his own factory; for he will be quick to see the value of new methods of treatment, and their bearing on his own; like a skilled cook who can often tell without trying a new recipe for a cake or a pudding, whether it will stand the proof of the eating; while I doubt not that some of you will find in some of these details of manipulation confirmation of some pet notions of your own, which you are accustomed to apply in your practice, and thereby, as you think, produce better cheese than your competitors.

Holland or Dutch cheeses are an object of world-wide commerce. More than thirty million pounds were exported in 1866, of which over two-thirds went over England to English colonies. Of all the so-called dry cheeses, those of Holland keep best, and bear long voyages with least injury. They are spherical or ovoid in shape, and so expose the least possible surface to the action of the air; they are very compact, and oppose the greater resistance on that account to atmospheric influences; while a further protection is often afforded by wrapping them in tin-foil. The *Edam* is the one most largely exported; so-called because the city of Edam, in North Holland, is the principal market through which the cheese passes, on its way to

all parts of the world. Mr. Flint, in his excellent work on Milch Cows and Dairy Farming, a work which every dairyman might read with profit, says, "that the manufacture of cheese is almost the only object of keeping cattle in North Holland, which is easily explained by the fact that in no other province are there more or better cattle; the dairy farmer of this region applies himself with the greatest possible zeal to the most careful modes of cheese-making, in order to keep up the ancient reputation of the products of his country, both in the foreign and domestic markets."

Edam cheese is made from the milk of cows, and the rennet used is prepared as usual from the fourth stomach of the young calf; this is carefully cleaned and for preservation either dried in the sun in hot weather, or dried and smoked in the chimney. For use, either this dried skin or the fresh skin well cleaned, is cut in finger lengths, and soaked for twenty-four hours in sweet whey; the whole is then brought to a lukewarm temperature, and to every quart three quarts of the brine used in salting the cheese are added, and the mixture is allowed to stand four days, after which it is ready for use. Everything connected with the handling of the milk is conducted with the greatest care as to cleanliness; the milk is strained as soon as it comes into the dairy, and, when all is ready for the coagulation, is again passed through a finer cloth into the cheese tub. All the pails, tubs, and other utensils are washed several times every week with hot water and lye; no cow's milk is allowed to go into the cheese-tub, till after nine days from calving, and the milk of a cow in heat is rejected, for either will spoil the cheese of a whole meal with which it may be mixed.

From the end of August till the close of the season, at first a third, and later, half of the milk is skimmed, in order that the cheese shall not be too fat. The temperature to which the milk is brought for the addition of the rennet is from 88° to 93° Fahr. in summer, and 90° to 95° in winter; the proportion of the extract of rennet added is varied according to the temperature, and also to the variation in the quality of the milk at different seasons of the year; thus in March and April, before the new-milch cows have been turned out to pasture, the quantity of the extract added ranges from 1-1400th to 1-1250th of the milk; in May, when the first green fodder is tasted, 1-1250th; from the end of May to the 20th of August, while the cows are in the upland pastures, 1-1250th to 1-1110th;

from August 20th to October 20th, when the milk is richest, 1-1100th to 1-1000th, and finally in November and December, 1-833. If the cows have had thin, poor pasturage, the addition of coloring matter with the rennet is considered necessary; otherwise not.

The coagulation should take place in eight, ten, or at most fifteen minutes; in some localities it is considered that no dependence can be placed upon the product, if a longer time is required; and yet in others the mixture of milk and rennet, is allowed to stand an hour in quiet in the well covered tub. The older method of dividing the curd, and the one still practiced to some extent, consists in running a common plate through it edgewise in all directions, and then, taking it up plateful by plateful, to let it fall slowly back into the tub, till the pieces are no thicker than the thumb.

More recently a sort of a curd-cutter is used, consisting of parallel copper wires stretched in a frame; this, held by its two handles, is passed through the curd in all directions, with care to move it gently; for, if operated too rapidly, more of the butter, or white whey, will escape from the curd and be carried off with the common whey. If, however, the product of a rich unskimmed milk is under the hand, the cutter should be worked rapidly, in order purposely to eliminate some of the butter from the cheese. The proper division of the curd with this instrument usually requires from four to seven minutes.

The curd being thus sufficiently divided, in the older process boiling water is slowly poured into the tub, for the double purpose of giving more firmness to the small lumps of curd, and of causing them to settle more speedily, by diminishing the density of the liquid in which they are suspended; the whole is gently stirred as the water is added. As soon as the pieces of curd begin to stick together, this operation is stopped; they soon settle to the bottom of the tub, without any adhesion to each other or to the sides of the vessel, provided the latter be gently tapped with the plate. A considerable portion of the whey is then ladled off with the plate, heated to boiling, and slowly poured back, while the same operation of stirring and of tapping the sides of the tub during a few minutes' repose, is repeated; after the second settling of the curd, a large portion of the whey is again drawn off and heated, but, this time, not to boiling, and poured back again. This scalding or cooking of the curd is considered as properly accomplished, when the grains

can be easily worked into a dough in the hand. By another and later process, the curd, after being suitably divided with the plate, or the cutter, is allowed to stand quietly a few minutes, and is then collected together in one mass with the aid of a large bowl-shaped wooden spoon, that is dexterously moved around the outside of the tub, and most of the whey is then ladled off with the same instrument; then the curd is covered with a cloth, the ladle laid on it, and weighted with from twenty to forty pounds for a quarter of an hour, after which still more of the whey can be drawn off. At the end of this operation the curd should have a temperature of 81° to 82° in winter, or 88° to 89° in summer; that the curd should have this temperature, without any application or withdrawal of heat, is regarded as a point upon which too much stress cannot be laid; but if it is too cold or too warm, it should be brought to the desired temperature by the addition of warm or cold water.

The curd being separated from the whey as completely as possible by this operation, it is next put into the forms; these are shaped much like a very broad and shallow goblet, on a very short foot, are made of wood, and pierced with holes in the bottom. The curd is taken in the hands, in small portions at a time, and kneaded and pressed between them till each portion is worked into a doughy mass of uniform texture, and then it is kneaded into the form and pressed down with all the force that can be applied by the hands; the cheese thus formed is taken out, turned over, and pressed into the mould again, after cleaning out the holes if stopped up; this operation is repeated several times by some makers, and in some cases, particularly in hot weather, a tea-spoonful of salt or a little of a very weak brine is worked in during its performance, it being believed that thereby bulging of the cheese is prevented. This filling of the mould should be performed as rapidly as possible, so as to avoid too much cooling: if a considerable quantity of curd is to be disposed of, each moulder should have an assistant.

After the cheese has thus been most thoroughly manipulated with the hands, aided by the mould, the top of the latter is covered with a concave wooden plate, a little smaller than its opening, and a pressure at first light and afterwards heavier, applied for several hours, during which the cheese is frequently turned. Before this, however, the cheese is sometimes put in fresh whey at a temperature of 131° in winter or 127.5° in summer, where it is left two minutes;

it is then worked over once more with the hands into the mould, after which it is wrapped in a linen cloth, and pressed, as already described, for a length of time varying from two to twelve hours; two, three or four hours in winter, or twelve hours in summer.

The pressing being finished, the salting comes next; this is managed differently in different localities. By the older method, the cheese is immersed in a bath of brine, strong enough to bear up an egg, for twenty hours, when it is taken out and wiped with a cloth that was wetted in the same brine and well wrung out; this wiping is repeated daily for a week, after which the cheese is wiped daily with a dry cloth, to remove any moisture that may appear on the surface. After six weeks of this kind of treatment in the curing room, the cheese is ready for the market. According to the other method, each cheese is put in a mould very much like that in which it was first made, and just a pinch of salt sprinkled over the uppermost face; the next day the cheese is rolled in damp salt in a tray, and, with all the salt that will adhere to it, is put back in the same mould, but with the side up that was down before; this salting is continued, till the whole cheese is uniformly salted throughout, and the rind though soft and springy at first becomes hard and firm; the time required varies with the season; it is usually eight or nine days, but at the time the cattle begin to feed in the upland pastures, eleven or twelve days may be necessary. The cheeses are then removed from the forms, soaked for a few hours in the brine that was collected from the troughs in which the moulds with their contents were placed during the salting, or in some of the salt water that flows in the canals of the country, washed with water or whey, and sometimes scraped till the outer crust is entirely removed, dried for an hour or two, and then carried to the curing room. Those who practice the first method of salting, by soaking the cheese in brine, claim that it is more uniformly salted and that a firmer consistency and better keeping qualities are communicated to the paste.

The curing room is very dry, excessively clean and supplied with wholesome air and a good light; its temperature should never rise above 72°, nor fall below 45°, the average being about 64°. In opening the windows in summer, care must be taken to avoid exposing the cheeses to north, north-east, or east winds, which are generally supposed to injure them; protection must be afforded, too, against fogs, or very high or damp winds from any direction; if these

precautions are not observed, a very injurious red mould is liable to take possession of the cheese.

Here the cheeses, in whatever way salted, are turned daily during the first four weeks, or sometimes even twice, if it is summer, every two days in the second month, and twice weekly thereafter; with the indispensable precaution, however, to turn all the cheeses without exception, in sultry, thundery weather. When the cheeses are twenty or thirty days old, they are soaked an hour in water of a temperature of 68° to 77°, and washed with a brush, then dried in the sun if the weather allows; after half an hour or an hour they are put back in the store-room; two weeks later they are washed and dried again, and rubbed with linseed oil, and stored in the curing room till sold.

Thus the cheeses areat least six weeks old when they come into the Dutch markets; but they are not yet ready for transportation; the finishing touches are given by the dealers who buy them of the makers; except in France, where Dutch cheeses are also made to a considerable extent, and the manufacture is entirely completed by the maker himself. All unevenness left by the cloth, or the pressing, being removed with a sharp knife, the cheese is polished a little every day as it is turned in the magazine, till it presents the appearance of a ball of polished horn or ivory; then those cheeses which are intended for the English market are simply colored yellow, by rubbing them with a little linseed oil; while those for the French market must be colored red with a mixture of tournesol and Berlin red. The plant from which the tournesol is prepared is raised in France, all attempts to produce it in Holland having failed; so that Holland has to pay 38.000 to 76.000 dollars annually for the coloring that she imports. The juice is expressed from the leaves and stem of the plant, hempen rags are soaked in it, dried and exposed to the ammonaiacal vapors from a pile of fermenting manure; the rags take a fine blue color, and it is for these old rags that Holland pays so much money, and for the cost of which the consumers of the cheese must pay in their turn. It is not all a mere expensive fancy, however, for cheeses with bright, red rinds, as in the case of annatto-colored cheeses; for the coloring matter appears to keep insects away, while it goes no further inward than the rind. When the cheese is first rubbed with the rags it has a violet color; but after the surface

has become dry, it is polished with butter, to which a little Berlin red has been added, and takes a fine red glow.

Finally, a Dutch Cheese that has been well made, washed at the right time and in a proper manner, rightly salted, and suitably ripened in a dry, well situated and cleanly room, is soon covered with a light, dry, greenish blue coat of mould which is much prized by the Dutch dealers; a poorly made or too highly salted cheese, on the other hand, becomes damp and slimy, and filled with fissures and cavities within.

Although the Edam is Holland's most famous cheese, there are others that are widely known, and made in large quantities. The *Spice* cheese of South Holland is made from skimmed milk that is curdled with rennet. The curd is well broken up by hand, wrapped in a cloth, kneaded and worked over, and put under a press of very simple construction, till all the whey is pressed out; the thin cake thus obtained is broken up again in a low broad tub, by what might be called a primitive form of curd-grinder, the treading of bare well washed feet, until it has been brought to the consistence of a thin dough; a layer of this dough is put over the perforated bottom of the cheese mould, and firmly pressed down with the hands or feet; then layer after layer of the doughy curd, each portion of which has been well mixed with caraway and pounded cloves, is pressed into the mould in the same way until it is full, a thin layer of pounded or whole cloves being scattered between each layer of curd; the cover is laid on, a round board a trifle smaller than the inside of the mould, and the whole is put in the press. After being pressed eighteen or twenty hours, during which the wrapping cloths are changed two or three times, it is pressed with still greater force in a large flat pan without any form to support the sides. The cheese is then salted with dry salt, sprinkled over it in repeated doses, till, in the judgment of the operator, it has taken up a sufficient quantity. The cheeses are colored on the outside with annatto, and well rubbed with the first milk of a fresh cow, by which operation a firm smooth red rind is given to it, after which it is stored away for ripening.

The *Gouda* cheese is another renowned product of the Holland dairies, but the method of its manufacture differs but little, essentially, from that of the Edam cheese. The milk is curdled while it is warm from the cow, and rennet enough is added to make the curd

come in fifteen minutes. The cheese, fashioned in the goblet-like mould is pressed twenty-four hours, with gradually increasing force, while frequently turned to give it the right shape. It is salted by soaking twenty-four hours in brine, and then rubbing salt over the surface from time to time for four or five days, after which it is washed with hot water and put in the curing room. It is fit for use at the end of four weeks. If in very hot weather the cheese begins to swell up, by reason of excessive fermentation, it is either laid on the well cleaned floor of the room, where it is cooler, or it is pierced with a needle; as the heat diminishes the swelling disappears, and, although the appearance of the cheese may be impaired, its taste is improved.

Switzerland is famous for its cheeses, chief of which is the *Gruyere*, spoken of in an older French work on agriculture, as beyond contradiction meriting the preference over all other kinds of cheese from cow's milk. It is made mostly in huts, called chalets, high up on the sides of the Alps, during all the season that the pastures there are accessible, and the huts habitable, from the melting of the snow towards the end of May to the end of September or the middle of October. The pasturage is mostly on slopes of such an incline that the cows can crop the grass themselves; but many valuable plots are either inaccessible to the animals, or are too steep for them to venture there with safety. From such fields the grass is gathered by the mountaineers themselves, and stored in stacks or barns; often the harvester has to fill the soles of his shoes with sharp pointed nails to prevent slipping, or to support himself by a girdle attached by a rope to a rock or tree above.

The chalets are located in the midst of the pasturage in some place which is safe from avalanches or land slides, and usually near a spring or small pond. They are well, though economically built, and often have a certain elegance and picturesque aspect, and, with all that is in them, are kept most scrupulously clean. Each one is divided into two parts, one of which is used for the stable, and the other for the habitation where the cheese-maker and his assistants live through the season. Bread and flour are carried up from the valley every week, and with this, and fresh or curdled milk and whey, they make out their simple fare. Under such, as it would appear to us, strange, difficult and romantic circumstances, a cheese is made which for hundreds of years has been almost if not quite

the best on the continent, and even now carries off most of the prizes at a World's Fair.

The milk, partly skimmed or not, according as a lean or a fat cheese is to be made, is put in a great kettle capable of holding sixty-five to eighty gallons, and swung on a crane over a gentle fire, where it is allowed to reach a temperature of 77°, when the kettle is swung off and the rennet added. Sometimes this addition is made by dipping a porringer in the vessel containing the rennet, and then stirring the milk thoroughly with this same porringer, thus introducing just as much rennet as will remain adhering to the surface of the dish. In every well furnished chalet, two infusions of rennet are kept on hand, one strong, and the other weak; and the operator, by testing the stronger one with a little of the warmed milk, weakens it to the right point by adding more or less of the other, till he obtains a mixture that, under the particular circumstances of quality of the milk and state of the atmosphere of that day, will begin to act in twenty seconds, or will complete the coagulation in fifteen minutes.

The curd is divided in the kettle, now swung off from the fire, with the aid of a large wooden knife; with this it is cut into smaller and smaller squares, and then when as fine a division as practicable with this implement is attained, the curd is taken up in a porringer in small portions at a time, and poured back through the fingers, whereby a still finer division is effected. Great importance is attached to the division of the curd, in order that every particle of it shall be fully exposed to the action of the heat in the cooking which follows. To accomplish this cooking, the kettle is swung back over the fire again, when its contents are stirred without intermission till the temperature reaches 89° to 91°; the kettle is then swung off immediately, and the stirring continued fifteen minutes longer. If this cooking or scalding has been properly performed, the particles of curd have the appearance of bursted grains of rice, swimming in the whey; they have a yellowish white color and rather a firm consistency, and when worked together between the fingers, form an elastic dough.

This result being attained, the stirring is stopped, and in a few minutes the finely granulated curd settles to the bottom of the kettle. The workman then collects it into a single mass with his

hands, slips a cloth under it, and bringing the four corners of the cloth together, lifts it out of the whey; after letting it drain a few minutes, puts into the form and under the press; which means usually nothing more than that a board a trifle smaller than the mould is laid on its contents and weighted with stones from twenty-four to forty-eight hours, or until no more whey escapes, and the wrapping cloth, which has been changed every six hours, comes off dry. It is deemed necessary that the pressing should be carefully and vigorously performed in order to expel the whey completely; any residue of that in the cheese is supposed to injure it seriously, by causing bulging and cracking. After being taken from the press, the cheese is put in another form a little lower than the first, in which it remains for three or four weeks without further pressure while it is salted.

The salting of the cheese is also regarded as a very delicate operation. On being carried, in the second form, to the room set apart for this purpose, fine salt is sprinkled over one face, and the next day the cheese is turned over and the other face salted in the same manner; the salt dissolves readily in the water that it draws out from the cheese in the same manner that salt sprinkled over meat will draw out of it water to dissolve it and make the brine. This salting is repeated at first every day, while the crust that is formed in the surface is rubbed off from time to time, to facilitate the access of the salt to the interior of the cheese. The appearance of an abundant and permanent coat of moisture on the surface of the cheese indicates that no more salt is absorbed, and the salting is finished. Towards the end of the operation the salt is applied but once in two days, and later but once a week. It is believed that usually the cheese cannot take up too much salt, while several causes may prevent it from taking up enough; the inner parts of the cheese may not be opened sufficiently by fermentation, and it has not the proper consistency for absorbing the salt, or the curd may not have been properly granulated and scalded; or the salt may contain gypsum, which tends to form an impenetrable crust over the surface.

The salting lasts four or five weeks, or even two months, in the course of which the cheese takes up four or five per cent. of its weight of salt. One of my authorities states that in the manufacture of the best cheeses, the salting is continued for one or two years, at intervals of a week.

A well executed cooking and a good salting are believed to contribute most towards insuring a good product. It is thought, however, by the Gruyere cheese-makers that a cause which often tends to produce poor cheeses is the addition of an insufficient quantity of rennet, a result of which is that the fermentation proceeds too rapidly in the product, and it becomes necessary to place the cheeses in shallower moulds, pierce them with needles or skewers in several places, press them anew, and finally to cover them temporarily with pounded ice, to check fermentation.

The cheeses are believed to ripen best in a room where there are a large number together, and hence one reason why the product of associated dairies is better than that of single ones; it is supposed by some that the ammonia evolved from the cheeses in the course of the ripening, and pervading the air of the room to a certain extent, reacts upon them and improves their quality. Villeroy, a French cheese-maker, in order to test the truth of this supposition, broke up a cheese, after having pressed and salted it, and then kneaded into it enough ammonia to nearly neutralize its acid, gave the dough, thus obtained, the desired form by pressing it into a mould, and exposed it to a current of air till dry on the outside. The effect was surprising; as the ammonia was worked into the curd, it became more salvy and digestible and acquired the properties of a ripened cheese. Nothing would be easier, if any real advantage could be gained thereby, than to permeate the air of the curing room with ammonia; the effect might be to favor the development and growth of that miroscopic vegetable life upon which as shown in my address of last year, the ripening of the cheese depends.

A good Gruyere cheese has a soft yellow paste, that melts in the mouth, and is filled with cavities about the size of a pea, and of which there should be as many as three or four in a cylinder six inches long taken out by the cheese taster's knife. There are three varieties of the cheese, the fat, half fat and lean, made with unskimmed, half-skimmed or wholly skimmed milk; the first is very salvy and melting, but it will not preserve these properties long; the second has a delicate paste that keeps well, and is, so far as I can judge from the accounts, the one most commonly made; the third is hard, compact and white, and is least profitable. The cheese has the form of a circular disk, with usually somewhat bulging faces,

and is almost four feet in diameter and only four or five inches thick —very much like a cart-wheel; it weighs about eighty pounds.

The whey is not thrown away, nor even fed to the hogs, till more albuminous matter has been extracted from it to make another kind of cheese, that will keep several months, and is eaten mostly by the mountaineers themselves. About half its bulk of water is added to the whey, heat is applied, and just as the liquid boils, some other whey is added, in which water cresses have been macerated for eight days, till it has become very sour; the liquid becomes covered with a whitish matter, having a pasty consistence that is skimmed off and put to drain in a cloth; the amount of this kind of cheese obtained is about one-sixth of the first quantity. This precipitation in one way or another of the albuminous substance that remains in the whey after the casein has been extracted, and which consists mostly of albumen, and is no less nutritious than the casein, is very common on the continent, whatever variety of cheese is made.

It was at first believed that the superior quality of the Gruyere cheeses was due to the excellent character of the pasturage of the region where they were produced; but when the same method of manufacture was followed in other places where the pasturage was fair, it was found that cheeses could be made, which were with difficulty distinguished from the Gruyere; so that, now, Gruyere cheeses are made in other parts of Switzerland, and along the Jura and Vosges mountains, in France. The Emmenthal and Bellelai cheeses of Switzerland are of the first quality, and fairly rival the real Gruyere, but are made in much the same manner.

Of the other Swiss cheeses the *Schabzeiger*, made chiefly in the Canton Glaris, merits special notice from the peculiar manner in which it is made, and its old and excellent reputation. As long ago as 1252, mention is made of it among the items of tax paid to the convents by this Canton; but it did not appear as an importation in other countries until the end of the 16th century. Now it finds its way to all parts of the continent, and the quantity made in the Canton to supply this demand is from two to three million pounds, valued at $140,000.

The milk, as soon as drawn, is carried into cellars, and put in earthen vessels standing in a stream of fresh cool water; after three or four days the cream is taken off, the skimmed milk poured into

a kettle, and rennet, or a weak acid, such as vinegar or lemon juice added, to coagulate the casein; the whole is then strongly heated over the fire, while vigorously stirred; the curd is put in moulds with perforated bottoms, and allowed to drain twenty-four hours.

The cheeses are then taken out and put in larger forms, near a fire, when, under the influence of the gentle heat, they undergo the necessary putrefaction; after several days the cheeses are put in perforated casks, the covers of which are loaded with stones to press them. Here they remain till autumn, when they are ground up in a mill, and the product is mixed with powdered melilot and salt, in the proportion of 100 of cheese, 5 of melilot and 8 or 10 of salt; the greenish mixture is strongly pressed eight or ten days in forms shaped like truncated cones, and the cheeses thus a second time formed are dried in a place where no strong currents of air can blow against them.

The product when ready for consumption, is quite hard and dry, so that it has to be eaten grated, and has a peculiar aromatic odor which, though not pleasant to a stranger, is very much prized by the lovers of the cheese. This melilot is an annual leguminous plant, which is cultivated on a large scale in the Cantons Zurich and Glaris. When dried it is fragrant, and is used also by the Swiss, in their wardrobes and furs, to ward off insects.

In Italy, we find the *Parmesan* cheese holding the first rank; it is manufactured for exportation in large quantity, as well as for home consumption, being the cheese of which most is consumed in Italy, while in Germany the demand for it is equally large; and even in France, where the consumption is smaller, 600,000 pounds were imported in 1862. It is pronounced to be one of the finest of cheeses, and is considered by some equal to the best made in other renowned cheese-producing regions; it always commands a high price and a ready sale.

It is made from the milk of cows that is either wholly or partly skimmed; by some of the older authorities, it is stated that for the best quality of cheese, it is essential that the milk should be freed from as much of its cream as possible, the night's milk being skimmed in the morning, and the morning's milk three or four hours after it is drawn, while at the same time the evening's milk is skimmed again, and more than this, the milk is put in very shallow vessels, and its temperature often kept sufficiently low, by artificial cooling

with ice, in order to facilitate the rising of the cream; a temperature of 46° to 57° is considered the best for this purpose.

The treatment of the curd is not much unlike that of the Gruyere method. To prepare the milk for coagulation, it is heated in a great kettle, capable of holding often one hundred and thirty gallons, to from 77° to 90°, while stirred by an upward and downward movement, with a round dish of wood attached at right angles to a handle. The rennet consists either of the calf's stomach as usual, or of the coagulated milk found in the stomach, which is mixed with wheat flour and salt; if used in the usual form the skin is warmed with water till a stringy paste is obtained; the mixture with the milk is made by enclosing the coagulating material, whatever it may be, in a bag, and moving this bag around in the milk, while it is slightly compressed and kneaded with the fingers, and the milk is constantly stirred by an assistant. The kettle is then swung off from the fire, and after three-quarters of an hour its contents are heated again over a very quick fire, while rapidly agitated with a stirrer composed of two short narrow strips of wood fastened to each other at right angles, and attached to a handle so that they can be ploughed up and down through the curd till it is well divided, after which the saffron is added to color the curd, and it is allowed to repose for fifteen minutes; then the kettle is swung over another quick flaming fire, and constantly stirred till the temperature reaches 90°; the fire is then freshened, and the temperature pushed rapidly up to 111°, or thereabout, or sometimes a portion of the whey is taken off after an hour's repose, and the kettle is then swung over the fire and the temperature carried up to 122° to 130°.

This cooking is regarded as a very nice operation, requiring great care and good judgment on the part of the workman; while it is proceeding, he constantly tests the temperature of the liquid with his hands, as well as the consistency of the curd, as he crushes the portions that swim at the surface; and he proceeds with particular care as the end is approached, so as to seize just the right moment when to remove the kettle from the fire; if the heat is applied too long, and the temperature carried above 135°, other matters appear to be precipitated from the whey, which, becoming mixed with the curd singularly injure the cheese. The curd is considered as sufficiently cooked when the particles settle quickly to the bottom, if the agitation is stopped, and have lost all their elasticity or springiness, and acquired a tendency to agglutinate together. The whey being

ladled off, cold water is sometimes thrown over the curd, it is taken out by slipping a cloth under it as quickly as possible, for it hardens rapidly as it cools, and is put to drain in a shallow form with a perforated bottom, and left there five or six hours either without any pressure at all, or with only a light 88 lbs. one to make it fill out the mould.

After four to six days the salting begins, by sprinkling fine salt over one of the faces of the cheese, and is continued by repeating the dose, on each face in alternation every day for twenty days, as the cheese is turned. After six weeks the salted cheeses go into the curing room, which should be dry and spacious, with windows to the north, and of a temperature of about 60°; the air should be slowly changed, so that the cheese shall not dry too rapidly. As the cheese is taken to this room the crust on the outside is scraped off, the exposed surface washed with warm whey, hardened by polishing with a wooden instrument and rubbed with linseed oil to prevent too rapid drying; the cheeses are then turned and oiled twice a day. They may be exported after six months, but are better at the end of two years; and the best improve even after that time.

The cheese is so hard that it is generally grated for eating. A favorite dish of the Italians is prepared with Maccaroni and Parmesan cheese. Its average weight is, I judge, about 120 pounds, but sometimes the weight is made to run as high as 180 pounds.

Another interesting Italian cheese is the *Stracchino*, made in September and October, from the milk of cows that have spent the summer in the mountains, and have come down to winter in the rich pastures not far from Milan. The inhabitants of Gorganzola, buy the milk of these herds for the fabrication of their Stracchino cheese; the method of making it was for a long time kept secret.

The milk is curdled as soon as drawn from the cow, the curd cut up as usual, gathered in a cloth and hung up to drain five or six hours; the compact mass so obtained is cut into slices of half an inch to an inch in thickness, and at the same time, a curd obtained the preceding day in the same way is cut into slices of the same thickness. Then a cheese is made up of alternate layers of the newer and the older curd, and herein the only secret of the manufacture lay hidden; the older curd has begun even in that short time of one day to suffer alteration, and between that and the layer of fresh curd is a thin stratum of air. All the circumstances are particularly favorable for the growth of the fungi upon which the ripening of

the cheese depends, and a velvety green mould does speedily appear between each layer of curd; if the cheese-maker thinks the layers adhere too closely together he pries them apart gently to admit air enough. The loaves of curd thus prepared are wrapped in cloth, placed on shelves, and turned every two or three hours in the first day; then they are put in forms on a bed of straw, and turned twice daily during two or three months in a room whose temperature is never allowed to fall below 59°. They are salted when the faces of the cheese are completely occupied by the mould, and the plants that appeared first have begun to wither. Very fine salt is first sprinkled over one face, and then after a day or two the other face, and so on, till ten or a dozen doses of salt have been given to the cheese; after sixteen days of such treatment the cheese is taken from the form, and the salting is continued three weeks or a month longer. During the winter the cheese is kept in a somewhat warmed room, when first a white mould covers it, then a blue one, and finally red or orange pustules appear, that indicate a satisfactory termination of the ripening.

Of the French cheeses, although there are several excellent varieties, and as many different and interesting modes of making them, I shall have time to speak of only the two most important ones, the Brie, and the Roquefort.

The *Brie* cheese is made almost entirely in the immediate neighborhood of Paris, and, being too fresh and soft to suffer transportation to any greater distance, it is consumed mostly by the inhabitants of that city; yet its reputation extends throughout Europe. At the World's Fair in Vienna, in 1866, it was prized as the best cheese in the world; perhaps that judgment would have been contested if there had been a cheese there from Oneida or Herkimer County. In 1862, 6,567,000 of these cheeses were made around Paris.

The cheese is about fourteen inches in diameter, and from six-tenths to eighty-five hundredths of an inch thick, and of a brown green color; the edible part is within the thin rind that has been taken possession of by the mould, and is of a whitish yellow color, and soft even to a creamy consistency; its odor is slight as compared with that of most soft cheeses, and is pleasing to most consumers. Its flavor is decided without being too strong, but in this respect the quality appears to vary considerably. One of my authorities speaks of the cheese as being sometimes delicious, and

sometimes detestable, and says that no two in a dozen are alike. Formerly the cheeses were sometimes made with double cream; that is, the cream of the evening's milk was added to the morning's milk, before the latter was made into cheese. It was these double-cream cheeses that were so highly praised at the Vienna Fair. Now they are more rarely made, for the price which they must bring, in order to make the manufacture profitable, is too high for most consumers; simple unskimmed, or skimmed milk, is mostly used.

The process of manufacture is not difficult nor complicated; it requires much care and great cleanliness, as is the case with all operations in which milk is handled for the purpose of making products that are to be preserved for any length of time.

Fifteen minutes after the milk is drawn, it is heated to about 80° and the rennet is added; this rennet is most carefully strained through a fine cloth, to exclude undissolved particles that would spot the white paste, besides becoming centers of corruption. They are convinced in Brie that the smallest quantity of the rennet left in the cheese injures it, by accelerating decomposition, or promoting an undesired change.

The coagulation is completed in half an hour or an hour, or even not till after two hours, according to the state of the atmosphere, the character of the milk, and other circumstances. The curd, when well formed, is broken up by stirring with a porringer, and worked and kneaded with the hands against the sides of the vessel; then it is taken out with the hands, pressed into the mould and put under the press, where it is turned and the cloth changed a dozen times or so in the course of twenty-four hours, and it is then pressed for an hour without any wrapping cloth.

Taken from the press, the cheese is sprinkled on both of its faces with salt and put in a shallow tub; after twelve hours it is salted again in the same way, and is then allowed to remain three days in the brine that collects at the bottom of the tub. The salting finished, the cheeses are carefully put to dry on willow hurdles, in a light, well-aired room, where they are turned at least once daily, and carefully watched, to see that they are drying fast enough, and yet not too fast; the operation of drying is considered to be a very nice one, and it is performed most successfully at rather a low temperature; hence the best Brie cheeses are made in autumn.

Without the greatest care as to the cleanliness of this room the

fungi take too strong a hold on the cheese, and the product is ruined. On some farms the shelves are changed every two or three days, in order that they may be more thoroughly cleaned outside the room.

Next comes the ripening process. The cheeses are so thin, that, if left as cheeses usually are to ripen, they would dry up, and the mould would die before completing its work. Each one being carefully examined to be sure that fermentation has not proceeded too far in it, a number of cheeses are then piled in a dry clean barrel, with a layer of dry straw or oat chaff, half an inch thick between each one, and a covering of the same in the bottom of the barrel and on the last cheese; these barrels are then put in a cool but not too damp room. Under these circumstances the air is very speedily deprived of most of its oxygen, and there is little chance for the growth of organisms, which would do injury to the cheese, while the desired alteration of the casein goes on rapidly enough. This is the most common method of ripening these cheeses, but many others are practiced; sometimes they are packed in slightly musty hay, and sometimes between layers of straw alone, without the barrel, in a cool room. In whatever way the process is conducted, a greenish blue mould soon covers the cheese, in connection with whose growth the ripening goes on. The cheese sweats, loses its grain, and assumes an unctuous consistency, and acquires in three or four weeks the delicate flavor which indicates the completion of the ripening, when it is ready for consumption.

If the temperature has been too high, or from any other cause, the putrefaction has proceeded too rapidly, the inner part of the cheese becomes liquid, and if not attended to, this liquid flows out as it is formed and nothing but an empty shell is left in the barrel. This almost liquid product of the excessive decomposition of the cheese is at first very pleasant to the taste; in order to save it, as soon as its formation begins, the cheese is transferred to a room of which the air is kept charged with ammonia; the paste, as it rapidly liquefies, runs out on inclined tables that are kept scrupulously clean, and is collected in small jars; these jars are then tightly covered with parchment and deposited in cellars, where their extremely delicate contents will keep a year or more.

The *Roquefort* cheese is called in France the king of cheeses. In the exhibition of 1866, it took the gold medal prize, although the Gruyere took the highest prize. As already stated, its reputation

extends as far back as the time of Pliny, who mentions it in one of his works. It is a small cheese about ten inches in diameter, and eight high, with a yellowish paste inside the rind, of an unctious, salvy consistency, and without sharpness or bitterness, and marbled with greenish brown lines. It is made from the milk of sheep and goats of which in 1866, 250,000 out of a flock of 400,000, supplied the milk for 7,150,000 pounds of cheese. The milk and cream have an unusual reputation as well as the cheese. The very fertile pasturage of these animals is an immense plain, eight or ten leagues across, and is renewed from time to time by cultivation. In regard to the relation between the character of the fodder and the quality of the cheese, concerning which I have found but little mention in the course of my readings for the preparation of this essay, one or two interesting observations appear to have been made in the Roquefort region. When the animals are fed on luzerne alone, in its green state, a very fair cheese is produced, but when they are turned into fields where thyme or sainfoin abounds, the milk possesses a delicious aroma, and the cheese is of the first quality; when green clover is the only fodder, the cheese is not so good.

The cheese-making season lasts from May to October; after the shearing, the flow of milk diminishes; from the first of May to the middle of July, the yield is the largest, when each animal gives a little more than a tenth of a gallon. In the evening, after the return of the sheep from the pastures, they are allowed to repose an hour till they get quieted down, and will yield their milk more readily, after which the flock is milked as rapidly as possible. Seven or eight milkers are required for a flock of two hundred. The uncommonly large size of the bags of the Larzac race of sheep from the milk of which the Roquefort cheese is made, is attributed to the practice of beating the udders with the back of the hand as soon as the milk ceases to flow, in imitation evidently, of the manner in which the young lamb seeks to get more milk; but it is often brutally done by the domestics who do the milking, and sometimes causes serious diseases in the bag. The additional milk obtained in this way is much richer in casein than the first part, drawn before beating the udder; thus, 16 pounds of the former gave, in one trial, 1.68 lbs. of cheese, more than a pound and a half, while 16 pounds of the latter gave but a little over one pound.

The evening's milk is heated almost to boiling and set aside. In the morning it is skimmed, and heated to 98° and mixed with the

morning's milk for coagulation. M. Roche asserts, with respect to the amount of heat to be applied to the milk, that if the herbage upon which the animals feed grew in a bright clear atmosphere, on a lime soil with but little iron, they are firmer in texture, less watery and produce blood rich in globules, fibrine and albumen, and consequently milk rich in butter and casein, and remarkable for its savor and aroma; such milk should only be heated just to boiling; if heated longer, it will lose its aroma, and the cheese made from it, its lightness and delicacy; if, on the other hand, the sheep have fed on cool clay soils, or where the grass is insipid, and watery, the milk should be kept boiling twelve to fifteen minutes; if not, the cheese will never acquire the firmness and consistency requisite for its good preservation; it will not take up salt enough, and will ripen tardily; the same is true of the milk of animals fed largely on such watery fodder as turnips, potatoes, carrots and the like.

The best Roquefort cheese is thus made with half skimmed milk; the cream taken from the night's milk is very highly esteemed, under the name of Roquefort cream.

The rennet is prepared from the stomachs of lambs and kids, which are dried and salted, and when wanted for use are digested twenty-four hours with four parts of water or whey; this infusion will not keep more than three weeks, and during the hot weather it is not used when more than four days old.

After the curd has been divided, by stirring with a paddle, and the whey drawn off, it is well kneaded with the hands, and pressed, in layers, into moulds of glazed earthenware, or of wood, with perforated bottoms, and usually a thin layer of mouldy bread is put between each layer of curd; the purpose of the mouldy bread is to hasten the ripening of the cheese by supplying an abundance of the germs of the Pencillium mould, but it must be added with care, for an excess will cause a corresponding excess of putrefaction and the ruin of the cheese. Formerly, no such addition was made to the curd, for it is not indispensable to the proper ripening of the cheese; but as the desired marbled appearance of the paste will not present itself for several months without it, and the impatience for the new crop of cheeses is very pressing, the manufacturers are almost constrained to meet the early demand by putting the mouldy bread in. The bread for this purpose is usually made before Christmas, of equal parts of summer and winter barley, with considerable

sour dough and a little vinegar. After being baked it is put out to mould; the mouldiness is not sufficiently developed under three months, unless hastened by warmth. After being moulded, it is ground, sifted, moistened with water, and kept from contact with the air till wanted.

The curd remains in the forms three or four days, under a pressure which is gradually increased to from forty-five to fifty-five pounds. The cheeses are then wrapped in dry linen and put to dry, and the good quality of the product depends much upon the care with which this operation is performed. The drying room is sheltered from south winds, or such as come from a manure pile, or stacks of new hay; it is maintained at a uniform temperature by burning charcoal in chafing dishes, which, however, are kept as far from the cheeses as possible. Sometimes, to prevent too rapid drying, the cheeses are wrapped in several folds of cloth. The cheeses remain in this room three or four days, after which they are taken to the village of Roquefort, where the ripening is completed in a very peculiar manner.

This village, now containing 1600 inhabitants, consisted in 1846 of but a score of houses, situated in a deep narrow gorge with high precipitous walls of limestone rock that even overhang the houses; often immense boulders may be seen between the houses which have fallen in some time past directly from the rock above. This wall of rock is filled with fissures, from which currents of cold air issue without cessation, that are usually strong enough to extinguish a candle, and it is in vaults, constructed in these fissures, when they are large enough, or hollowed out of the face of the rock and closed from the street by a wall, that the ripening of the Roquefort cheese is carried on; and it appears as if cheeses of the peculiar character and excellent quality of the Roquefort can be made only in these vaults. The value of the vaults has increased largely since they first came into general use; they were bought by the present possessor for 215,000 francs, ($43,000) although they are small and narrow, and cost in the first instance only 12,000 francs.

The currents of air are quite cold, so that the temperature of the vaults is kept at from 41° to 44°, even in the hottest season, when the mercury outside stands at 84°. Chaptal observed the mercury to fall on one occasion from 84° outside to 41°, as he carried his thermometer into one of the vaults. The warmer the outside air,

the cooler it is within, for the stronger the currents. The mouth of the vault is closed by a door in which an opening is left for the egress of the air that enters through the minor fissures in its walls. Those vaults which are so situated that the currents of air flow from south to north, are believed to yield the best cheeses; the few that receive the air from the east are held at a smaller value. Among the attractions at the French Exposition in 1867, was a miniature representation of one of these grotto, from which a pretty peasant girl of the village distributed pamphlets containing a description of the place, and the singular occupation of its inhabitants.

The cheeses, brought in by the shepherds at all seasons, are bought by the proprietors of the vaults, and so sure is the demand for them when ripened, that the produce of the shepherds used to be, and is now, for aught that I can find to the contrary, bought and paid for by the owners of the vaults for several years in advance; thus these fissures in the limestone rock serve the same purpose as bank vaults, and in case of a bad harvest or an unusual mortality among the flocks may be the means of preventing much misery and destitution.

The cheeses are carefully examined when brought in, and while the good ones are bought as mentioned above, the poor ones are kept apart, and salted and ripened on account of the shepherd who brings them, and who afterwards takes them home for consumption in his own family. The next day, all the cheeses are taken to the salting room, and salted in the usual manner, by sprinkling salt over both faces on successive days, and then they are piled up, five together, and left two or three days; then the piles are taken down, the salt and brine rubbed in, piled up again and left seven or eight days. The cheeses are then scraped and pared; the outer scrapings are fed to hogs, while the inner or last portions, which are not so salt are kneaded with water and sold to the poorer people of the region, under the name of "rhubarb." After this scraping, the cheeses are left in piles again for fifteen days, till they become dry and firm in texture, and begin to be covered with mould; this mould by its brilliant whiteness, its length, the filaments being sometimes five or six inches long, its succulency, and the thickness of its coat, indicates the goodness of the cheeses on which it grows, and of the vaults in which the ripening is going on; if, on the other hand, it is dry and blackish, or reddish, the cheeses and the vaults are of small value.

The piles are now taken down, and the cheeses are placed on the shelves ranged against the wall of the vault one over the other, so as not to touch each other; for it is observed that wherever they come in contact, the cheese softens and spoils. The cheeses may now be marketed, after scraping them and getting a fresh quantity of "rhubarb"; the exposed crust soon hardens and takes a new color spotted with blue. More commonly, however, they are kept in the vaults two months longer, or more. In a few months the first mould has run through its course of life, as shown by the fructification that appears in the form of black spots scattered over the surface; it is then scraped off, to make room for a new crop, that is in its turn also removed, as soon as the object of its life is accomplished, the production of spore cases or fruit, and a third crop appears. In this way six or seven generations of mould live on the cheese in the course of two months, each one of which has taken from it what was needed for nourishment; but as the last crops are much less luxuriant than the first, it appears that the matter of which the cheese is composed becomes less and less fit for their support, this matter suffering as it does a gradual change, in consequence of their invasion. After two months, two new moulds appear one of which is in the form of orange-red, cup-like masses, scattered here and there among the white or blueish silky threads of the other. When these appear the cheese-maker knows that the casein has undergone the desired degree of change, and the cheese is ripe and good; if these last moulds are blackish, the cheeses were originally poor, or they have been spoiled by ripening in poor vaults.

The cheese is scraped again and a reddish "rhubarb" obtained which is more highly esteemed than the portions previously obtained. In the course of these operations the cheese loses from a fourth to a third of its weight, about half of which may be recovered in the scrapings sold as "rhubarb." If the cheese cannot be sent off to market at once now, as soon as ripe, and has to be kept in the vaults still longer, it must be scraped every fifteen days; it improves in quality for a year, if kept where it will not be entirely consumed by mould. The superior quality of these cheeses is so evidently connected with the peculiar circumstances under which they are ripened, that it is strange that no attempts, except in one instance, have been made to produce it elsewhere, where similar vaults could be constructed in fissured limestone caves. This one attempt was tolerably successful; the cave opened toward the north, and its tem-

perature never went above 50°. Attention was called ten or twelve years ago to limestone caves in Saxony, similar to those at Roquefort, and to others in the Jura mountains in France and Switzerland; but I can find no record of any test of their value as places of deposit for the ripening of cheese.

A very delicate product from sheep's milk, put up at Bobiquy, where the only attempt at Roquefort cheese was made, was a kind of cream cheese, that was supplied to the Paris restaurants in small cream pots. The milk was heated to the boiling point in a water-bath so as to run no risk of burning it, and bay-tree leaves were infused in it, and after it had cooled down to 104°, extract of rennet was added, at the rate of a spoonful to two and a half gallons. The mixture was then poured into the little Fayence-wan pots, when it coagulated and assumed the appearance and consistence of cream. Its manufacture was much more profitable than that of cheese, a quart of milk converted into that shape bringing more than twice as much as a quart sold in the form of cheese.

As to *cheese-making associations*, we find that they have been in existence in one form or another, even for centuries, in France and Switzerland. Co-operations for the manufacture of Gruyere cheese are among the oldest. Of the manner in which some of these are conducted, a good idea is familiarly given in a conversation reported as held between a visitor to one of these associations in the Vosges mountains, and the superintendent, who is called a fruitier, and which I should like to give verbatim if there were time. In answer to the question how long their associations have existed, he says hundreds of years: that even their grandfathers do not know when they were first founded. All the members of the community belong to the association; a committee, composed of members who have the largest interest in the good management of the affairs of the association, hires a place that is called the chalet or fruitiere, and appoints its fruitier—that is to say, the man who is to make the cheese. Every morning and evening, the milk is brought to him by the women of the different households, and he measures it, and credits each one with the quantity brought. The cheeses are so large, weighing eighty or ninety pounds, that no one brings milk enough in one day for a cheese; but after a certain number of days some one member, whom we will designate by A, will have brought, in all, the necessary quantity, and then the cheese, or one of the

cheeses of the next day is made for A, weighed, marked with his name, and carried to the common ripening room. The following day the cheese is made for B, who has also by that time brought milk enough for a cheese, and so on. Then, at the end of the season, each member of the association has a number of cheeses in the storehouse, in proportion to the quantity of milk brought in during the season. The committee hold a sale of the cheeses to the wholesale dealers twice a year, and, having received the money, announce by placard that on a certain day it will be distributed, pro rata, to the members. The position of fruitier or superintendent is, evidently, a very responsible one, for upon his skill and vigilant care the whole value of the year's product depends. He receives for wages about sixty dollars a year, and his board, which he gets in the same way that country school teachers did once, by boarding round; and the best tid-bits are reserved for him, each member of the association being strongly interested in securing his good will; hence the proverb in the French Jura mountains, "as gluttonous as a fruitier." He receives also from the wholesale dealers about a dollar for every 1800 pounds of cheese sold, and his income from this source may be three or four times as large as from the wages paid by the association. The better his cheeses, the better the sale of them and the higher the price; so the largest part of his income depends, as it should, upon the quality of his work, and is not paid to him till judgment has been passed upon it by the readiness with which it sells, and the price brought.

In Switzerland, it has been the custom from time immemorial for each owner of cows to send his animals to pasture in summer upon the mountain sides, under the care of a herdsman and assistants, whose business it is to look after the herds of his several patrons, to use a term so common among our cheese-makers and meaning much the same thing, and to make the butter and cheese; while in winter, when the cows are home, each man attends to the milking of his own cows, and takes the milk to the same herdsman, who works it into butter and cheese as in the summer; the herdsman keeps a book account with each man whose milk he has taken, and gives to each his share of the profits of the manufacture. It is claimed by this writer that this idea of cheese-making associations was taken to the United States by Swiss emigrants, by whom it was first carried into practice in this State.

Of late years there have been frequent complaints, in the Swiss papers, of the depreciation in the quality of the cheese ; this is attributed to the fact that the milk is, more than formerly, sold directly to the cheese-makers, and that these persons, having thus the sole control of the matter have attempted, by skimming the milk, or making the cheese hastily and carelessly, or some other discreditable performance, to increase their immediate profits, without regard to future consequences ; whereas, formerly, the milk was manufactured into cheese on a sort of co-operative plan, the company being composed of twenty or thirty producers at whose common expense the work was done and each of whom was paid out of the net proceeds from the sale of the cheese, according to the quantity of the milk furnished. These companies rivalled each other in honest endeavor to produce the best quality of cheese ; and in reality all the best cheeses in the last Swiss exhibition of dairy products were offered by them.

In 1863, a society was formed in Switzerland for the better development of the resources of the Alpine pastures, and called the Society of Alpestrian Economy ; annual sessions are held at Glaris in the first days of January. With some pecuniary aid from the Federal Government, this society has founded a prize for the best work on Alpestrian Economy, has established stations for determining the value of commercial fertilizers, and has prepared statistics in regard to the particular branch of rural economy for the encouragement of which it was created. From these statistics, it appears that there are in Switzerland about 300,000 acres of Alpine pasturage on which over 270,000 head of cattle are fed.

At the annual meeting of this Society in 1868, prizes were distributed for the best cheeses and for the best system of management of Alpine pasturage, and papers were read on the fabrication of Schabzeiger cheese, on the importance of chemistry to dairy industry, and on associations for breeding improved stock, and manufacturing the products of the dairy.

Thus we find in Switzerland both those features that particularly characterize the dairy system of this State, and which appear to be spreading from our State all over the country, viz: the associated plan, or the factory system of making cheese and butter, and a national society holding annual meetings at which the interests of dairymen are considered in papers presented and in discussion.

In the manufacture of the Parmesan cheese in Italy, co-operation is necessary; the farms are small and the cheeses large, so that the milk of fifty cows or oftener of sixty or seventy, is put into a single cheese. There it is the custom for a number of farmers to club together and lend their milk to each other in rotation, and each one is thus enabled to make one or more cheeses in the course of the season.

The Austrian Government has lately taken action for the encouragement of dairy associations, in offering two prizes, amounting to 300 dollars each and a gold medal, for the best product in quality and quantity of associations that convert 1350 gallons or more of milk daily into fat cheeses, and three prizes of 150 dollars each and a silver medal, to the associations that offer the best produce in quality and quantity of half-fat cheeses, or works up less than 1350 gallons of milk daily into fat cheese. The main object of offering these prizes is to stimulate the formation of dairy associations in the Alps of Austria, the competitors being confined to that region.

In conclusion I would present a few considerations, suggested by what has gone before:—

1st. Some of these methods of cheese-making illustrate in a most interesting manner that intimate connection between the development and growth of mould fungi, and the ripening of the cheese; a connection as close and invariable, as I attempted to show in my address of last year, as that of cause and effect; so that, without the occupation of the curd completely and entirely by the fungus in one or another of the numerous forms that it can assume, but particularly the form of the micrococcus, there can be no such thing as the salvy, digestible article of food which well-ripened cheese is.

We have such an illustration in the case of the Stracchino cheese of Italy, where the fresh curd is interlaid with older curd, that has become highly charged with living organisms by a day's exposure to the air; it certainly will not appear extravagant to say *highly charged* when we remember that one cell of a micrococcus can by natural multiplication produce four hundred million more in twenty-four hours. The natural result of this intermixture which is really a sort of cultivation of the fungus, is a more rapid and abundant growth of it throughout the cheese, and a more perfect ripening.

Again, in the Roquefort cheese we find an even more marked in-

stance of cultivation of fungi, in the pains taken, to sow their germs by the admixture of mouldy bread in the curd, and give opportunity for the more rapid succession of one generation after another by the removal of each crop of mould as soon as it shows signs of decadence. But even if the mouldy bread is not added to the curd, the germs of Pencillium that must be suspended in plentiful quantity in the air of these caves where the mould is all the time growing so vigorously, soon attach themselves to the fresh cheeses that are brought in, and produce the same final result, though more tardily. The abundant moisture in the air of the vaults, and the even, though rather low, temperature appear to favor a most luxuriant growth of the fungi, for no where else do we read of filaments of mould six inches long. There is a choice of vaults then, you may remember, some being more valuable than others ; the best ones are undoubtedly those in which the Pencillium mould will grow most rapidly, and where new generations will replace the old and useless ones most speedily.

So again in the occasional practice of the Brie cheese-makers, of packing their thin flat cheeses in musty hay, we have another instance of one of the most important steps in all cultivation of plants, viz : the sowing of the seed, after the ground has been properly prepared ; the seeds in this instance are in the mouldy hay.

In all these cases the recognition of the real agent that brings about the ripening of the cheese is manifest enough ; and in other cases it is plain that some connection is traced, though somewhat dimly, by the cheese-maker between the ripening that goes on under his hands, and the growth of fungi, however ignorant he may be as to the real nature of the process ; for the appearance of certain kinds of mould on the cheese indicates to his skilled eye, satisfactory progress in ripening, and of other moulds among which there is usually an orange-red one is as sure an indication of the satisfactory termination of the process.

2nd. To the uniformity in the practice of salting the cheeses after they have been formed and pressed, and without breaking up the curd after it has been completely separated from the whey ; the salting being then performed by applying it to the outside of the cheese, either by sprinkling salt over the surface in small doses at a time, which is the more common method, or by immersing the cheese in brine.

3d. To the absence in most cases of the heavy pressure that we

put on our cheeses. To be sure, the lightly pressed cheeses may not keep so well, but they are intended for more immediate consumption, without transportation to great distances.

4th. To the indications that point to some connection between the presence of ammonia in the air of the curing room, and the process of ripening: you will recall, under this head, the interesting result of Villeroy's experiment; and the practice of the Brie cheese-makers, of hastening the alteration of their cheeses that have ripened too fast and too far in the curing room, by transferring them to a room where the atmosphere is pervaded with ammonia, or spirits of hartshorn as it is sometimes called. In this way a change is made to take place with great rapidity, which seems quite analogous to the ordinary change that goes on in ripening cheese, the main difference being that the product is liquid and still pleasant to the taste.

5th. To the peculiar circumstances under which the best cheese of France is made, "the king of cheeses," and the possibility of the construction of similar vaults in fissured limestone in our own country.

6th. To the fact that some of the best and most highly prized cheeses are made from wholly or partly skimmed milk, so that an additional income is derived from the cream worked into butter.

7th. To the small size of some of the favorite continental cheeses. The Edam weighs only about four pounds, the Gouda, fifteen, the Schabzeiger, five to seven, the Brie, four to seven, the Roquefort four to five pounds; while only two, the Parmesan and Gruyere are large like the American cheeses. How different the practice in Europe from ours of making almost entirely large cheeses. Certainly the time should not be far distant when a housekeeper in a small way can buy his cheese uncut and yet not get more than he wants and can keep in a good condition while it lasts.

8th. To the great variety of cheeses obtained by these variations in the details of cheese-making and the better market thereby obtained for the products of the dairy. Greater variety appears plainly to lead to greater consumption in Europe; and a similar result might reasonably be expected here. The demand for more variety in the character of our cheeses for use at home is in fact already beginning to be felt and supplied. They are making some variety of Swiss cheese in Wisconsin, probably a small Gruyere, and also the Limburg cheese, a French variety of high repute. And then

there is that remarkable manufactory of the Mende brothers, in Philadelphia, where the milk of two thousand cows, bought from the farmers in the form of fresh curd, is converted into fifteen million cheeses a year, each cheese being in the form of a small cake two inches wide and half an inch thick and ready in twelve days for consumption or transportation to any part of the United States.

Finally, then, I would point my long story with a moral. With every variety of soil, situation, climate and consumers' tastes in the great extent of country represented by the American Dairymen's Association, there should be a correspondingly large variety in the character of the productions represented here; there should be something else besides big, round cheeses, weighing a hundred pounds or more, and though all good when well made, yet tasting about alike.

But you who are skilled cheese-makers or versed in the wants and whims of the markets and are making it your business to reap the largest profits from the products of the dairy can tell much better than I what practical worth my moral has.

AN ADDRESS

DELIVERED BEFORE THE AMERICAN DAIRYMEN'S ASSOCIATION, AT UTICA, N.Y., ON

WEDNESDAY, JANUARY 11TH, 1871,

BY

DONALD G. MITCHELL, ESQ.,

Of New Haven, Conn.

ON SOME OF THE RELATIONS OF SCIENCE TO FARM PRACTICE.

A year ago I had the pleasure of sitting on one of your back benches at this convention, and of listening very interestedly to the close and exhaustive discussion of certain phases of science which are related to agricultural practice. I could not but observe the eagerness with which the discussions were followed by a great many working farmers. They listened as if they intended to get some good out of the things that were said; and I began to conjecture how they would make application of it all, and how fit it to their practice. We hear a great many good things said, first and last—on week days and on Sundays—which we greet kindly enough, but which somehow we do not fit into our practice. And we tell the parson that it is a fine thing he has told us about the heathen, and the contribution box, and talking against our neighbors, and there we let it rest. Some good things we hear we do not fit to our practice, because from our condition we cannot, and a great many more fine things we hear of, we never fit to our practice, because we will

not. I feel more and more convinced that if every farmer were as good a farmer as he *knows* how to be,—that is to say, if his practice and method, and industry, and zeal, were up to the level of his information, there would be a vast many better farmers, and vastly better farmers than there are now. It is quite as certain that if every man would be as good a Christian as he knows how to be, there would be far more of them. But, not being so, many a man finds it convenient to get up an intermittent worry about theologies or possible interpretations of Scripture—thinking some new aspect of these will possibly bridge him over into a larger self-content. And just so in practical farming—there are a vast many who do not practice half so well as they know how, or up to the level of their actual knowledge, and who run after scientific expositions of particular phases of farming,—just as old sinners will run after the theologies,—in the hope of finding excuse for their mal-practice, or some rare new bit of information that will put them in a safe place without any particular labor on their part.

Now I think we may lay it down as a rule—and I am sure the scientific men will agree with me—that all the science in the world will not enable any man to grow good wheat or to manufacture good cheese without taxing his brain and his handiwork very persistently in the making of each. Whoever comes to science for a short cut to good cheese or to a full pocket, will inevitably be lost in a bog. Science goes after the *why* of things with most persistent search and unrelenting labor. Practice goes after the *how* of things, and never successfully, except with the same sort of indefatigable will. The two help each other, and always must, when both are earnest. But science makes no bridge by which a lazy, cunning man, who shirks work, can come to joy; and the expectation that the broadest acquaintance with scientific results will enable the shirk to make his land expectorate crops by the appliance of the right salts, as easy as a man would clear his throat, or blow his nose, is untenable and preposterous.

But how far can the man who is really in earnest to improve his farming put such a grip upon the special results of scientific inquiry as to help forward his practice?

I am not so bold as to think that one-half the ground opened by such an inquiry can be gone over in half a dozen pages, or in twenty. It is only possible, within the prescribed limits, to notice some

few of the relations of scientific inquiry to agricultural practice which are to be kept fast in mind, and which are sure to give aid to good practice, though the contrary may sometimes seem true, and also to hint at certain other phases of scientific inquiry on matters pertaining to agricultural practice which we have no need to follow to their issues,—not because all legitimate science does not aim at the truth and ultimately achieve it, but because the aim of the scientist is different from the aim of the practical man—the scientist aiming at whatever is possible in growth, or promoting growth, and the farmer aiming at what is practicable and remunerative in vegetable or animal development or in promoting the same. The scientific man who should devote himself to the investigation of what was remunerative and profitable in the way of feeding crops or animals, or in their treatment, would be brought into the presence of a great many variable and unsettled questions about labor, and markets, and wet or dry weather, which would disturb his calculations. He aims at those truths which can be severely and cleanly demonstrated, and hands them over to the practical man to deal with as his judgment and experience may dictate. Thus, while the scientist proper, by the whole bent of his education, must in his researches overlook all that range of probabilities about weather, and labor, and markets, which are of vast importance, and must be duly considered by the *practical* husbandman, he also pushes his researches to finer issues than will be of benefit to the practical farmer.

Thus the chemist tells us, perhaps, that phosphates applied to the soil promote largely the growth of certain plants, and that soluble phosphates are far more easily and quickly available than those which are insoluble. This is clearly established by a long range of experience, and by carefully conducted experiments. This is a fact of importance of which the farmer should avail himself who wishes to manure wisely. But the chemist does not stop here; he goes on to inquire why it is that the phosphates prove so stimulative to the turnip, or the cabbage, or the clover, and how it is that the insoluble phosphates—whether by attrition, and tillage, and æration, or by the prolonged wrestle of the little fibrous rootlets of the plants with their unyielding surfaces—do at last give up their stores. Now, all such minute, specific inquiries may yield a great deal to science, but not necessarily to the practical farmer. Legitimate scientific investigation in short pushes the chemist farther than it

is needful for the farmer to follow him, without neglect of those grosser and more palpable truths which are more nearly related to his business. The smith, working at his forge, wants to know when his iron is duly heated, and where and how he should direct his blows for best service; but the knowledge that the order and timeliness of the blows are directed by certain muscles bearing such and such names, and that the volition which governs their action accomplishes its passage from the brain to the muscle in certain specified time, will in no way help the smith to make a better horse shoe. It may make him a fuller and more thoughtful man; but we cannot be full of all knowledge; life is too short for that, and the fullness which is most helpful is that which lies in the line of our daily practice.

In those times when our agricultural fairs were closed up with a rosy address, it was not unusual for our orators to declare that a good farmer ought to be a good chemist, and a good botanist, and a good geologist, and a good entomologist,—all of which, if he were a good Christian, and attended to the duties that lay before him day by day, he certainly could not be. A good chemist wants to put the largest part of his life into his work, and so does a good geologist, and the largest part of a long life, faithfully devoted, will leave a good part of his appointed road untrodden. Beside which the habit of a farmer's mind does not fit him for that nicer and minute investigation which alone qualifies the apt student in chemistry. And if, with a love of it, the young farmer prosecutes inquiries in that direction, just so far he gives himself over to that engrossment with the subject which characterizes every true votary of science, just so far will he undervalue and lose sight of those grosser issues which belong to practical farming. The successful pursuit of any science is a love which demands devotion, and which will not tolerate the putting of any such question as whether such and such results will *pay* in a crop.

While asserting this, I do not for a moment mean to say that the possession of certain truths demonstrated by the chemists and botanists are not very important to the intelligent farmer; but I mean to say that he can lay hold of such in the agricultural text-books, prepared by safe teachers, far better than to worry toward them by a tussle with the whole body of science. The dyer and the tanner must know certain laws of chemical action, and must know them so thoroughly as to make them a part of their trade; and the builder

must know certain mathematical laws as fully; but no one supposes for a moment that a good practical dyer must needs be a chemist—that an accomplished builder must be a mathematician. And one great secret of the large practical success of either lies in the adroitness and shrewdness with which he seizes upon special revelations of scientific study, and warps them into the channels of his business. Indeed it is the secret of success everywhere—to seize upon the *large facts* which will help us, and to let the *little ones* alone; the trouble with the unsuccessful man is that he can't determine what the large ones are.

This is specially true in the matter which we are considering—I mean the possible engagement of the ambitious farmer upon a long course of scientific study. Being without the full mastery which only exclusive devotion gives, he is apt to rate all facts alike in importance which have had scientific demonstration, and with undue pride in his special study, he is disposed to undervalue all the results of practical field experience, when compared with the results of his study. Now this is a thing which the conscientious scientist never does; he has an immense respect for actual field experience, provided only he can get—what it is, unfortunately, very difficult to get—an absolutely true account of it. But the superficial and cursory student has none of this respect. If he finds phosphoric acid largely present in a crop, he may rashly conclude that he must feed it mainly with the same. If he finds nitrogenous compounds he concludes here, too, perhaps, that he must feed mainly with the same. But the experienced scientist rushes to no such hasty conclusion. There lie long months of active and miraculous plant vitality between the issue and the application. That vitality is a subtle thing, far subtler and more complex than the pouring of the contents of one gallipot into another gallipot. Experience and carefully conducted experiment show the conscientious, scientific observer that phosphatic manures may very possibly best stimulate that plant which in its ripened state shows preponderance of nitrogenous material, and that nitrogenous manures may best stimulate the plant which ultimately shows preponderance of phosphatic material. The larger and important fact and conclusion is one made up of analysis and carefully conducted experiment combined, and the lesser and unimportant fact is the one which is due to analysis only, and which the neophyte pounces upon and rushes thereby to his own hasty conclusion.

Now, if phosphoric acid is largely present in a ripened plant it is clear enough that the source of it must form a part of the plant food, but it does not at all follow that direct application of its chemical sources in such crude form as we may command will best quicken, and secure its full development. Nay, more, it would appear from abundant experience that the application of some food wholly different in quality, and not mineral at all, will best push into exercise that vigor of the plant which will enable it to make successful forays for its phosphoric acid in the existing constituents of the soil. What I say here is in the way of illustration, and not with the intention of laying down the law on this particular question of phosphates and ammonia. But we may be sure that all analogous and similar facts will be brought to publicity by those qualified to speak authoritatively, just as soon as experiment and investigation will warrant it.

Meantime it is a pity that we should be befogged, and science discredited, by the utterances of those smatterers who base their theories upon a mere course of scientific reading. A course of scientific reading may be a very wise thing to take, but it does not form basis sufficient to indoctrinate us in new theories on agricultural practice. Medical reading is interesting to many people, but if such fall sick in earnest, they are apt to have a very large distrust of mere medical reading. If farm writers would cultivate a nice habit of observation, and spend their writing force upon exactness of detail in regard to their personal experience, and leave scientific disquisition and theorizing to those who give their lives to such studies, I think we should all be much the better off for it. It is the wearisome iteration of unimportant facts in science and the deluge of a vague theorizing about them by amateurs in our journals that more than anything else befog practical men, and render them incredulous about the real validity of thorough scientific investigation. What a man *supposes* about the action of fertilizers may be very fine, but it's far better to tell what he knows.

I have alluded to the hasty conclusions to which a cultivator, with insufficient knowledge, and yet an overweening trust in science might be led—as in the matter of giving phosphates largely to wheat—by laying undue stress upon an isolated chemical fact, without due consideration of scores of related facts. I think, too, that the same overweening confidence is apt to breed great doubt and perplexity for quite insufficient reasons.

Thus the smatterer, with a lively sense of what the true odor of ammonia is, and knowing, or thinking ammonia to be of supreme importance, almost the only gold, as he extravagantly counts it, in the whole treasury of fertilizers, is too prone to judge of a fertilizer by a snuff of it, and to disturb himself unduly by escaping odors from the barn-yard and his compost heap. He wastes anxiety and resources in frantic endeavors to arrest a smell, and is far more disturbed by its escape than either the experienced farmer who is honestly ignorant, or the experienced chemist, who is wisely cool. The fact is that a very minute quantity of ammonia will give its odor to a dealer's bag, and Dr. Graham has proved that air containing a seventy-five-thousandth part of its weight in ammonia will effect test paper, as it will doubtless a well organized nose. And a manure heap, where there is a slight ooze of urine, will give out this odor for months without damage to the amount of a fifty cent currency note. Many things will spend a strong smell without wasting much. A fopling, for instance, will exude a fearful amount of musk or jockey-club perfume without the diminution which we would all like to see in him. There is, again, that other familiar animal, the skunk, who can spend an equal amount of fetid odor without much waste of material substance. So, though an ammoniacal scent is good proof that ammonia is present, it is by no means an absolute proof that it is largely wasting. What will make the nose tingle very emphatically, will have much less emphasis upon a crop.

In respect *to the analysis of soils* from which enthusiasts once entertained very large expectations in aid of practical culture, there has been grave disappointment. Not because science has told untruths about soil, but because from the nature of the case, the truths it told were not broad enough and not wide-reaching enough to cover all the conditions of a varied practice. Carefully conducted, it developed possible sources of fertility which somehow the growing plants failed to grapple, and even the minuteness of its search failed to find, in such samples as analysis must needs deal with, that little modicum of nitrogen or other provocative of growth scattered over a broad field, which was good to make a crop of rye, in the face of apparent barrenness. We do not learn that the educated and experienced farmer of any country thinks it needful to secure an analysis of the various fields of a farm before committing himself to a purchase or to the rental. He finds sufficient means of determining general range of quality and capacity, in the actual crops, in the native

flora, in situation, in climate, in texture of soil, and in those grosser qualities and conditions of it which do not tempt or reward the finer investigation of the chemist. And this counts no whit against the validity of scientific teaching. If a patient were to consult a physician about his chances of taking fever in a certain low district of country, the physician might assure him that there were sources of miasma there, but he could never assure him that he would surely take the fever, or that he surely would not. And I do not think this fact would count one whit against medical science. It would only prove that many things are unproven by science, which can only be proven by individual trial. And yet soil analysis is of the utmost importance in the conduct of minute experiment upon growth, under charge of those competent to pursue such investigations. We should never have learned without it, a great many of those wonderful facts about plant food and plant growth, of which we are now possessed, and which form the only sufficient basis of a sound vegetable physiology.

Chemical analysis is again of the utmost importance in determining the value of our muck deposits, our marl, our river mud, in which it may chance to bring to light wealth of which we have been utterly ignorant, and which we only discover in practice haltingly and uncertainly, after years of trial. I remember that in the early spring of 1853 I was walking with a planter upon the banks of the Ashley, in South Carolina, and he called my attention to a certain yellow looking marl or mud which underlaid the soil in his flower garden, and he said that he had been applying it with considerable success, he thought, to his cotton and his sweet potatoes. And he had continued this for many seasons. It was some five or ten years after this that this marl fell under the close observation of science, and the result was the so-called discovery of the vast phosphatic deposits in that region, which have given birth to a new commerce, and turned old river banks into a mine of wealth. A hundred years ago vessels lay there under the shadows of the weird gray moss of the live oaks, laden with bricks from England to build planters' houses; now vessels lie there under the same shadows of the mosses taking in cargoes of fossilliferous deposit, sharks' teeth, and the bones of extinct monsters, to fertilize the turnip bearing downs of England. Baked earth came over to build houses, and a hundred years later, phosphatic earth goes back to build crops.

In the analysis of the concentrated fertilizers of commerce chem-

ical analysis is doing some of its most directly and palpably effective work at present for the practical cultivator. He might indeed arrive at a knowledge of manurial values by long and repeated trials, but he might attribute his failures to condition of soil or atmosphere, or anything rather than the deviltry of man which finds a profit in adulteration. And this adulteration is carried to an enormous extent. Guano is moistened to carry weight, and is treated with sand; the debris from the fish-oil works has its special adulteration; the super-phosphates are charged with valueless addenda; and even wood-ashes are dosed with earth and hydrate of lime, to make full measure. Nothing but the watchful eye of those competent to detect the short-comings in these fertilizers can save us from imposition.

Some two years since, the Connecticut Legislature, at the instance of the Board of Agriculture, passed an act requiring all packages of commercial fertilizers, whether in bags or barrels, to carry a plainly printed enumeration of their chemical constituents; if untrue to this, the fertilizers were liable to seizure and forfeiture. What the pretical result has been cannot as yet be determined. It is to be observed, however, that the next Legislature put an end to the Board of Agriculture, as an unnecessary institution. It looked very much as if the manufacturers of fertilizers had strewn some of the corrupting material which lobbyists employ for the propogation of ideas, over the Legislature itself.

There are some indications by which, with a very moderate knowledge of science, a purchaser might be able to detect gross frauds, such as color or shape of crystals, specific gravity, fusibility, odor, &c. But the trouble is that the shrewd adulterator directs his disguises in view of just such cursory examinations, and the first dupes they make are ordinarily those who think they know most.

Again, it is to be considered, in connection with proper analysis, that a fertilizer which is almost worthless, so far as its chemical qualities go. will sometimes surprise us by noticeably good results; and this is due, not to values overlooked, but to mechanical effect, in acting as a mulch, in retaining heat, or moisture, or possibly in that happy and minute distribution of the little of chemical value which it possesses. And this matter of proper mechanical distribution of a fertilizer to the plant is a subject of far more importance than is currently believed. It is certainly well worthy of scientific experiment, and I believe the time is not far distant when we may

reap double our present advantages out of a fertilizer, by so timing its application, and so minutely adjusting its distribution to the wants of the plants, as to forbid any waste of plant vigor in making long search for its nutrition.

At some future day, too, it is probable that a finer analysis than we now know of, will explain to us why it is that a grape in one vineyard will produce wine of a special and wonderful flavor, and the same grape a stone's throw away, upon soil identical so far as ordinary tests go, will give wine of a wholly different and inferior flavor; and how tobacco in one field will yield a delicious aroma, (if I may use that word in presence of "the coming man,") and on another field will fall away into the most beastly of flavors. At present the matter is a puzzle to scientists and everybody else. A more complete knowledge of the physiology of plants will doubtless have its part in making up any possible explanation, and however far physiology may push its investigations, I think it will be found that different members of the same fruit-bearing plants will have always their idiosyncrasies to perplex us, just as boys of the same parentage will one of them have red hair and the other brown, and one of them be given up to pipes and ale and the other to charity and good works.

Again, in considering the aids offered by scientific inquiry to practical culture, it must be borne in mind that science does not stand still and leave us to revolve about it with our hoes and guano bags. What seems a fixed basis of departure may possibly be shifted by further and fuller investigation. Thus, in regard to the question whether or not growing plants could avail themselves of the free nitrogen in the air. In 1779 Dr. Priestly held that they could, and Dr. Priestly was a man whose opinion in that day would have staggered the guano market, if guano had been on sale. Twenty years later DeSaussure, with finer tests, declared that plants could have no gain from this source. Forty years later Boussingault, with further tests, decided that they could; and ten years later, continuing his experiments, he landed on the conclusion now held, that it is unavailable, and must remain so until we can, by some magnetic or electric discharges, knock a hole in the air, and let the nitrogen drop out.

Again, science, in its connection with agricultural experiments, establishes from time to time exceptions to previous rulings. Thus

it has been laid down as an axiom, confirmed by good practice, that a plant which matured its seed robbed the soil of more fertilizing material than one which did not. But in the light of the recent very full and long continued experiments conducted by Dr. Voelcker, it would seem to be established that there is an exception to this rule in the case of the clover crop, and he seems to have demonstrated conclusively that a field which is allowed to ripen its clover seed will thereby be richer in nitrogenous food, and in better condition for a succeeding wheat crop, than if the crop were removed in bloom, or even ploughed under in a green state.

Again, science, in its investigations, not unfrequently establishes and clinches the truth of some old tradition current among practical observers, yet coyly entertained by thinking people, because at variance with the ordinary laws of nature. Thus, old farmers of forty years ago, and longer, kept firmly by a strong prejudice against the barberry bush, as being injurious to their rye crops, if near them. It seemed very preposterous that an innocent shrub should blight grain, and traditional prejudice held ground only in virtue of the pertinacity with which many will cling to traditions because they are old. But now, science, in looking into the habits and qualities of a certain fungal growth which is incident to the barberry, discovers that the *Æcidium berberidis* represents one stage in the growth of a fungus, which, at a later stage, afflicts the rye. Whether the danger in the case is enough to warrant the extirpation of the barberry is quite another and doubtful question. But it is a curious illustration of the nicety with which scientific investigation will probe and detect every little germ of truth which lies mummied in tradition.

Another fact of the same nature is worthy your attention, and it is one which is specially related to the pursuits of dairymen. In the course of the exhaustive discussion by Prof. Caldwell, at the Dairymen's Convention of 1870, upon the fungal growths in dairy products, he stated that it had been clearly proven that the germs of this growth could be only effectively and surely destroyed by a certain extreme degree of heat; thus beautifully confirming the old ruling of good dairywomen: that nothing promotes sweetness and cleanliness in the milk-room like an occasional swash of scalding water.

In considering the relations of scientific inquiry to practical cul-

ture, it should be remembered that the obligations are not and ought not to be altogether on one side. Practical cultivators are indebted to scientific men for special and minute investigations which they cannot make. I say they are indebted, but the misfortune is that practical cultivators in general observe and make record with so little accuracy, that the scientific men cannot count upon them. This is worse that a misfortune—it is a wrong. Professor Buckman, formerly of the Agricultural College of Cirencester, says: "Teach your boy a close and accurate habit of observation, and more good will accrue to agriculture than if he brought away all he learns at an agricultural college."

Accurate observation is a thing that can be cultivated, and it can be cultivated without scientific formula. Only gather and mass your facts in such way that they can be relied upon, and you will put a lever into the hands of the scientists that will lead you to better accomplishment than you have ever known. Yet it is abominably true that half the reports of experience with crops or fertilizers, floating through the agricultural journals, are worth no more in way of guidance than if the writers had blown a soap bubble into the air. "A crop was planted on such a day, and manured so and so; and on such a day was harvested, and the product was so and so." What is such stuff good for, except to give work to the printers? What was the previous condition of the soil? What was the treatment of it? What was the seed? What was the season? What was the culture? How was it with adjoining fields, under different conditions? These are only a few of the questions to indicate what should be that fullness and minuteness of observation which alone can make the record of practical farm experience available to the scientific inquirer.

Now, not only does close and exact observation furnish a body of facts which will be of use in prosecuting scientific inquiry, but by such exact observation only can the practical farmer determine the value of scientific suggestion.

I remark again, that the scientific man seeks truths *purely*; while the practical cultivator seeks economic results. In a certain sense, truth is the parent of all economics. But a scientific truth may not develope an economy, this year or next year, or for ten years to come. Its effective employment in the product of economic results depends on combinations and comparisons, which are the resultant of

diverse and cumulated truths. But a man intent only on scientific truth cannot be balked by the question of what he can carry to market, and what people, as now civilized, will soonest buy. The scientific man who over-slaughs or neglects the severity of his investigations to contrive a money-making scheme is prostituting science and weakening its momentum. The practical man, on the other hand, who in a fever of special scientific love, transcends the economies of culture to make good his theory, is weakening the educational effect of good practice.

I have used the term scientific man in this paper, with almost exclusive reference to those devoted to special study of those natural sciences which bear upon the practice of farming. But there is growing up year by year a proper Science of Agriculture, and the scientific agriculturist will be worthy of that name just so far as he has the discrimination to lay hold of those salient truths in the natural sciences, which bear on his work, and wed them to such practical method as shall ensure the largest and best economy.

I have endeavored to show that the practical cultivator will reap most gain from outside but related sciences, just in proportion as he exercises a discriminating choice and lays firm grip upon those truths which are helpful, to the neglect of those which are either unimportant or out of his range. And nothing will more aid in this discrimination than that nice habit of observation which is at the bottom of all good practice. He who does not watch closely what he has opportunity to see, will never be able intelligently to apply what others see for him.

Lastly, I remark that this discrimination, this pouncing upon what promises aid in science, and this close, and inflexible watchfulness of processes and results will be all the more effective by limiting our investigations and observation to our special branch of farming, whatever that may be. I am inclined to think that Americans in general, and ambitious farmers with the rest, have a strong disposition to spread too much,—to know somewhat of almost everything, and thus lose the illuminating and burning power which always comes of concentrated effort.

In this connection one cannot too highly commend the well directed zeal of those who have organized this Dairymen's Association and others of kindred stamp. The patrons of such have thus

not only given a large commercial aspect and a healthy industrial ring to their special calling, but they have challenged the investigation of scientists to those points of practice, on which they are concerned to know the whole truth.

There is no reason why there should not be an annual parliament of graziers, and grain-growers, and nurserymen, as there is now of dairymen and fruit-growers, that they may the better rally about them those who can help forward the speciality, either by scientific suggestion or the results of experience.

The dairyman, more especially the one engaged in cheese making, can afford to neglect a great many considerations which are of importance to the grain-grower, or the cattle-breeder, and thus by centralizing attention can equip himself more perfectly for his work. His main concern is with the forage of his herd, and such treatment of his land, whether by tillage or otherwise, as will maintain that forage at the best. Some of the old anxieties and perplexities about the dairy work are now gone by; that admirable factory system, which has been a lesson to the world, has simplified the proper work of the dairy-farmer to an extraordinary degree; and he will presently, if not already, have no more need to concern himself about the manufacture of cheese than the grazier has need to concern himself about the cutting up of the beef, or the butcher about the tanning of his hides. The cheese manufacturers, and soon the butter manufacturers, will make up a guild and trade of their own, interested by every possible motive to do their work in the best possible way. The farmer who furnishes the milk, may be sure of placing it in the hands of proficients who, under the stimulus and critical watch of the largest dealers in Europe—whose agents are brought face to face with them—are accomplishing themselves more and more every year.

What a change is this from the old days when we were worried with tormenting dairy-maids and uncleanly dairies! A marvelous change, to be sure, when the dairy-maids are drifting from their old pursuits into the learned professions, and those who drifted of old into the learned professions, find a more lucrative, if not a more useful employment, in the new cheese houses of the present. But this relief from anxieties should breed no sloth in the farmer: the narrower his range, the more intent and penetrating should he make his observation.

The main questions for him to consider are: What is the minimum of tillage that will keep his land up to the product of the best forage material? What age and class of cows will furnish fullest and most regular product of milk? And what treatment of milk after coming from the cow will ensure its delivery in best condition at the factory.

On all these points I have not space to dwell at length; but I may remark in regard to the *minimum* of tillage which should be an aim,—that large tillage supposes large planting of annual crops, and is further urged for its æration and just admixture and communition of the soil. But the dairyman's main dependence is not on annual, but on perennial crops; and, with thoroughly drained land, which through its tile system supplies in a large degree the æration sought by tillage, I doubt much if we cannot profitably leave our grass lands (under a system of top-dressing, of course,) much longer undisturbed than we are wont to do. Where foul growth intrudes, of course we must till; and we must till, too, for a fair share of roots to splice over the dryer food of winter upon the succulence of May pasture,—and till, also, for the summer soiling, which dairymen are beginning to recognize as a wise and saving policy. With these exceptions, a minimum of tillage will involve a minimum of labor, and a minimum of labor for a given product is the true economy of farming, as in everything else.

And now, gentlemen,—and it is the last word I have to say to you to-day,—I cannot forbear felicitating you on forming part of an association which has re-organized a great department of farm industry, and with such zeal and success as to serve as an example for all the farm industries of the country.

You have brought science to your aid in your Annual Congress. You have brought, also, the keenest practical farmers to lay before you their experience, and wisely judge that the best lessons will flow from the comparison of the teachings of both. You have brought commercial shrewdness to your aid by inaugurating a system for putting your products in best marketable shape, which commands the respectful attention of large buyers in every mart of the world. The associated action of Dairymen, with their factory system, has given a commercial dignity to their calling. They have thus gained in independence; have gained in leisure; gained in opportunity to investigate more fully the bearings of every science on their special

pursuit, and, as an incidental result of no small consequence, they have brought about the emancipation of woman from the drudgery of the dairy. Whatever other emancipation may be in store for her, I can conceive of none which more than this will give opportunity to country women for self-culture, and to multiply those graces which make the charm of a country home. Whatever other sovereignty is in store for her, there she is always Queen.

Nor has the dairyman, or the farmer of any stamp, filled the whole cycle of his duty when he has enlisted science and the best practice to make a crop that will secure the largest marketable return. By every law of good citizenship, and of good feeling, he is bound to do the best that in him lies to make his farm not only an exemplar of thrift, but of well ordered thrift. Neatness and fair proportions in our buildings; protecting belts of wood to the north of outlying fields; road-side trees; enjoyable gardens,—these all will win children and neighbors' children to respect for order; and within the limits of a far-sighted economy, every farmer of this beautiful region of country can so invest all his belongings, not only with an air of thrift, but with such tokens of aptitude for higher enjoyments as shall, most of all, stay the drift of his young people to the empty vanities of the town. Add the culture and refinement which can see the good in order and neatness (and, if need be, the beauty in flowers and trees,) to the vigor and foresight which can make a paying crop, and we have the type of country manhood which will most enlarge our wealth and will best ripen and illustrate our Republican civilization.

AN ADDRESS

DELIVERED BEFORE THE AMERICAN DAIRYMEN'S ASSOCIATION AT UTICA, N. Y., ON

THURSDAY, JANUARY 12, 1871,

BY

JOSEPH HARRIS, ESQ.,

Of "Moreton Farm," Rochester, N. Y.

Fattening Cows on Dairy Farms.

It is with great diffidence, Mr. President, and ladies and gentlemen of the American Dairymen's Association, that I appear before you. My experience in dairying is quite limited and somewhat antequated. I was born on a farm in the valley of the Severn, near the borders of Cheshire, England. It is a grain-growing, turnip-raising and sheep-feeding section—the home of Hereford cattle and of the Shropshire Down sheep. But we were too near Cheshire not to feel the influence of its peculiar system of agriculture. Nearly every farmer made more or less cheese of the Cheshire type.

My father and his oldest brother lived on adjoining farms. My father was blessed with a large family, and it so happened that I spent much of my time on my uncle's farm; and it was there that I learned nearly all that I know of dairying. My aunt was a Cheshire dairyman's daughter—a remarkably sensible, energetic woman, and a skillful cheese-maker. She could and did milk her twelve

cows in the hour, and under her instructions, though now somewhat out of practice, I am not sure that I cannot still milk a cow as clean, as quick and as well as the Hon. Harris Lewis or the honored President of the American Dairymen's Association! My uncle's farm contained 268 acres, about half of it high, dry, rolling land, rather too light and gravelly for permanent pastures, but when well manured it produced excellent crops of grain. The other half of the farm was of a heavier character and very cold and wet. It was only rated at about half the value of the upland, and was dear at that. It produced little except rushes and coarse grass. Cattle mired on it, and a man and horse came near being lost in a quagmire, on the public road that ran through it from Moreton to Stanton. Such was the condition of the farm when my uncle took it. A water-course five or six feet deep was cut through the farm down to the river. This gave him an outlet for his under-drains, which he constructed as rapidly as he could afford. In my days there was not a wet spot remaining on the farm. It was from this low land that my uncle made his fortune. He was not satisfied by merely draining it. It was broken up and thoroughly cultivated to kill weeds, and then seeded down again. Nor was this all. He constructed dams in the water-course, by which he could overflow eight or ten acres of meadow, and this irrigated land produced immense crops of grass.

These improvements, of course, were not effected at once. He was a prompt, energetic, intelligent man, and seems to have had unbounded faith in good farming. He spent his money freely, and was willing to wait for its return, and he did not wait or labor in vain. *He got rich by farming*, and by farming alone. And if he had *owned* the farm, as our American farmers do, the enhanced value of the farm alone would have made a moderate fortune.

As I said before, my aunt was a Cheshire dairyman's daughter, and was a very skillful cheese and butter maker, and she could not be content without a good dairy of cows. My uncle was a great lover of sheep, and liked, also, to see his barns and his stock-yard well filled with grain. He raised grain, kept sheep, and made cheese and butter. In my time he kept eight horses, over 200 large Leicester and Shropshire Down sheep, raised forty acres of turnips, ten acres of potatoes, forty to fifty acres of wheat, and the same amount of barley or oats, and kept a dairy of forty-four cows, rais-

ing a dozen calves, keeping a dozen yearlings, and two-year-olds, and fattening a dozen cows each year. He also made a good deal of money in fattening pork, and still more in selling store pigs. And all this was done on 268 acres of land, and without any extravagant purchase of food or manure. I do not think his purchases of bone-dust, guano, super-phosphate, or of bran and oil-cake, would exceed, all told, $400 per year. His farm was practically self-supporting. I recollect one year when wheat only brought a dollar per bushel, he fed some of it to his cows, but as a rule all the wheat and the best of the barley was sold. His wheat seldom averaged less than thirty bushels per acre, and his barley seldom less than forty bushels. His cows averaged $75 each, besides the pigs and calves. The foundation of this great productiveness was underdraining, and clean and thorough cultivation. These gave him good crops of grass and turnips, which enabled him to keep more stock, and make more manure, and this in turn made the land richer and still more capable of keeping more stock and making more manure. And this is the fundamental principle of all good farming. The man who makes $1,000 a year and spends a thousand, will never be any richer, while the man who, by a little more energy, intelligence and skill, earns $1,500 and spends only one thousand, will, by investing his earnings at 7 per cent., find himself in thirty years worth nearly fifty thousand dollars. It is not merely what we earn, but what we save, that enables us to get rich. And we can so manage our farms that at the end of thirty years they will be no richer or more productive than they are to-day; while by developing the latent plant-food in the soil and organizing it into crops which are consumed on the farm, we invest it at compound interest. In the one case we are content with the amount of plant-food that the soil will naturally afford, while in the other case we exert ourselves to increase the amount by underdraining, thorough cultivation, and other appliances of good farming.

Now, how is it with the dairymen? Are they making their farms richer, or are they satisfied to let them spend just what they earn? If so, they will be no better or more productive ten years hence than they are to-day. And, enthusiastically as I love farming, I can conceive of no more humdrum life than that of the farmer who is making no effort to improve his land. He has nothing to hope for, and that fact alone, if he is a thinking man, would make him mis-

erable. How is it with the dairymen? I know how it is with the grain-growers. Some of us are improving the productiveness of our farms, while not a few are content to plow and sow as they have always done, hoping for a propitious season, which seldom comes, or for high prices, which are equally delusive, for should they come they afford little or no relief for the simple reason that such farmers have little or nothing to sell. How is it with the dairymen? We grain farmers are told that if we want to renovate our farms we must raise less grain and keep more stock; we must raise more grass and feed it out on the farm to cattle and sheep, or we must put up cheese factories and go into the dairy business.

So far as keeping up and increasing the fertility of the soil is concerned, the dairyman certainly has the advantage over the grain grower. A dollar's worth of cheese sold from the farm removes far less plant-food than a dollar's worth of corn or wheat. Five hundred pounds of cheese contains about twenty-five pounds of nitrogen and twenty pounds of mineral matter. A cow that would make this amount of cheese would eat not less than six tons of hay, or its equivalent in grass or grain, in a year. And this amount of food, supposing it to be half clover and half ordinary meadow hay, would contain 240 pounds of nitrogen and 810 pounds of mineral matter. In other words, a cow eats 240 pounds of nitrogen, and 25 pounds are removed in the cheese, or not quite $10\frac{1}{2}$ per cent., and of mineral matter not quite $2\frac{1}{2}$ per cent. is removed. If it takes three acres to produce this amount of food, there will be $8\frac{1}{3}$ pounds of nitrogen removed by the cheese, per acre, while thirty bushels of wheat would remove in the grain 32 pounds of nitrogen, and 10 to 15 pounds in the straw. So that a crop of wheat removes from five to six times as much nitrogen per acre as a crop of cheese. And the removal of mineral matter in cheese is quite insignificant as compared with the amount removed in a crop of wheat or corn. If our grain-growing farmers can keep up the fertility of their land, as they undoubtedly can, the dairymen ought to be making theirs richer and more productive every year. Is such the case? And if not, why not?

The productiveness of a farm does not depend on the absolute amount of plant-food which the soil contains, but on the amount of plant-food which is in an available condition. An acre of land that produces half a ton of hay may contain as much plant-food as an

acre that produces three tons of hay. In the one case the plant-food is locked up in such a form that the crops cannot absorb it, while in the other it is in an available condition. I have no doubt there are many farms in this county that contain 3,000 pounds of nitrogen, and an equal amount of phosphoric acid, per acre, within six inches of the surface soil. And this is as much nitrogen as is contained in 100 tons of meadow hay, and more phosphoric acid than is contained in 300 tons of meadow hay. And these are the two ingredients on which the fertility of our farms mainly depend. And yet there are soils containing this quantity of plant-food that do not produce more than half a ton of hay per acre. In some cases, the land is wet and the plants cannot take up the food, even though abundance of it is within reach. The remedy in this case is under-draining. In the other case the plant-food is locked up in insoluble combinations. In this case we must plow up the soil, pulverize it and expose it to the oxygen of the atmosphere. We must treat the soil as my mother used to tell me to treat my coffee, when I complained that it was not sweet enough. "I put plenty of sugar in," she said, "and if you will stir it up it will be sweet enough." The sugar lay undissolved at the bottom of the cup; and so it is with many of our soils. There is plenty of plant-food in them, but it needs stirring up. They contain, it may be, 3,000 pounds of nitrogen, and other plant-food in still greater proportion, and you are only getting a crop that contains 18 pounds of nitrogen a year, and of this probably the rain supplies nine pounds. Let us stir up the soil and see if we cannot set 100 pounds of this 3,000 pounds of nitrogen free, and get three tons of hay per acre instead of half a ton. There are men who own a large amount of valuable property in vacant city lots, who do not get enough from them to pay their taxes. If they would sell half of them, and put up buildings on the other half, they would soon have a handsome income. And so it is with many farmers. They have the elements of 100 tons of hay lying dormant in every acre of their land, while they are content to receive half a ton a year. They have property enough, but it is unproductive, while they pay high taxes for the privilege of holding it, and high wages for the pleasure of boarding two or three hired men in the family.

We have, say 3,000 pounds of nitrogen locked up in each acre of our soil, and God sends us 8 or 10 pounds every year in rain and dew, and yet, practically, all that we want, to make our farms highly

productive, is 100 pounds of nitrogen per acre per annum. And furthermore, it should be remembered, that to keep our farms rich, after we have once got them rich, it is not necessary to develop this amount of nitrogen from the soil every year. In the case of clover hay the entire loss of nitrogen in the animal and in the milk would not exceed 10 per cent., so that, when we feed out 100 pounds of nitrogen we have 90 pounds left in the manure. We want to develope 100 pounds of nitrogen in the soil, to enable us to raise a good crop to start with, and when this is once done, an annual development of 10 lbs. per acre in addition to the manure, would keep up the productions of the soil. Is it not worth while, therefore, to make an earnest effort to get started?—to get 100 pounds of nitrogen in an available condition in the soil?

As I said before, this is practically all that is needed to give us large crops. This amount of nitrogen represents about twelve tons of average barn-yard manure,—that is to say, twelve tons contains 100 pounds of nitrogen. But in point of fact it is not in an immediately available condition. It would probably take at least two years before all the nitrogen it contains would be given up to the plants. We want, therefore, to get a good start, 24 tons of barnyard manure on every acre of land. How to get this is the great problem which you have to solve. In the grain growing districts we get it in part by summer-fallowing, and I believe you might often do the same thing with advantage. I presume your land is none too clean, and a thorough summer-fallow would not only clean the land, but would render some of the latent plant-food available. This will be organized in the next crop, and when once you have got the plant-food you have decidedly the advantage over the grain-growing farmer in your ability to retain it. You need not lose over 10 per cent. a year of nitrogen, and not one per cent. of some of the other elements of plant-food. Is there not on many dairy farms some low, wet land that needs little more than draining to make it very productive? If so, such meadows are a grand source of nitrogen. Then, I think I have seen streams of water in the Spring and Fall that might be used for irrigating purposes—made to double and treble the grass on several acres of land. Where this is the case, there is no cheaper source of nitrogen. Drain all land that needs it, irrigating after draining (for it is no use irrigating lands surcharged with stagnant water,) all land where there is an opportunity, and summer-fallow-

ing or otherwise stirring the soil, to kill weeds and develop the latent plant-food. *These are the three primary means of getting nitrogen.* And, as I said before, when once you have got it, it is not a difficult matter to retain it.

I am aware that many will object to plowing up old grass land, and I do not wish to be misunderstood on this point. If a farmer has a meadow that will produce two or three tons of hay, or support a cow, to the acre, it would be folly to break it up. It is already doing all or nearly all that can be asked or desired. But suppose you have a piece of naturally good land that does not produce a ton of hay per acre, or pasture a cow on three acres, if such land can be plowed without great difficulty, I would break it up as early in the fall as possible, and summer-fallow it thoroughly and seed it down again heavily with grass seeds the next August. If the land does not need draining it will not forget this treatment for many years, and it will be the farmer's own fault if it ever runs down again.

In this country, where wages are so high, we must raise large crops per acre or not raise any. Where land is cheap it may sometimes pay to compel a cow to travel over three or four acres to get her food, but we cannot afford to raise our hay in half ton crops; it costs too much to harvest them. High wages, high taxes and high-priced land necessitate high farming; and by high farming I mean growing large crops every year and on every portion of the farm; high wages and low-priced land do not necessarily demand high farming. If the land is cheap we can suffer it to lie idle without much loss. But when we *raise* crops whether on high-priced land or on low-priced land, we must raise good crops, or the expense of cultivating and harvesting them will eat up all the profits. In the dairy districts I believe land, in proportion to its quality and nearness to market, commands a higher price than land in the grain growing districts. Hence it follows that high farming should be the aim of the American dairyman. I am told that there are farms in the dairy districts of this State worth from one hundred to one hundred and fifty dollars per acre, on which a cow to four acres for the year is considered a good average. At a meeting of the Little Falls Farmers' Club, (whose proceedings I always read with great interest,) the Hon. Josiah Shull, gave a statement of the receipts and expenses of his farm of 81 1-2 acres, which cost $130 per acre. He

kept twenty cows and fatted one for beef. The receipts were as follows :—

Twenty cows yielding 8337 lbs. of cheese, at about 14 1-4 cents per pound,	$1,186.33
Increase on beef cow,	40.00
Calves,	45.00
Total receipts	$1,271.33

EXPENSES.

Boy, 6 months and board	$180.00
Man by the year, and board	360.00
Carting milk and manufacturing cheese	215.00
Total cost of labor	$755.00

THE OTHER EXPENSES WERE:

Fertilizers, plants, &c.	$18.00
Horse shoeing and other repairs of farming implements, (which is certainly pretty cheap,)	50.00
Wear and tear of implements	65.00
Average repairs of place and buildings	175.00
Average depreciation and interest on stock	180.00
Insurance	4.00
Incidentals, (also pretty low,)	50.00
	$620.00

Total receipts	$1271.33.
Total expenses	1375.00.

This statement, it is said, was considered by the Club, a very fair estimate.

Now here is a farm costing $10,595, the receipts from which, saying nothing about interest, are less than the expenses. And if you add two cents per pound more to the price of the cheese the profit would still be only about $50 per year. The trouble is not in the low price of cheese, but in the low product per acre. I know grain growing farmers who have done no better than this the past year. Some of us have not sold enough to pay our hired help. We are looking to higher prices and lower wages to enable us to make a living. We may get both and we may not. Wages are advancing all over the world, and while they are undoubtedly too high in this country, it is

not probable that they will be very much lower. If we are to make anything by farming, either in grain growing or dairying, we must look to a larger production per acre. We shall not do it by reducing our expenses but by increasing our receipts. Mr. Shull places the annual depreciation and interest on stock at $180, equal to nearly one-seventh of the total receipts of the farm. It would pay the wages and board of another man for six months. Cannot it be avoided? Good beef is relatively much higher in this State than good cheese. Mr. Willard and other dairy authorities tell us that cheese is the cheapest animal food in the world, while beef is the dearest. Why, then, should our dairymen confine their attention to the production of the cheapest of farm products, and neglect almost entirely the production of the dearest? If beef is high and cheese low why not raise more beef? On low-priced land it may be profitable to raise and keep cows solely for the production of cheese, and when the cows are no longer profitable for this purpose, to sacrifice them—to throw them one side as we do a worn-out machine. And in similar circumstances we may be able to keep sheep solely for their wool, but on high-priced land we cannot afford to keep sheep merely for their wool. We must adopt a higher system of farming and feeding, and keep sheep that will give us wool, lambs and mutton. In some sections of South America, where land costs nothing, cattle can be kept for their bones and hides, but where food is costly we must make better use of it. A cow is a machine for converting vegetable food into veal, butter, cheese and beef. The first cost of the machine, if a good one, is considerable,—say $100. This machine has to be kept running night and day, summer and winter, week days and Sunday. If we were running a steam flouring mill that could never be allowed to stop, we should be careful to lay in a good supply of coal and also have plenty of grain on hand to grind, so that the mill would never have to run empty. No sensible man would keep up steam merely to run the mill. He would want to grind all the time and as much as possible; and yet coal is a much cheaper source of power than the hay and corn with which we run our milk-producing machine. How often is the latter allowed to run empty? The machine is running night and day,—must run, but is it always running to advantage? Do we furnish fuel enough to enable it to do full work, or only little more than enough to run the machinery?

I estimate that it takes from 15 to 18 pounds of hay per day to run

this cow-machine, even when kept warm and comfortable; and if exposed to cold storms, probably not less than 20 pounds of hay a day, or its equivalent, and this merely to keep the machine running, without doing any work. It requires this to keep the cow alive, and to prevent her losing flesh. If not supplied with the requisite amount of food for this purpose, she will take enough fat and flesh from her own body to make up the deficiency; and if she cannot get it, the machine will stop,—in other words, the cow will die. We have, then, a machine that costs $100; that will last on an average eight years; that requires careful management; that must have constant watching, or it will be liable to get out of order, and that requires, merely to keep it running, say 20 pounds of hay per day. Now, what do we get in return? If we furnish only 20 pounds of hay per day we get—*nothing*. If we furnish 25 pounds of hay per day or its equivalent, we get, say half a pound of cheese per day. If we furnish 30 pounds we get one pound of cheese per day or 365 pounds a year. We may not get the one pound of cheese every day in the year; sometimes the cow, instead of giving milk is furnishing food for her calf or storing up fat and flesh; and this fat and flesh will be used by and by to produce milk. But it all comes from the food eaten by the cow; and is equal to one pound of cheese per day for 30 pounds of hay or its equivalent consumed; 20 pounds of hay gives us nothing; 25 pounds of hay gives us half a pound of cheese, or 40 pounds of cheese from one ton of hay; 30 pounds gives us 1 pound, or 66 2-3 pounds of cheese from 1 ton of hay; 35 pounds gives us 1 1-2 pounds, or 85 5-7 pounds of cheese to one ton of hay; 40 pounds gives us 2 pounds of cheese, or 100 pounds of cheese from one ton of hay; 45 pounds gives us 2 1-2 pounds of cheese, or 111 pounds of cheese from one ton of hay; 50 pounds gives us 3 pounds of cheese or 120 pounds of cheese from one ton of hay.

On this basis, one ton of hay, *in excess of the amount required to keep up the animal heat and sustain the vital functions*, gives us 200 pounds of cheese. The point I wish to illustrate by these figures, which are of course hypothetical, is, that it is exceedingly desirable to get animals that will eat, digest and assimilate a large amount of food, over and above that required to keep up the heat of the body and sustain the vital functions. When a cow eats only 25 pounds of hay a day, it requires one ton of hay to produce 40 pounds of cheese. But if we could induce her to eat, digest and

asssimilate 50 pounds a day, one ton would produce 120 pounds of cheese. If a cow eats 33 pounds of hay per day, or its equivalent in grass, it will require 4 acres of land, with a productive capacity equal to 1½ tons of hay per acre, to keep a cow a year. Such a cow, according to the figures given above, will produce 401½ pounds of cheese a year, or its equivalent in growth. A farm of 80 acres on this basis, would support 20 cows, yielding, say 8000 pounds of cheese. Increase the productive power of the farm one half, and keep 20 cows that will eat half as much again food, and we should then get 21,600 pounds of cheese. If cheese is worth 15 cents per pound, a farm of 80 acres producing 1½ tons of hay or its equivalent per acre, and supporting 20 cows, would give us a gross return of $1204.50. The same farm so improved as to produce 2¼ tons of hay or its equivalent, per acre,—and this fed to 20 cows, capable of eating, digesting and assimilating it,—would give a gross return of $3,240.

In presenting these figures, I hope you will not think me a visionary. I do not think it is possible to get a cow to produce three lbs. of cheese a day throughout the whole year. But I do think it quite possible to so breed and feed a cow that she will produce three pounds of cheese per day, or its equivalent in veal, flesh or fat. We frequently have cows that produce three pounds of cheese a day for several weeks. But a cow *can* be so fed that she will produce three pounds of cheese a day without losing weight. And if she can extract this amount of matter out of the food for a part of the year why cannot she do so for the whole year? Are the powers of digestion weaker in the fall and winter than in spring and summer? If not, we unquestionably sustain great loss by allowing this digestive power to run to waste. This digestive power costs us 20 pounds of hay a day. We can ill afford to let it lie dormant. But I shall be told that the cows are allowed all the food they will eat winter and summer. Then we must, if they have digestive power to spare, endeavor to persuade them to eat more. If they eat as much hay or grass as their stomachs are capable of holding, we must endeavor to give them richer hay or grass. Not one farmer in a thousand seems to appreciate the advantage of having hay or grass containing a high percentage of nutriment. I have endeavored to show that a cow eating six tons of hay, or its equivalent, in a year would produce 400 pounds of cheese, worth $60. While a cow capable of eating, digesting and turning to good account nine tons of hay or its equivalent, would

produce 1090 pounds of cheese, or its equivalent in other products, worth $162!

Now the stomach of a cow may not allow her to eat nine tons of hay a year; but it will allow her to eat six tons; and if these six tons contain as much nutriment as the nine tons, what is the real difference in its value? Ordinarily we should probably estimate the one at $10 per ton and the other at $15. But according to the above figures one is worth $10 per ton and the other $27. To get rich grass, therefore, should be the aim of the American dairyman. I do not mean merely a heavy growth of grass, but grass containing a high per centage of nutriment. Our long winters and heavy snows are a great advantage to us in this respect. Our grass in the spring, after its long rest, ought to start up like asparagus, and, under the organizing influence of our clear skies and powerful sun, ought to be exceedingly nutritious. Comparatively few farmers, however, live up to their privileges in this respect. The climate is better than our farming, the sun richer than our neglected soil. England may be able to produce more grass per acre in a year than we can, but we ought to produce richer grass, and, consequently, more cheese to a cow. And I believe, in fact, that such is often the case. The English dairyman has the advantage of a longer season of growth. We have a shorter season but a brighter sun, and if we do not have richer grass it is due to the want of draining, clean culture and manuring. The object of American dairymen should be, not only to obtain more grass per acre, but to increase its nutriment in a given bulk. If we could increase it one-half, making six tons equal to nine tons, we have shown that it is nearly three times as valuable. Whether this can be done I have not now time to consider, but at any rate if your land produces as many weeds as some fields on my farm do, and if the plant-food that these weeds absorb, could be organized by nutritious grasses, this alone would do a good deal towards accomplishing the object. Whether this can be done or not, we want cows that can eat and turn to good account as much food per annum as is contained in nine tons of ordinary meadow hay; and we want this amount of nutriment in a bulk not exceeding six tons of hay. *If possible*, we should get this amount of nutriment in grass or hay. But if we cannot do this we must feed enough concentrated food to bring it up to the desired standard.

The next thing to be done is to obtain cows that can turn this extra

amount of food to good account. I suppose there can be no doubt that milk will afford the dairyman the greatest amount of direct and immediate profit. Such is the case not because cheese, in proportion to the nutriment it contains, commands a higher price than beef, but because milk or cheese is a much less elaborated or organized product than flesh. Flesh, like milk, is formed from the blood; but after it is formed it is transformed into venous blood, and then, under the influence of oxygen in the lungs and other organs of the body, is converted into arterial blood, and then into flesh again, and this process is repeated again and again. It is true that this transformed flesh is not wholly lost. It helps to sustain the vital functions of the body, and to generate animal force; still it is a somewhat costly process, and hence it is impossible to produce a pound of dry beef as cheaply, leaving the cost of milking and manufacturing out of the question, as a pound of dry cheese. The one is a much more highly organized product than the other. Cheese is generally spoken of as animal food, but I doubt its correctness. It occupies an intermediate place between vegetable and animal food, partaking somewhat of the character of both; so that any argument drawn from chemical analysis showing that cheese is cheaper than flesh-meat, falls to the ground; we cannot compare the two. I doubt very much whether the chemists and other learned gentlemen who use such arguments do themselves live wholly on bread and cheese, and eschew beef steak. For some reason people that can afford it always want, and will have, flesh meat. They will eat more or less cheese as a tonic or a relish; but it never becomes a regular article of food that they live on as they do on beef, mutton, pork and poultry.

As I said before, the nine tons of hay, concentrated into six tons, that we want the cow to eat in a year, can be turned into milk with more immediate profit to the dairyman than any other product; but there is a limit to the milk-producing power of the cow. If we succeeded in getting a cow that would convert the whole of this nine tons of hay into milk it would amount to over one thousand pounds of cheese a year. The cow could not long stand such a drain on her constitution, and nature would protest against the abuse, and, sooner or later, refuse to allow such an animal to raise her offspring. Extraordinarily great milkers rarely produce great milkers; and it is fortunate that they do not, as the health and vigor of the

race would of necessity degenerate. Were I fortunate enough to be a dairyman, my first object would be to get my land clean, rich, and at the same time I should select a herd of good common cows, try to take good care of them, and feed liberally. I should not expect at first to get cows that would eat nine tons of hay a year; but I should aim to breed such. I think I should select a thoroughbred Short-horn bull. I am certain that he should be *thoroughbred*, whatever the breed might be. I should continue to feed the cows liberally; and those that would stand high feeding should be retained, and those that got too fat should be turned off, and so with the young stock. They must be educated to eat well and turn the food to good account; they must be taught to have confidence in the forethought and kindness of their owners—taught that their supply of food is certain, and that it is entirely unnecessary for them to lay up a store of fat and flesh to be used during a period of scarcity, as they do in a state of nature. This is an exceedingly important point; and one advantage in getting a Short-horn is that they have for generations been taught this lesson, and will use their daily food for their daily growth, without wasting any of it in storing up tallow for future use. I should want them to convert their food into butter, and not into tallow. I should expect some of these grade Short-horns, bred from cows liberally fed, and they themselves supplied with an abundance of food from the time of their birth, and before, not only to make cows of good size, but also to prove excellent milkers, producing say 600 pounds of cheese a year, a 100 pound calf, with perhaps twenty or thirty pounds of winter butter. This would be about as good a cow as I should expect to get, and I should not hope to get it at once. And furthermore, after I had got her I should not expect her to last very long. I should feed high—must feed high; and if she eats her nine tons of hay a year, or its equivalent, there would be a surplus each year for increased growth, and in the course of four or five years she would become so large and fat that it would be more profitable to sell her to the butcher than to keep her for milk. In the meantime I should be raising others to take her place. Some would prove not to be good milkers; but in this case they would get very fat, and would command a good price for beef. I feel certain that on high-priced land we cannot make much money out of average sized cows that eat only six tons of ordinary hay a year, or its equivalent. The profit comes from the food fed in excess of this amount, and I do not know

of any system of management that will enable us to adopt high feeding without running the risk of having to fatten more or less beef every year. My uncle usually fattened twelve cows every year, and had twelve three year old heifers coming in, out of a dairy of a little over forty cows. He did not keep a thoroughbred bull, but was careful to select as good a one as he could find; and under the influence of liberal feeding, and this yearly weeding out, he soon had a very profitable dairy—averaging seventy-five dollars per cow in gold, besides the pigs and calves, with cheese at about thirteen cents, and butter about twenty-six cents per pound. And, besides this, I have no doubt that he raised as much grain and fattened as many sheep as if he had not kept any dairy at all. He made so much manure, and of such good quality, that his land grew richer and richer every year.

The system I have suggested will do the same thing here. We should be able to keep more and more stock, and make more and more manure, and of better quality year after year. The main difficulty is to get started. At the present time a dairyman, with the right kind of cows, can well afford to buy corn and bran. I have estimated that ten pounds of hay fed, over and above the amount required to sustain the vital functions, will give one pound of cheese. I am inclined to think that four pounds of corn is equal to ten pounds of ordinary hay, but let us say five pounds. I am now buying corn at less than seventy cents a bushel, of sixty pounds, or $23.33 per ton. I regard this as cheaper than hay at twelve dollars per ton, while it is worth from twenty to twenty-five dollars in market. I am feeding it out freely to all my stock, giving say three-fourths of a pound of corn per day to each 100 pounds of live weight of animal. We feed our cows about eight pounds of cooked corn meal each per day, with what stalks and straw they will eat, but no hay. We are fattening two of the cows, but are milking them at the same time; and we are now making as nice yellow butter as we did in summer; and by next June, when beef usually brings its highest price, they will be fat.

Since I have been here I have been asked what is the best food for fattening farrow cows. If peas were as cheap as corn, I would give a mixture of half peas and corn meal; but at the present time corn is by far the cheapest grain we can use. Bran or shorts, in addition to the corn meal, is excellent; and as the manure from a ton of

bran is worth about fourteen dollars, it is a cheap food to purchase. I apprehend that the best food to make cheese is also the best food to fatten the cows, when giving little or no milk. The great point, in either case, is to give the cows as much nutriment as they can digest and assimilate. As I said before, if the cow can digest it, we want to give her as much nutriment as is contained in fifty-six pounds of ordinary hay, concentrated into a bulk of about thirty-three pounds of hay, per day. Ten pounds of hay, ten pounds of straw, ten pounds of corn, and ten pounds of shorts, I think, would be equal to fifty pounds of ordinary hay; and this amount of food should enable a cow to give more or less milk, exceedingly rich in butter, and gradually fatten the cow at the same time. It makes comparatively little difference what food is used, provided it is easily digestible and contains the requisite amount of nutriment in the desired bulk. I apprehend that the difference of opinion in regard to the value of corn fodder will be found to turn on this point. Corn fodder is succulent, easily digested, sweet and nutritious; but, at least before it has commenced to ear, its nutriment is not sufficiently concentrated. If we could take away one-third of the water and one-third of the indigestible woody-fibre, the part that remained would be of much greater value than the whole. The water we can easily get rid of; and if we cannot get rid of the excessive bulk, we can feed out sufficient corn meal with the fodder to bring it up to the desired standard.

I think this is the true explanation of the interesting fact mentioned yesterday by Mr. Harris Lewis The cows having a good pasture of rich grass gave a much greater yield of cheese than the cows fed on corn fodder. The corn fodder contains the same nutritive matter as the grass, but it was not sufficiently concentrated to enable the cows to eat as much of this nutriment as they got in the grass.

TRANSACTIONS

AT THE

SIXTH ANNUAL MEETING

OF THE

AMERICAN DAIRYMEN'S ASSOCIATION,

HELD IN THE COURT HOUSE, UTICA, N. Y., ON

TUESDAY, WEDNESDAY AND THURSDAY,

January 10, 11 *and* 12, 1871.

Shortly before twelve o'clock on Tuesday morning the President of the Association, Hon. Horatio Seymour, called the Convention to order. He announced that the Court House and the City Hall had both been engaged for the use of the Convention, so that in case the former proved too small the latter could be used. The Court House he considered decidedly the best fitted for the holding of the Convention, and if it proved large enough, the sessions would continue to be held there. He desired to state that the officers of the Utica Mechanics' Association regretted that they were unable to place their hall at the disposal of this Association for the purpose of these meetings, as last year, but it had been pre-engaged for this time, before the application of the officers of this society had been made for its use. He further stated that the probabilities were that before the time of holding the next Convention of this Association, Utica would be provided with a hall more in keeping with her wealth and position, and far better adapted to gatherings of such a character as this, than any which she now possesses.

APPOINTMENT OF COMMITTEES.

On motion of Mr. L. T. Hawley, of Onondaga, the Chair was empowered to name the usual committees.

The Chair appointed the following:—

COMMITTEE ON ORDER OF BUSINESS.

Farrington, of Canada West; Wight, of Oneida; Hawks, of Illinois; Shull, of Herkimer; Dick, of Erie.

COMMITTEE ON FINANCE.

Arnold, of Tompkins; Platt, of Clinton; Smith, of Erie.

COMMITTEE ON NOMINATION OF OFFICERS.

Williams, of Oneida; Lewis, of Herkimer; Kingsbury, of Madison; Geddes, of Onondaga; Jerome, of Michigan.

The President stated that at the suggestion of the Secretary he would ask the Convention to consider whether there is not a better and more democratic way of electing the President, Secretary and Treasurer of the society than the present one; whether, in short, an election of these officers by ballot would not be more satisfactory to members generally.

On motion, this subject was referred to the Committee on Nominations, with instructions to report respecting the manner of choosing these officers, if, in their judgment, a change seemed desirable.

Mr. Scovill, of Oneida, offered the following resolution:—

Resolved, That the members of the Business Committee of this Association are respectfully requested to select and arrange, so far as practicable, the subjects to be considered during the third day's session, and announce the topics so selected to the Convention at the earliest possible moment, and also furnish a duplicate thereof to the daily papers of this city for publication.

The President said the Chair did not understand that it was the purpose of the Association, in extending its sessions another day, to limit debates on the two other days. While he thought the resolution a proper one, yet it seemed to imply that debates were to be so limited on those days, whereas, unless otherwise instructed by the Convention, he should consider it to be his duty to encourage debates as much as possible on the various topics brought forward during the sessions of the Convention.

Dr. Wight, of Oneida, thought that at the conclusion of each subject, on the different days, time should be given for debate. He hoped each subject would be finished before another is taken up. He did not believe that the discussion of cheese-making should be confined to one day.

The President thought the resolution should be referred to the Committee on Business. It would be a great improvement in the method of proceeding, if the speeches and papers prepared by the different members were to be printed and circulated during the sessions of the Convention, in order that members of the Association might read them, and more intelligently grasp the subject. He

thought decidedly more benefit would result from such a course than from the simple hearing of the speeches and reading of the papers.

Hon. Josiah Shull, of Herkimer, moved that the resolution be referred to the Business Committee. Motion carried and resolution so referred.

The Secretary of the Association, stated to the Convention that members who had prepared papers on subjects not mentioned in the schedule, would greatly aid the Committee on Order of Business in their work by making the fact known to them.

On motion of Dr. L. L. Wight, of Oneida, the Convention now adjourned until two o'clock, P. M.

AFTERNOON SESSION.

At 2 o'clock President Seymour called the convention to order. Hon. J. Shull, chairman of the Committee on Order of Business, reported as follows:

FIRST DAY—AFTERNOON.

1. Report of committees.

2. Would the consumption of cheese be promoted in any considerable degree by the more general manufacture of small cheeses? Discussion to be opened by A. Holdredge, Otsego.

3. Condensed milk manufacture. C. C. Church, Elgin, Ill.

4. Soiling cows in connection with pasturage. Hon. Harris Lewis, Herkimer.

EVENING SESSION.

Fattening cows on dairy farms. Joseph Harris, Monroe.

SECOND DAY—MORNING.

1. Factory buildings, fixtures and apparatus. Dr. L. L. Wight, Oneida.

2. Is there a decline in the amount of dairy products in our old dairy regions? If so, what is the cause and what the remedy? X. A. Willard, Herkimer.

3. Is there any way by which patrons of butter and cheese factories can receive credit for the milk delivered, according to its actual value, and not according to its weight or measure. Harris Lewis, Herkimer.

AFTERNOON SESSION.

1. Causes of tainted milk and floating curds, and the remedies. S. A. Farrington, Tompkins.

2. What shall be done with the cream which rises upon the milk during the night, in cases where the agitator is not used? L. B. Arnold, Tompkins.

3. Grinding curds—is it advantageous or otherwise? Alex. Macadam, Montgomery.

EVENING SESSION.

The manufacture of cheese in Germany, France, Switzerland, &c. Prof. G. C. Caldwell, of Cornell University.

THIRD DAY—THURSDAY MORNING.

1. How far and in what way the practical farmer or dairyman can best avail himself of the teachings of science? Donald G. Mitchell, Esq., of New Haven, Conn.
2. Management of butter dairies. O. S. Bliss, of Vermont.
3. Coloring cheese. H. Farrington, of Canada West.
4. Election of officers at 12 M.
5. What should be done with the whey? Harris Lewis, Herkimer.
6. Special methods in the manufacture of cheese.
7. General discussion.

DISCUSSION.

No person shall be permitted to speak on any one subject more than ten minutes, except by permission of the Convention.

The report was adopted.

The Chairman announced that, as the other committees were not prepared to report, the first question named upon the programme was now in order, and he introduced Mr. A. Holdredge, of Otsego county, who read the following paper on this subject:—

WOULD THE CONSUMPTION OF CHEESE BE PROMOTED IN ANY CONSIDERABLE DEGREE BY THE MORE GENERAL MANUFACTURE OF SMALL CHEESES?

I have been requested by the Secretary of this Association to prepare a paper, introductory to the general discussion of this theme, "Would the consumption of cheese be promoted in any considerable degree by the manufacture of small cheeses?" Fortunately for me, the request was to prepare a *short* paper upon this subject, for I must confess that I am able to offer but little argument upon this point, and can, at best, but give the experience of myself, and the opinions of those whom I have met or communicated with upon this subject; and as all of the members of this Association are more or less interested in the manufacture, sale and consumption of cheese, perhaps we can, by a comparison of opinions and experiences, ascertain the true solution of this important question.

We shall, no doubt, all agree that the consumption of cheese in this country has largely increased within the past few years, and that it is desirable to all manufacturers, and farmers, at least, that the home consumption shall be still farther encouraged, and that this increased demand is due in a great measure to the fact that cheese is becoming more and more to be regarded by our people as a staple article of food, rather than a luxury. The demand for all articles of food is increased in proportion to the cheapness of the same, the facility with which it may be obtained, its keeping qualties and the form or package in which it is furnished and can be kept. This is particularly so as to lard, butter, and all other perishable articles of food. Most families are without cheese, a large portion of the time, because of the difficulty in obtaining a piece of good cheese, and the difficulty of preserving the same. Very few families

can, with safety, cut a cheese for consumption weighing fifty pounds, or even thirty pounds, for much of it will mould and spoil before wanted for the table; and, be the cheese ever so fine, they rarely get but one good slice, and that is the one first cut. The same will not suit the taste of all persons, and when a party can find a cheese in market suited to his taste, if it could be purchased in some shape or size in which it can be safely kept, he will purchase an abundant supply for his family, and not be content with a few pounds, as he must be, when cut from a large cheese. People generally purchase butter, lard, meat, potatoes, and such articles of food in the fall, in quantities sufficient to supply them till the next season. They can then buy cheaper, and can keep them till required for use; but, as I have before remarked, no family can, with safety, cut for use a large cheese weighing sixty pounds. We want a cheese that everybody can buy without cutting. Dealers want something that they can sell whole, without peddling out in pieces; and they want cheese that they are obliged to cut and sell in small pieces, in some form or package, that will prevent the enormous waste now incurred in cutting up large cheese. Even in the families of farmers who carry milk to factories very little cheese is consumed, on account of the difficulty in keeping a large cheese after being cut. During the season of cheese making some factories, on certain days, cut a large cheese, and the patrons take such pieces as they can consume at once. Every manufacturer knows how difficult it is to cut a cheese to suit the tastes of all his patrons. Others have attempted to supply the demand of their patrons by making the milk of certain days into small cheeses, weighing from ten to twenty-five pounds, for the exclusive use of such patrons; and such cheeses are always eagerly taken by the farmers for their own use. This, however, involves a large amount of extra labor, hoops, &c.; but the patrons prefer to incur this extra expense, rather than to be without cheese, or take large ones.

This fact shows that there is a large unsupplied demand for cheese, even among dairymen themselves, which demand can be supplied and increased by the manufacture of small cheeses. Any family will consume more cheese during the year if they can at all times have on hand cheese suited to their taste, and this can be accomplished in no other way than to furnish them with such cheese, in some form and size, that they can safely keep and use when desired. There are many persons who now content themselves with occasionally purchasing a piece of cheese weighing four or five pounds, when they would buy a whole one, weighing from ten to twenty-five pounds, if they could do so at a price not too far above the price of a large cheese.

The great obstacle to the manufacture of small cheese, weighing from ten to thirty pounds, has been the extra cost of such manufacture and the great expense and risk of boxes and transportation. In all the Southern and Western States the demand is for small cheeses, weighing from ten to fifteen pounds, and English dairy cheese is made to supply this demand. Attempts have been made to supply this increasing demand for small cheeses, but the expenses, as I have

before mentioned, has so enhanced the price as to greatly limit the demand for them. The pine apple cheese which is familiar to you all, is made only in limited quantities, as the great expense attending their manufacture, boxing and shipping, compels the seller to demand a very high price for it as compared with large cheese, the difference being from five to ten cents per pound. A small cheese is made in Western New York called the "Young America," the expense of single presses being somewhat reduced by placing the hoops in groups under one screw; this seems to be an improvement in the right direction, and is secured by letters patent; but such cheese cannot be afforded at a price calculated to satisfy or stimulate a demand for cheese.

In England immense quantities of round Dutch cheese, called Edams, weighing only a few pounds, are imported to supply the demand there for small cheeses, and the dairy cheese of England all seem to be made of smaller size, showing the demand for small cheese. The question, however, seems to me to be governed greatly by the price at which such small cheeses can be furnished to the consumer. It is not expected that cheese weighing from ten to thirty pounds each can be furnished at the same price per pound as large cheeses, weighing from fifty to eighty pounds. The waste in cutting these large cheeses, in fragments and down weights, is considerable, which, together with the profits, labor of cutting, weighing and putting up by the middle men, must be paid by the consumer. I am informed by retail dealers of cheese in the markets of New York and elsewhere, that the waste in cutting a large cheese is two cents per pound; this of course benefits no one. Now, if even this can be saved, the purchaser can afford to pay a better price to the manufacturer, and the consumer would be enabled to obtain his cheese in better shape, at the same price as formerly. If all cheese could be made in smaller size, say from ten to thirty pounds each, to be sold at a price not exceeding four or five cents per pound above the price of large cheese, many would purchase whole ones, and those cut by the dealers would be cut but once or twice, making a great saving in down weights and fragments.

Under date of July 6th, 1870, says a correspondent, "We are making square cheeses, ten pounds weight, and find they sell more readily than large, round cheeses; we get eighteen cents per pound, both from merchants and others. All merchants admit that they can afford to give from one to three cents per pound more for them, on account of the convenience in cutting, and the fact also that so many can be sold without cutting. I find they cut very satisfactorily and I sell ten small cheeses without cutting, where I would sell one fifty pound cheese out of my store."

Mr. N. R. Baker, of Schuyler's Lake, Otsego County, N. Y., who has made the same size and form of cheese since about the first of September last, says he has sold his cheese at two cents per pound above the best factory of large size cheese, and the experiment pays him well.

The *Western Farmer*, a leading agricultural paper, of Madison, Wisconsin, in its issue of Dec. 17th, 1870, says: "We think it

very desirable that smaller cheeses be made to supply a demand which already exists to some extent, and which we have no doubt would rapidly increase if an attempt were made to supply it. If small cheeses, of about ten pounds each, for instance, could be supplied to those who would purchase such for home consumption, we think it would have a marked tendency to increase the demand for cheese in this country."

I have received communications from parties residing in Pennsylvania, Michigan, Wisconsin and California, as also from parties furnishing cheese for the largest and best markets in this State, and all, as far as I can learn, agree that if cheese, weighing from ten to thirty pounds each can be furnished at a fair compensation above the price of large cheese, the consumption thereof will be greatly enhanced.

I believe I have now said enough to open the discussion upon this subject; I am satisfied that there is a great, growing demand for such cheeses, and that the main question with us is, "How best we can promote and supply this demand?" In other words how we can supply consumers with a cheese they can purchase whole, of a fair size and at a reasonable price, that they can cut with economy, and safely keep after being cut until the whole is consumed?

At the conclusion of the paper by Mr. Holdredge, several questions were asked by various gentlemen and answered by the essayist and Vice President Burnham, of Chautauqua. Mr. Holdredge said he makes his cheese in the form of a parallelogram. He does not hear any fault found with the large amount of rind. The proportion of shrinkage, compared with the large cheeses, is a fraction larger for the first thirty days, and afterwards it is about fifty per cent. less.

Mr. Burnham, of Chautauqua, said that during the past season he manufactured sixty tons of small cheeses, weighing from seven to nine pounds, seven inches in diameter. They were all round in shape, and sold easily. He could press from nine to eighteen at a time. It cost him about one-half cent per pound more to manufacture small cheeses, this covering all expenses of boxing, bandage, &c. The extra shrinkage made them cost about one cent a pound more than large cheeses, but he could realize from one and one-half to two cents per pound more on the sale of the small cheeses. He manufactured the small and large cheeses precisely alike.

Mr. Geddes, of Onondaga, said that as the small cheeses presented more surface in proportion than large ones, they must necessarily shrink more.

Mr. Bonfoy, of Herkimer, stated that the small cheeses do not need to be made so firm, which would offset, in a measure, the extra shrinkage.

Mr. Holdredge, in reply to queries, said that he used in small cheeses a trifle over ten pounds of milk, on an average, to a pound of cheese. The extra expense for bandage is small. The less shrinkage in small cheeses is accounted for by the action of the rennet, in imbibing moisture from the atmosphere. The small cheeses possess better keeping qualities. In foreign markets they have brought

three-fourths of a cent more than the best large cheeses. He did not advise the running of the whole bulk of manufacture in the State into small cheeses. The thirty-pound cheese is the best for retail sale.

Mr. Burnham said that he boxed his cheese mostly with seven in a box. Most of his small cheeses were sold in his own county—Chautauqua—though many had been sent to New York and to Chicago, and a few to Utica. He knew of no patent on the small, round cheeses.

The discussion of this subject being closed, the Chair stated that it might be called up again on Thursday.

Mr. Church was called upon by the President to address the Convention upon the subject of "Condensed Milk Manufacture," but that gentleman desired that the matter be deferred for a day or two, as the state of his health made it imprudent for him to speak now.

The Chair then introduced Hon. Harris Lewis, of Herkimer, who addressed the Convention on the subject next in order:—

SHOULD NOT EVERY DAIRYMAN PRACTICE SOILING HIS COWS IN CONNECTION WITH PASTURAGE, AND WHAT CROP OR CROPS ARE BEST FOR THE PURPOSE?

Three lessons during the ten years just passed have taught us, or should have taught us, that it would be well for every dairyman to practice soiling his cows, in connection with pasturage. The drought of the last season was the third one, within ten years, that has commenced early in the summer. That of last year commenced early in May, earlier than either of the others, and continued, with greater or less severity, in some parts of our dairy regions until late in the season. We have had here in Central New York two other droughts within ten years, more severe than that of last season; but they commenced later in the year, and we were much better prepared to meet them But the drought of last year, commencing, as it did, in the spring, had so far retarded the growth of grass in pastures that before the end of June, not one pasture to one hundred, was affording a sufficient quantity of grass to supply the wants of the herd dependent upon it, and we all found ourselves unprepared to supply the deficiency with succulent food, which would keep the cows in good condition, and at the same time enable them to maintain a generous flow of milk. The only alternative left me was to feed meadow grass, and as I finished my haying on the ninth day of July, dry hay was all I had from that time until about the middle of August, with which to supply my cows the necessary amount of food. This food kept my cows in good condition as to flesh; but every dairyman present must know that the yield of milk was much less than it would have been had I fed some kind of succulent food, even of much less value than the hay used.

I have now been engaged in the business of farming thirty-six years—a period of time a trifle longer than that allotted to our race as the average of life—and during this time (if my record be

correct), we have had here but eight seasons in which the rain-fall has been in sufficient quantity, and sufficiently often, to induce a continuous growth of grass from spring until fall. Twenty-eight years of this time dairy cows have required some additional milk-producing food to that obtained from ordinary pastures. For the last twenty-five years I have been trying to manage a small farm on my own account; but I must confess that my farming has been of that slipshod, hap-hazard, improvident kind, that four times I have been caught in precisely the same way that I was last season, with no food for my dairy by which the condition of the cows could be maintained, and a good liberal flow of milk secured while the drought continued. During all this time I have been trying to learn, but have not been able to come to a full knowledge of the truth, that we are liable to a drought any, or even every season, like that of last summer.

The continual removal of our forests is constantly effecting a change in our climate, so much so that within a few years, at longest, we may, with good reason, expect almost cloudless skies and hot, parching weather during our summer seasons. The evils resulting from our climatic changes will be still further intensified by the wretched system of shallow cultivation, which is known to prevail throughout the whole dairy region of our country. Horace Greeley has well said in his work, "What I know about Farming," that millions of acres in the Middle and Eastern States, of steep side hills, rocky slopes, and soils too poor to ever pay the cost of cultivation, should be again planted with some useful kinds of timber. In addition to this, timber belts or screens might be planted in every school district in the land, to the very best advantage, if not upon every farm. This would restore to the atmosphere its former humidity, and prevent that intense, dry heat, which will bake, broil and burn every kind of vegetation under the sun. Again, three other things present themselves to us, by which the effects of this drought may be lessened, if not entirely counteracted. And first of these is Irrigation. This may be practiced on very many farms, at a cost which would be paid two or three times over by the increased productions; but to make the system general along our great valleys, by using our large streams, it will require large combinations of farmers, and the use of a large amount of capital. How this can be done, to the entire satisfaction of the individuals interested, so that each one will be satisfied that he is receiving all the benefits he has paid for, and that he is not paying for those which his neighbor enjoys, is to me an unsolved mystery. Perhaps irrigation will come into general use, and be practiced without jars and discords, when every one shall love his neighbor as himself, or when the millennial morn shall have dawned upon the earth.

We may then regard a general system of irrigation, where it is not an absolute necessity, as in the distant and uncertain future, and turn our attention to other means by which we may ward off or mitigate the affects of our droughts. Thorough under-drainage will do this, and so will deep cultivation. These are improvements within the reach of all dairymen, and are of that class which

quickly repay their cost, with compound interest added. I will venture the assertion that under-drainage and deep cultivation are destined to work out a great revolution in the agriculture of this country within the next fifty years. The high price of labor, and the low price of land, has operated against the general adoption of the first; while the great velocity of this fast age has put it beyond the power of most farmers to practice the latter.

Our progression, although rapid, has been of the decreasing ratio, so far as regards deep and thorough cultivation of the soil, or our ability to do so. The heavy, strong, but slow-moving draft horses, and the ponderous, but powerful draft oxen, have nearly all disappeared from our farms, and we now find them replaced (not their places filled), by the gaunt, spindle-shanked, light-stepping horse. This kind of horse will, if well fed and cared for, move a spider-web buggy on a smooth, level road, for a short distance at a rapid rate; but they lack strength and the powers of endurance to so great a degree that, for the purpose of turning up the furrows at any considerable depth, they are almost as worthless as so many cats. These fast horses will do for the sporting gentry, who always have money to bet, but who never have any inclination to pay an honest debt, or the money wherewith to pay; but farmers and farmers' sons will do well to reject them as worthless property on the farm. Inasmuch as the former humidity of the atmosphere cannot be restored by tree-planting for many years to come, even if the work should now be commenced in earnest; and as irrigation is also in the far off future, I would urge upon every dairyman the importance of taking a piece of land convenient to the barn, say one acre to every ten or twelve cows kept, underdrain it in the most thorough manner, then go down, down, down, with the plow, below the gold deposit, or strata, enrich it as every dairyman has the ability to enrich it, and seed this early the next spring with a liberal supply and general assortment of our best grasses, which ripen or mature about the same time. I give this advice with the most perfect confidence that if this system be once commenced, it will be continued, as the means are obtained and opportunities offer, until the entire farm shall have undergone the regenerating process, and the effects of drought are no longer felt or feared.

Land, prepared as above directed, will, when seeded with orchard grass, produce four cuttings of two feet each every season, as long as its fertility is maintained and the cutting done at the proper time. It may be well to remark here that orchard grass, when used for soiling milch cows, possesses a value far above that of ordinary meadow grass, if fed just before, or as soon, at least, as the blossoms appear. At this stage of its growth, if fed to dairy cows with a liberal hand, it will induce a large flow of milk, and that, too, of excellent quality; but if allowed to stand but a short time after blossoming, it loses its value as a milk-producing food rapidly, soon becoming tough, woody, and indigestible. At the head of all forage plants to be used for soiling dairy cows, in connection with pasturage, I would place *lucern*, provided the soil and the cultivation given to it is suited to its habits, meeting all its requirements. The

soil should be a deep, rich, gravel, or sandy loam, naturally underdrained. As the roots strike down to water, and prefer to go down eight or ten feet to reach it, no kind of artificial underdrainage would be of much service after one year. The roots would enter any drain where waters could enter, and soon fill up the best constructed artificial drain. Again, lucern will monopolize the soil upon which it grows, or soon quit it. However deeply rooted it may be, if other plants encroach upon it and obtain a foothold, its day of prosperity is ended, and it will often leave the soil where it grew so vigorous and so well, without a struggle for existence. Lucern is sometimes sown in drills about ten inches apart, so that it may be kept free from grass and weeds; but, if to be fed for soiling dairy cows, it can be fed with much less labor, and in better condition, if sown broadcast on clean, well prepared soil. If the seed is sown in drills ten inches apart, ten pounds of seed is sufficient for an acre; but if sown broadcast, sixteen pounds of seed will be required for one acre. My first choice among all the forage plants for soiling dairy cows, in connection with pasturage, would be lucern, provided I had a piece of land which would be suitable for its growth. My second choice would be *orchard grass;* and my third choice would be our common meadow grass. These may all be cut with a mowing machine, and raked together with a horse-rake into bunches for handling. Corn, although a general favorite with dairymen for soiling, I regard as worthless; its cost, in most cases, exceeding its actual value.

Allow me to suggest the importance of feeding all our forage plants before they pass out of blossom; and what I have said in regard to orchard grass will be found to hold good in regard to all the others. The elements which produce fat and milk rapidly change into seeds after the blossoms appear; the plant grows less valuable every day for soiling, and the root becomes at the same time more and more exhausted, and less able to produce another growth of plant food.

In conclusion, I would remark that, after careful trials for a number of years, I have come to the conclusion that all our forage plants, when used for soiling, in connection with pasturage, are enhanced in value by wilting, or partial drying. When this cannot be accomplished on account of the weather, I have found it advantageous to feed in connection with all our forage plants, and especially corn, a small quantity of dry hay.

Dr. Wight, of Oneida, said his experience had been just the reverse of Mr. Lewis', as regards corn. If the ground is well prepared, and the corn properly sown,—sown broadcast or in drills,—and cut when succulent, he had found the cattle would all relish it, and it would keep them up to their full flow of milk. He had found small clover good for soiling, in connection with pasturage. The only objection that he found with corn was that its use imparted a flavor to the milk.

The President said the Commissioner of Agriculture had sent him a letter, asking his opinion of corn, but he had postponed answering the letter until he should hear the opinion of the members

of the Association upon the point, as he knew that the dairymen connected with this Association were able, perhaps, to answer the question more satisfactorily than any other body of agriculturists in the country. His experience in connection with corn had taught him that, after cattle are taken from pasturage, their milk for a time increases, but afterwards did not, but their vigor was increased. He thought it was the easiest crop of all to gather, if sowed and grown properly. His opinion agreed with that of Dr. Wight. One gain in feeding corn lies in the fact that our pastures are relieved for a while, a great benefit, and the cattle go back to the pastures with an increased flow of milk and increased vigor. He was opposed to pasturing meadows. He thought that far less manure was required for this crop than Mr. Lewis considered necessary. By sowing corn early, and cutting it in August and September, his cattle ate it eagerly. Corn is a nutritious plant, and the amount of water it contains is not large when compared with turnips and other roots. He had used corn as a forage crop for many years, and extensively, and had never doubted that he had been well repaid. He had sown it broadcast, three or three and a half bushels of the western or dent corn, to the acre. He thought it served to invigorate the systems of animals. He did not think the objections to the crop, on account of manure required for it, or on account of the amount of water in it, strong reasons against its cultivation. He very much doubted whether there is any plant that can take the place of corn as a forage or soiling plant. He did not doubt that lucern is a valuable crop; but he thought the attempt to make a forage plant of timothy or common meadow grasses would fail, because he thought they would not endure more than one or two croppings a year. Throughout the Western States the dairy interest cannot be general unless corn can be used as a forage crop. The soil is well fitted to corn, while the seasons are very irregular, and the pastures often suffer from drought. If this crop can be made profitable as a substitute for pasturage, dairying can become general throughout the prairie region. We can make market for our dairy products faster than we can increase our production of cheese. In the matter of grasses, he had found that timothy grows down and gains over grasses. He recommended the seeding of meadows with the best grasses. He had been advised by Mr. Harris that the red clover is the only clover which will succeed here as well as in Europe. Red clover, with sowed corn, he considered the plants mainly to be relied upon in this country for soiling. The question in the raising of root crops is the cost of labor. In our battle for the market of the world, our advantage lies in cheap lands, while in Europe labor is cheap. We can raise cattle cheaper than any other people in the world, owing to cheap land; but our cheap lands in that branch are offset by heavy cost of transportation. It is in dairying, and in cheese-making especially, that we have the advantage, because when our cheese is made, transportation is comparatively low. The products are not impaired by cheap lands. A little while ago cheese-making was a ruinous branch of agriculture. To-day it stands at the head of agriculture, and Englishmen even

had sent men here to try to ascertain how to improve their systems of cheese making, by observing and studying our method. Without exception, there is no branch of agriculture enjoying a degree of prosperity in this country exceeding cattle raising and the various branches of dairying. He hoped to see the people of the United States engage in dairying largely, for we now command the markets of the world. He believed markets could be more easily made than cheese manufactured. He would say that in some western sections trees are being planted to create humidity of the soil. He hoped the Convention would discuss the subject of corn so as to arrive at a definite conclusion, for he deemed its decision of great importance upon dairymen. The Convention should say whether corn is to be recommended for soiling generally in connection with pasturage or not. He hoped some member would introduce some resolution by means of which the sentiment of the Convention could be ascertained. The authorities at Washington having written to him in the matter, he would like to be able to answer them definitely.

Mr. Farrington, of Canada, said when he lived in the Mohawk valley he sowed dent corn very dense, and received good results. It grew small, and was eaten eagerly by stock.

Mr. L. Schermerhorn, of Oneida, had found soiling with corn profitable. He had fed the corn to the cows in a small lot, and this so enriched the soil of that lot that he plowed it and sowed it to corn the next year without more manure, and raised a large yield. He knew of nothing with which we could succeed better than with sowed corn.

Mr. Nicholas, of New Jersey, said the people in Sussex county, in that State, are feeling their way to an improved state of agriculture. England, he said, consumes 130,000,000 pounds of cheese more than she makes, and the United States furnishes 60,000,000 pounds of that amount. The practice of soiling with corn is growing in favor in Sussex county, as it is considered economical and profitable. The value of sowed corn there is dependent upon the state in which it is used, and not upon the variety. They use it when in a milky state, and there is little waste of stalk.

Mr. Chapman, of Madison, said that thirty years ago he sowed his first crop of corn for soiling. He was much pleased with it, and had continued its cultivation until the present time. He had raised four or five consecutive crops on the same piece of ground without manuring. If it is not allowed to ear it does not exhaust the soil much; and corn sowed for soiling should never be allowed to ear. He had made practical and definite experiments in feeding this crop, and had found that when he left off feeding it his cows not only shrunk in their mess, but their milk made less cheese, from the same bulk.

Mr. Dick, of Erie, had found that he could produce more milk from his cows from sowed oats than from corn; but the milk produced by feeding corn was richer and yielded more cheese, than a like quantity of milk produced by feeding oats or clover.

Mr. Platt, of Clinton, had practiced sowing corn for soiling, and

was satisfied it was profitable. He had never sowed his corn on the same ground two years in succession. He manured the ground specially for the crop. When it was taken off it left the ground clear of weeds, and he was in the habit of sowing on it, the next year, wheat or barley and seeding it down. He knew of two dairymen in his vicinity, having the same number of cows, whose bill of delivery on August 1st showed a difference of 3,500 pounds. One of them fed his cows sowed corn after that period, and the other did not. The former, whose bill was the smaller on August 1st, gained the 3,500 pounds and 500 more, before September 19. He considered the experiment a practical and definite one.

One gentleman advocated sowing in drills, and cutting and binding in bundles, and setting up around a stake; or setting it around a stake and binding into one large shock.

Some further discussion took place, leading to the presentation of the following resolution by Mr. L. B. Arnold, of Tompkins:—

Resolved, That this Convention is of the opinion that corn is a valuable product for the dairy farm, and that we commend it as a forage crop.

The resolution was adopted almost unanimously.

Mr. Hawley, of Onondaga, controverted the idea that sowed corn fed to cows improved milk. The best food, and the most natural, is grass. Frequently, sowed corn is cut short by early drought.

Hon. George Geddes, of Onondaga, then moved that the following propositions be referred to a committee of five, to be appointed by the Chair:—

First—The advisability of cultivating corn as a soiling crop.

Second—The best manner of cultivation.

Third—At what time in its growth should it be fed.

Carried.

Dr. Wight, of Oneida, moved a vote of thanks to Hon. Harris Lewis for his very valuable address. Motion carried.

On motion, the Convention adjourned until 7½ P. M.

EVENING SESSION.

Upon taking the chair in the evening, the President announced that there had been a change in the order of exercises by which the address of Mr. Harris, of Monroe, would be postponed, and Prof. G. C. Caldwell, of Cornell University, would now address the Convention on "Methods of Cheese-Making in Europe."

Prof. Caldwell's address, in full, will be found in this volume, beginning at page 25.

The address gave rise to considerable extemporaneous discussion, which would undoubtedly have been considerably prolonged but for the lateness of the hour.

Mr. Arnold, of Tompkins, called attention to the influence of grasses and other feed on the flavor of the cheese. All herbage has such an influence. He had found sweet vernal grass to give cheese a desirable fragrance. Corn, of all kinds, possesses no fragrance, and imparts none to the dairy product; at least none that

is valuable. Meadow grasses, of every kind, do. June grass, he considered, possesses and imparts the finest aroma; timothy and red-top next, and red clover but little. White clover has a better fragrance than red, but is inferior to the grasses proper. He thought from these facts we might gather the lesson, that all feed for the dairy should be selected with a view to this influence that it exercises upon the milk, and therefore upon butter and cheese.

Mr. B. B. Moon, of Herkimer, was quite sure that cows fed on corn or grain, in the spring, or the stalks in the summer and fall, produced richer milk than when feeding only on grasses.

Mr. Hawley, of Onondaga, strongly dissented from the views expressed by Mr. Moon. He contended that the natural grasses produce the best quality of milk when fed to cows. We cannot get as good a flavor from feeding grain as from natural grasses, and grain is much better than corn-stalks. He said farther, that he thought there was not care enough exercised by dairymen in cooling milk, and in a hundred other matters connected with the dairy.

J. R. Chapman, of Madison, sowed four acres of orchard grass, some years ago, and there happened to be in the seed some seed of the sweet vernal grass. This latter, by ripening so much earlier than common grasses, had propagated itself and spread considerably. It now scents his mows; and is eagerly sought by stock. He thought it valuable. The English meadows contain numbers of flowering herbs, of delicious fragrance, which scent all the hay with their aroma. He had also noticed in the hay cut in the towns of Floyd and Steuben, a similar peculiarity of fragrance.

Mr. Bonfoy, of Herkimer, suggested that factorymen keep accurate records of the weather, every day, with a view of learning the influence of the atmosphere on milk and its products. He deemed its influence very great.

On motion of L. B. Arnold, of Tompkins, a vote of thanks was extended to Prof. Caldwell for his able and instructive address.

Gen. Bruce, of Madison, made a telling and congratulatory address to the Convention on the benefits arising from the Association, and urging that before the Convention adjourns, a resolution should be adopted, calling upon the State Legislature to appropriate funds for the establishment of several experimental farms, one of which, at least, should be devoted to dairying, with the view of giving to dairymen,—to butter and cheese makers,—all the light to be derived from a scientific, and practical study and test of the many problems which our calling presents to us from year to year. He knew it would cost money, but it would be the means of saving millions to the farmers of the State; and the money for its conduct could be saved by the Legislature every year, by practicing a little economy in the simple item of the printing of public documents, which their constituents did not care for, and which were wholly worthless.

Mr. Nicholas, of New Jersey, gave some account of the farm connected with the State Agricultural College in that State. It had proved very beneficial.

An adjournment now took place.

SECOND DAY—MORNING SESSION.

In the absence of the President, the Convention was called to order by Hon. George Geddes, of Onondaga. The Finance Committee, L. B. Arnold, Chairman, then reported. Receipts for memberships, reports sold, advertising in Annual Report, and all other sources $1155.06. Expenses, Printing Annual Report,—Lectures; expenses attending Convention, Secretary's salary, postages, and all other outgoes,—$1036.68. Balance in Treasurer's hands, $118.38. The chairman then announced the next order of business, a paper by Dr. L. L. Wight, of Oneida, on

FACTORY BUILDINGS AND FIXTURES.

I propose to make a few suggestions in detail, on the construction of cheese factory buildings and fixtures, and the furnishing of implements.

The manufacturing of cheese by the modern factory system, dating back scarcely ten years, it would not be strange if our buildings and appurtenances were not of the most approved structure. Perhaps it would not be an exaggeration of the truth to say, that no cheese factory in America has been constructed on principles best adapted to secure the desired results—the greatest convenience in point of labor, and the finest quality of cheese. The vast interests clustering around this branch of industry, which has extended itself so broadly through our States and the Canadas, the export of whose products from New York alone, amounts to upwards of 60,000,000 of pounds annually, and the home consumption, we are told, is about 180,000,000 pounds more, per annum, which at 14 cents per pound, about the average of this season's prices, amounts to over thirty-three millions of dollars, which is thus annually distributed among our dairymen—such interests, I say, demand that no pains or expense be spared to furnish buildings, fixtures and implements, the best adapted to curtail the amount of labor required, and increase the quantity, and refine the quality of the production. The first thing to be considered in selecting a site for building, after having secured a sufficient number of cows, is a plentiful supply of cold running water. The quantity should not be less than sufficient to fill a two-inch pipe, for the milk of every five hundred cows. The temperature of this water should not rise above 60 deg. in the warmest weather of summer. Instead of erecting the buildings over some low, marshy, swampy ground, where water, slop and whey will settle and stagnate and infect the superincumbent air, as is too often the case, by all means select some dry, hard, airy location, a little descending to the rear, and with a continuous descent from the building, to insure the escape of all decomposing liquids to a safe distance. The size of the main building should be thirty-two feet wide, two stories high, of eight feet each in the clear, and the length will depend upon the amount of milk anticipated. A building seventy-five feet long will accommodate the milk from five or six hundred cows. Let the piers be made very substantial, extending to a depth beyond the possibility of frost, and not be over about ten feet apart in either direction.

The main timbers, being ten by twelve inches square, support three by ten inch joists, not set in gains, but resting on the cross sills. The joists must be sound and set not over sixteen inches apart, being well bridged. The flooring of the manufactory, made of well-matched, sound yellow pine plank, inclines three inches from the front, to a substantial box drain made in the floor, four feet from the rear. The floor also inclines slightly from the rear to said drain. The drain drops from each end of the manufactory to the center, where it enters another box which conveys all slop, whey, etc., to a safe distance from the building. The entire outside is covered with well-seasoned, matched, sound pine siding. The entire sides and ends of the manufacturing part, inside, are ceiled with pine. The ceiling is well plastered. The curing rooms have floors laid with good sound seasoned spruce flooring. The sides are double plastered so as to make two fixed air spaces. The ceilings are also all well plastered. There need be no posts to support the floor. The second floor is supported by iron rods suspended from bridges in the attic. The entire building is well lighted by double-sash windows, which are supplied with good rotary outside blinds. Thorough ventilation of the curing room is secured by the building being elevated so far above the ground as to admit of an abundance of air; and the insertion of large registers, in each bent, under every counter in the first and second floors; and by good ventilators through the attic floor and roof. By careful attention to these registers, and keeping the blinds closed in hot and sunny days, the temperature can usually be kept at a sufficiently low degree, even in the warmest weather. An ice chamber in the attic, so arranged as to register the cold, moist air into the curing-rooms below, would likely at times be beneficial. The curing-rooms are supplied with counters twenty-four inches high and three feet wide; each table being made of two seventeen inch wide pine plank, with a two inch space between them. Matched boards under cheese are objectionable, from the greater difficulty of cleansing and the danger of skippers infesting the cracks. It is better to have the counters two feet distant from each other for the convenience of the laborers, cheese-buyers and visitors. The manufacturing room will be separated from the curing room below by a tight double partition, with a large sliding door in the center, between the two lines of presses. The length of the manufacturing and pressing room, in a building of the size above mentioned, would be thirty-five or forty feet. The boiler room, and wood or coal room, will be erected at the end and adjoining the manufactory, having easy entrance thereto. A building about thirteen feet square should be attached to the front of the manufactory, containing a driveway and a receiving platform. The platform will be closed toward the driveway, except a slide window to receive the milk through, and be open toward the vats. The center of this building will correspond to the center of the vats, so that the receiving-can may stand equi-distant from each outside vat. The ground of the driveway is four and one-half feet below the top of the weighing-can. The receiving platform is about one foot higher than the top of the milk-vats. This building is supplied with means to hoist the cans

of milk, either by a crane derrick, or, what is preferable, a hoisting wheel. Permit no faucets in the transporting cans, as they cause the milk to taint when not cleansed thoroughly, and are liable to be neglected. The wooden vats being about fifteen feet in length, it gives three feet between the receiving platform and the end of the vats—two feet between the vats and the curd sink—two feet between the curd-sink and the presses, and two feet between the presses and the rear of the building. The vats are separated two feet from each other, and three feet from the end of the building. The wooden vats almost invariably leak, and I think it would be better to have them lined with sheet lead. The tin vats should be made of the largest sheets of tin, of the best quality, and be soldered together very smoothly. The wooden vat should rest upon a frame-work extending the one-half length of the vat, and not coming to the edge or upper end within four inches. The wooden vats should not be incumbered with legs extending to the floor, to be in the way of the feet. The most convenient way of raising and lowering the foot of the vat is by means of a standard, spring and catch, attached to the floor and the lower end of the vat. The space between the last vat and the curing room will accommodate two tiers of presses, and give sufficient room for storing salt, for rennet and annatto jars, for hanging syphons, conductors, pails, and knives;—for washing-sink, hot and cold water barrels, etc., etc. Supply each milk vat with a water pipe of at least three-quarters of an inch bore. The water, after having circulated around and cooled the milk, will be conducted to a water wheel and furnish the power to move the milk agitator, of which Austin's patent is recommended. If the factory is to receive the milk of five hundred cows or over, get a steam engine of not less than two horse power, the boiler being not less than a six horse power. It requires the expenditure of a large quantity of steam to warm the milk, and you want to be sure of it just when you need it; and the engine will enable you to pump water into the boiler, to grind your curds, to churn, if you wish, to saw your wood, or perform what other service soever you may desire. If you have a less number of cows than above indicated, a patent heater manufactured by Charles Millar & Son, of Utica, will heat the milk gradually and very perfectly, and gives general satisfaction. If you do not grind your curds you will need two curd-sinks, so as to give greater facility for cooling the curds before putting to press. Your milk conductors will be large, stout, and open at the top to insure easy cleansing. Procure a good curd-mill to be used at least in hot weather. You want one gang knife of thirty blades, with one-fourth inch spaces, and one horizontal curd knife. If you use a steam boiler, use the steam dry, after the the method patented by Mr. Schermerhorn. Altogether, the best method of warming the curing room is by steam from the boiler. This gives a more equable temperature and a moister, purer atmosphere. The next best mode of heating is by a furnace, well supplied with water for evaporation. Wood or coal stoves do not sufficiently equalize the temperature. Having an ice chamber in the attic, you can perform the double operation of cooling and moistening the

rooms at any time. Curd rakes, to keep the curd from packing, are nearly as indispensable as curd knives. The patent horizontal press, pressing a number of cheeses at once, with one screw, will come into general use when the patentee has learned to obviate the difficulty of making an indenture or crease in each cheese, which harms their appearance, and supplies an excellent place for the generation of skippers in fly time. The followers must the fit hoops very nearly, or if not, the use of the rubber ring is necessitated. The use of this will hinder the curd from passing up between the hoop and the follower. In very hot weather, however, the acid in the whey soon decomposes the rubber and necessitates new purchases. No press cloths are needed. The rings and staples in the followers you buy are worthless, and should be replaced by your blacksmith, before attempting to use them. Turning covers are not wanted, even if the patentee will pay you for using them. Fairbanks' scales are the most reliable and give the best satisfaction. In weighing cheese for market, use a suitable sized counter scale, which you can slip along readily on the counter, as you weigh each cheese, before before being boxed. Give good up-weight in this manner, and there need be no trouble about having short weights returned upon you. Fine cap cloths give the smoothest rind. A convenient door will be made in each end of the second story, and in the end of the curing room below, through which the cheeses may pass to the wagons on shipping. The boxes may very readily be slid from the second story to the wagons, on properly constructed skids.

It may be thought that I have gone into unnecessary details, but if those contemplating a new construction of factories, or a rebuilding of those they have, should here find any hints or suggestions which save them from unnecessary trouble and expense, or give them additional facilities in the manufacture of fine qualities of cheese, the hopes of the writer will meet with their full fruition.

Some discussion followed the reading of this paper.

Hon. Z. Platt, of Clinton, had found many new factories with the presses placed in another room from that in which the manufacture takes place. He wished to know whether there was any necessity for this.

Mr. Lewis, of Herkimer, said that we could not be too careful in keeping from the milk in the vats of the manufacturing room any foul odors, such as are likely to arise from the whey draining from the presses.

Dr. Wight, in answer to a question about the desirability of using the pretended patent cheese-rail and set, said that he *very much* preferred the counter.

Mr. Chapman agreed with Dr. Wight in this matter.

Mr. Wire, of Ohio, had never used tables. He did not think there was any necessity for odors about factories. He never allows a drop of whey to touch the floor; and there is, by this plan, no need for a ditch under the floor, and he would never have any ditches or waste whey to be carried off by it.

Mr. Dick, of Erie, had a living stream of water running under

the factory continually. He had no stench about his factory, though there was a smell peculiar to a cheese factory, and he had never found any factory from which this smell is absent. But it does not injure the milk in the manufacturing room, because the odor is perfectly sweet.

Mr. Burnham, of Chautauqua, preferred hemlock or white wood for counters, to pine.

IS THERE A GRADUAL DECLINE IN THE AMOUNT OF DAIRY PRODUCTS IN ALL OUR OLDEST DAIRY REGIONS? IF SO, WHAT IS THE CAUSE, AND WHAT THE REMEDY?

Discussion upon this question was opened by X. A. Willard, Esq., of Herkimer, Dairy Editor of the *Rural New Yorker*, who read the following paper:—

Mr. President and Members of the Association:—In the printed programme of topics to be considered by this Convention, I am announced to open the discussion upon the question as to whether there is a gradual decline of dairy products, in our oldest dairy regions, and if so, what is the cause, and what the remedy? In justice to myself, I desire to say that I was quite unaware that this topic was to come before the Association, or that I was expected to take part in any discussion, until notified of the same by the printed programme sent out by our excellent Secretary.

The question is one which demands such a mass of facts and accurate statistics, not easily attainable, that I am quite unprepared to enter upon its discussion with any degree of satisfaction to myself, or, I fear, of usefulness to others.

Mere opinions, unless founded upon facts, are comparatively of little value to the argiculturist. The practical men of this age are more interested in what has been wrought out by experience or observation, than in any mere conjecture, or opinion founded on loose statements, or fictitious evidence. Of these latter we have such an abundance that one is often confused in sifting out the truth.

The statement is made on the authority of the *Ohio Farmer*, that for the past ten years there has been a gradual decline in the dairy products of that State. The statistics given show that in 1860 there was a larger amount of cheese and butter made in the State than in 1868. These statistics are as follows:

	POUNDS BUTTER.	POUNDS CHEESE.
1860	38,440,498	24,816,424
1861	35,442,858	20,637,253
1862	34,065,629	20,752,097
1863	31,121,275	19,130,750
1864	31,141,876	18,097,095
1865	32,450,139	16,947,905
1866	36,344,608	22,198,929
1867	34,833,445	19,985,486
1868	37,005,378	17,814,599

Now, taking the amount made in 1860, 38,440,498 pounds of

butter, and 24,816,420 pounds of cheese, as a standard, we find the decrease in the subsequent years, from this standard, as follows :—

	BUTTER.	CHEESE.
1861	2,997,640	4,178,167
1862	4,374,869	4,064,323
1863	7,319,223	5,685,670
1864	6,298,622	6,719,325
1865	5,990,259	7,868,415
1866	2,095,890	2,617,491
1867	3,607,053	4,830,936
1868	1,435,120	6,991,821

In 1869 Geauga county produced 4,534,980 pounds of cheese ; Trumbull county, 2,988,564 ; Ashtabula county, 2,771,810 ; Lorain county, 1,985,946 ; Portage county, 1,949,527 ; Medina county, 1,449,696 ; Summit county, 1,428,743 ; Cuyahoga county, 1,342,-464 pounds.

These are the great cheese counties of the State, none of the others reaching a half million of pounds, and most of them but a few thousand pounds.

These statistics, if correct, show an entirely different state of things from what has been commonly supposed. They show that the whole State of Ohio has dwindled down in the dairy business, until she is about equal in production to Herkimer county in this State. And it certainly would be interesting to know the causes ; whether, under the factory system, a considerable portion of the milk and curds have been wasted ; whether it be due to a less number of milch cows or their general inferiority ; whether the dairy business in Ohio is being abandoned, instead of being extended over new districts ; and, finally, whether there has been a series of unfavorable years in Ohio, where the product has been cut off by drouth, insects, or other causes operating to the depreciation of pasturage, and other forage crops.

I am unable to answer any of these questions definitely, but I presume there are persons here from the West, who may be familiar with some of the causes that are operating against the increase of the dairy product in that section. But these statistics are useful in a commercial relation. They show how very unreliable have been the vague or random estimates in regard to cheese production, from year to year.

Some of our dairymen have been greatly alarmed at the prospect of over-production, and year after year the argument has been used that immense quantities of cheese were manufactured in Ohio, which must necessarily have a controlling influence in reducing prices on the product of the whole country. Had it been known, from year to year, that the whole make of cheese in that State was not much above the annual product of Herkimer county, much less alarm, I think, would have been felt. And it may be remarked here, that much injury is done to the farmers of the country by over-estimating production, and spreading abroad unfounded statements in regard to enormous yields of dairy and other products.

I have had occasion, year after year, to caution the dairy public against these over-estimates, which, in whatever way they get afloat, always operate in the reduction of prices.

Now, taking the oldest dairying district in this State, Herkimer county, I can give the exact figures of the shipments of dairy products for several years. The statements are made up from the books at the several depots where cheese has been delivered. If there are other old dairying counties in the State where a record has been kept for a series of years, such record would throw much light on this question, but I doubt whether any such statistics have been made up; at least none have come to my knowledge.

We have the census reports, showing the product at intervals of five years, but, with the exception of Herkimer, the dairy was not made so exclusive a business in other localities, ten years ago, as in the latter county, and hence many counties have extended the business and show an increase. In Herkimer county for the year 1855 the butter product, according to the United States census was 1,305,377 pounds, and the cheese 9,068,519 pounds. In 1860 the number of cows in the county was 41,516; butter made, 1,251,872 pounds; cheese, 10,901,522 pounds.

HERKIMER COUNTY SHIPMENTS.

	CHEESE.	BUTTER.
1864	16,767,999	492,673
1865	16,808,352	313,755
1866	18,172,913	232,961
1867	16,772,031	204,385
1868	15,734,920	241,682
1869	15,570,487	204,634

Thus it appears that the cheese product of the county steadily increased until 1866, when the largest product ever made in the county was obtained. Since that time the product has been decreasing, falling short in 1869 about two and a half millions of pounds below the make of 1866. Since 1866 the number of factories has increased from 31 to 62, or, the number has been doubled.

Now, I think it may be safely said, so far as Herkimer county is concerned, at least, that a less average yield of cheese is made per cow at the factories than at the farm dairies. This may be different in other sections, where cheese-making is not so well understood generally, among the people, as in Herkimer.

I have taken some pains to examine this subject, and I feel quite confident I am correct. I know that in individual cases, and in certain neighborhoods, the average at the factory has been less. I can name men that, twenty years ago, would turn off during a good season, 600 pounds of cheese per cow, and that, too, from the common or native stock of the country. I have accomplished it in my own herd; others have made more; but I know of no factory that has made that yield for a single dairy among their patrons, at least for no dairy of any considerable size. Now the decrease in cheese production may in part come from this source, viz.:—the increase

of factories. But there are other causes operating in Herkimer county, by which the cheese product is affected, and one of these causes is abortive stock.

I think, of late years, there has been a more general disposition to keep over such stock—to milk up abortive cows when possible, and to worry through the trouble in this way, from year to year, hoping for better luck in the future. Of course such stock must yield a much less quantity of milk, and some may possibly regard this course as of doubtful economy. But, with cows at $70 to $80 per head, it is a serious business, I can assure you, for the farmer to change stock every year. I know of men whose losses have been from $1,000 to $1,200 per year in thus making the change, and these sums annually, for a series of years, eat ugly holes in the farmer's receipts, and take the *tuck* so out of a man, that he is disposed to adopt the course I have named.

I shall not encroach upon your time and patience in speculative theories in regard to this terrible scourge, for I do not know as the learned doctors and State Commissioners have arrived at any suggestions that are of practical utility in mitigating the evil. But I cannot pass over some of the growing faults in dairy management which are constantly coming under my observation.

In the first place, it must be observed that the old native or common stock of the country was more hardy and vigorous than that which now generally obtains. Since the introduction of grades of improved blood, our stock appears to have less vigor, and is more liable to disease. I believe this rule holds good with all cultivated breeds. The improved breeds demand better care, and will not endure neglect and abuse like the more base material. I am in favor of improved breeds and improved stock, but the point I wish to urge is a more careful treatment of it. Now, so far as my observation goes, the general treatment of stock is in some respects more faulty than it was years ago. It is true we have better and more convenient barns, but stock are now more entrusted to inferior help, and there is not that careful watchfulness and family interest in it that there was formerly. Farmers' sons and daughters to-day are of a different stamp from what they were twenty or even ten years ago. We have more pianos, and more fast horses, and less real interest in farm work. You see a great many dairy farmers now retiring from direct farm management, and entrusting their farms to tenants. Now the system of renting dairy farms in this country is all wrong. The stock should be the property of the tenant, or at least should be owned in common by tenant and landlord. It is not natural that a tenant should take that interest and care in his landlord's stock that he would were it his own, or were he a part owner in it, and the result is that cows are kicked and banged, and dogged, and stoned, and kept in a constant tremor of fright and nervousness. Fences, too, are not kept in good condition, and the herds break over, and are made to return the best way they can.

These things are telling on the stock of Herkimer county, and you find more diseased udders, more lame and ailing cows now

than formerly. These are some of the causes which, in my opinion, are operating disadvantageously upon the dairy interest of Herkimer county, and if they are allowed to continue, will press still more heavily upon that interest.

That there is any general depreciation in the fertility of the soil, by which less stock can be carried now in Herkimer county than formerly, I do not believe, and I speak advisedly on this point, having paid some attention to it in the examination of farms.

I have not proposed to make an elaborate essay upon the topic now before the Convention, but have merely presented some facts, by way of opening the discussion, in the hope of hearing it fully and ably treated by speakers who are to follow.

Some discussion followed the reading of the paper.

Mr. Farrington, of Canada, had heard, years ago, that the pastures of Herkimer county were deteriorating.

Mr. Willard thought that there was no diminution in the fertility of soil; but a want of proper cultivation may prevent their carrying as much stock as formerly. He did not believe that there has been a decrease in the number of cows in Herkimer county since 1866; nor did he think that more grain was grown there now than at that time.

Mr. Moon, of Herkimer, said he believed it is an admitted fact throughout the country, that the quality of the cheese has been improved, since the introduction of the factory system, but somewhat at the expense of the milk.

The reason for this opinion was that we now make our cheese much firmer than formerly, that they may be suitable for export. To do this we are obliged to use more milk than heretofore, when a softer cheese was made.

On motion of Dr. L. L. Wight, of Oneida, the subject was now laid on the table.

IS THERE ANY WAY BY WHICH PATRONS OF BUTTER AND CHEESE FACTORIES CAN RECEIVE CREDIT FOR THE MILK DELIVERED, ACCORDING TO ITS ACTUAL VALUE, AND NOT ACCORDING TO ITS WEIGHT OR MEASURE?

The discussion of this question was opened by Hon. Harris Lewis, of Herkimer, who spoke substantially as follows:—

He said he had not been notified of this appointment in time to prepare any paper on the subject. He, however, deemed it one of great importance, as he thought no little injustice is done by the present system of receiving milk by weight. The richer the milk, the lighter it weighs, and *vice versa*. By this system there is no inducement for patrons to improve the milking qualities of their stock, or to feed them highly, so as to produce milk of the very best quality. The value of milk for making cheese is dependent on the following points, the amount of cream and casein it contains; the amount of water; its freedom from filth, and its keeping qualities. The first two items can be discovered by the lactometer, the last two by setting samples taken from the can of each patron. By provid-

ing a per cent. glass for each patron, and testing milk carefully and frequently, by the aid of all the means within our reach, and by recording the specific gravity of the milk, the relative amount of cream which rises in a given time, and the number of hours the milk will keep sweet, we are put in possession of data which will enable us to give to each patron credit for his milk according to its actual value. He thought such a plan desirable and practicable.

Mr. Lewis, then, upon the question of privilege, which he had asked upon rising, referred to the discussion of the day previous, on his estimate of corn for soiling. He had since found, by referring to his farm accounts, that he had made some erroneous statements in his paper. He found that the poorest corn crop he had ever raised *did* pay, after deducting the cost of manure used on the crop. The amount of manure required, too, was not so much as he supposed. The President and other gentlemen had presented the subject to him in a new light, especially when the President referred to the ease with which the crop could be raised in the west and at the south, where grass could hardly be made to grow at all during the hot, dry season. He believed the subject of soiling second to none that had come, or would come, before the Convention. The one next in importance is that of what plants to use. He would suggest, in order to decide this, that every dairyman institute experiments for himself in the following manner: Let him divide his herd into two parts; carefully weigh each cow; feed one half on one plant, say corn, the other half on clover or lucern; at the end of two or three weeks, weigh the cows again, and compare the weight of their milk for that time; then reverse their food, and at the end of two or three weeks more, repeat the weighing and comparing process, and carefully note the result. Such an experiment would be of incalculable benefit to the community. He proposed to do this himself, and report to the Convention next year. He gave the milk account of two dairies which had delivered their milk at the factory near his house, in the town of Schuyler, the past season. It was taken from the Treasurer's book of the factory, last night, and he could vouch for its accuracy. The dairies numbered the same, were on farms as nearly alike as could anywhere be found, and all attendant circumstances were precisely the same, with the exception of the feed used for soiling them. One was soiled with grass, the other with corn, the soiling season beginning August 1, and ending October 31. The yield of the grass-fed herd, for that time, was 90,288 pounds of milk, and of the corn-fed, 79,452. The grass fed dairy gave a little more milk before the soiling began than the other, but there was nothing like the difference that was seen afterwards. With some facetious remarks upon the usage he had received from his antagonists on the corn question, Mr. Lewis took his seat, and the discussion of the original question was resumed.

Mr. Moon did not think there was enough difference in the richness of the milk of cows, in the immediate locality of any particular cheese factory, to make the system of receiving milk by weight objectionable.

Mr. Farrington, of Canada, and several others thought such nice

methods of testing milk, as those suggested by Mr. Lewis not practicable.

Mr. Farrington, of Tompkins, had found no difficulty in making such tests. He had been accustomed to make them once a week, with a view to finding whether his patrons were honest.

Mr. Arnold, of Tompkins, had had similar experience. He had found by such tests that there was a wide difference in both the cream and specific gravity of milk from dairies, on the same day. The range of cream had often been as wide as from 6 per cent. to 13 per cent.; and the specific gravity from 84 to 100. He had also made inquiries about the feed and water which dairies so differing had; and he had always been able to satisfactorily account for the differences. When a herd is turned from an old pasture to clover, the milk immediately drops down in specific gravity and in cream, and *vice versa*. The same result was perceptible in the yield of cheese. He considered the system recommended by Mr. Lewis and by Mr. Farrington, of Tompkins, entirely practicable. It required some skill and care, but not an unusual amount. He had arranged a scale for the tubes used for setting samples of milk in, by taking a strip of paper and dividing it into a hundred equal parts and sticking it behind the tubes. The amount of cream that would rise could thus be accurately ascertained.

Dr. Wight thought the subject one of very great importance, but thought the weighing system the only practicable one at present. Even after such experiments as those described by Mr. Arnold and others had been made, they were no nearer to a satisfactory method of determining and apportioning the value of each patron's milk than they were before. Science had not yet discovered reliable and practicable means for getting at such exact results. Meanwhile, he believed the great need of the dairy community was an experimental factory, where there could be efforts made to discover such methods, and reduce their application to a practical system.

Mr. Scovill, of Oneida, then introduced the following resolution:—

Resolved, That a committee of seven be appointed by the Chair, to whom shall be referred the subject of adopting an equable standard of value of milk delivered at factoires, according to its actual quality, rather than its weight, and that said committee report to the next annual Convention.

Hon. Harris Lewis, of Herkimer, said every one in the dairy business knows that rich milk weighs lighter than poor milk, and that great injustice would be done by retaining the weighing system. Encourage men to bring to factories good milk, by adopting the plan of testing it as he had indicated.

Dr. Wight, of Oneida, again contended that our present knowledge on these points is insufficient to justify us in adopting such a system. Greater injustice would inevitably be done, and a source of endless disputes and troubles be introduced.

Mr. Farrington, of Tompkins, earnestly supported the adoption of the plan indicated by Mr. Lewis, and adopted by Mr. Arnold and himself.

Mr. Moon, of Herkimer, moved as an amendment that the com-

mittee consist of three members, instead of seven, and report tomorrow. Amendment carried. Motion as amended, adopted.

The Convention, on motion, adjourned until 1:30 P. M.

AFTERNOON SESSION—WEDNESDAY.

Mr. Dick, of Erie, offered a resolution that no person in the Convention be allowed to speak more than once on any question, until all have spoken who may desire. Resolution adopted.

CAUSES OF TAINTED MILK AND FLOATING CURDS, AND THE REMEDIES.

The discussion was opened by Mr. S. A. Farrington, of Tompkins. Every factoryman knows the importance of this subject. The first cause mentioned was the feed of cows. This has a great deal to do with the milk of the cows He had two factories under his charge the past season. The cows, whose milk came to one of them, were pastured on low, clay soils. Their feed was very poor, and during the hot weather it was impossible to make good cheese from it. It was diseased before it came to the factory. The cows at the other factory, had good, nutritious grass, and it was easy to make good cheese, and no trouble was experienced with floating curds. A second cause was the bad health of the cow. This was too evident to need much illustration, as the cow is but the manufacturer of the milk, and if her body is diseased, the milk will be. A third cause, is the treatment of the cows. Good milk cannot be drawn from the cow when she is heated by driving, or injured by bad treatment. The fourth cause, was bad water. This is akin to bad feed and needs no explanation. The fifth cause, is uncleanliness of utensils. For patrons to send milk in dirty cans, or confining it in close cans where it receives the heat of the sun, is unfair toward the manufacturer. Such milk will become quickly tainted and will cause floating curds. The sixth cause, is bad odor in the atmosphere. He gave an instance of the influence of this cause. He had great difficulty in making the milk in one vat into cheese, a year ago last summer. He traced the difficulty to one dairy; and on following the matter still further, he found that the carcass of a dead horse was lying in the pasture of that herd. The carcass was buried, and there was no further difficulty experienced. It makes no difference whether the air comes in contact with the cow before she is milked, or with the milk after it is drawn from the cow. Thus far he had only spoken of causes dependent on the negligence or uncleanliness of the patrons. He did not intend to excuse any carelessness on the part of the manufacturer. The seventh cause is that of uncleanliness at the factory. There is not attention enough paid to draining off the whey from the factories. When whey is putrid, it gives off a very offensive and injurious odor. In fact, every item of uncleanliness about the factory has a tendency to produce floating curds. The last cause mentioned was tainted rennet. The remedy for these evils—one which he had found efficient in his own practice, was that of grinding floating curds. He made up tainted milk just as he did any other milk. Draw off the whey as soon as any acid is per-

ceptible, and let it undergo a process of digestion. Then grind it. The object of grinding it is to get the whey out of the curd; and this cannot be done without grinding or breaking up into small lumps, and exposing to the air. This remedy applies only to the manufacture of the milk; but the fundamental remedy is good feed and plenty of water for the cows, and entire cleanliness about the farm, the barn, and all utensils.

CHEDDAR PROCESS OF CHEESE MAKING—GRINDING CURDS.

The chair introduced Mr. Alexander Macadam, of Montgomery, who read the following valuable paper on the topic above indicated:—

I have been requested by the Secretary of this Association to prepare and read a paper to this Convention, giving a complete account of how the milk was manufactured into cheese at the Smith Creek Cheese Factory. But I perceive by the circulars issued, and by the newspapers, that the subject marked out for me is "Grinding Curd—is it advantageous or otherwise?" I will give a description of the grinding process as I practice it, and state some of the reasons why I practice it. As you are probably all aware, the milk that is delivered at cheese factories is not always in the same state, sometimes being tainted or partially putrid, sometimes sour, or nearly so, and sometimes it is, what it always ought to be, perfect. I propose to describe the process, first, when the milk is right and good; second, when it is partially sour, and third, when tainted.

The evening's milk, when delivered at the factory, ought to be cooled so as to reach a temperature of 58° to 62° in the morning. When the morning's milk is added, it is heated to 80°, then enough rennet is added to coagulate the mass in as nearly forty minutes' time as possible. When the curd has attained sufficient consistency, it is cut four times—twice with the horizontal curd-knife, and twice with the perpendicular one, with a short interval between each cutting. The curd is then gently manipulated and heated to 96°, care being taken to prevent the curd from packing on the bottom of the vat; the time required for heating being from an hour to an hour and a half. The stirring is continued for ten or fifteen minutes after this heat has been attained, and the curd is then allowed to pack on the bottom of the vat, where it lies undisturbed until the separation of the whey from the curd becomes necessary. Up to this stage the process is almost identical with that practiced in manufacturing cheese in the usual manner.

In the manufacture of American cheese (I will so designate the method usually practiced, to distinguish it from the grinding process, which I will term *Cheddar*,) it is of the utmost importance to determine the precise time at which to separate the whey from the curd, and it is also an operation requiring the greatest amount of skill and experience, as well as the exercise of the nicest sense of taste and smell. But in the manufacture of Cheddar cheese it is not of the same vital importance, as the whey can be separated from the curd from half an hour to an hour and a half before acidity is developed so as to be perceptible; and, on the other

hand, the whey can be left on the curd till the acid is distinctly developed, without materially affecting the quality of the product. As the acid or souring generally makes its appearance about noon, in summer, the Cheddar system gives factory hands more time for dinner, and consequently they can masticate their food, instead of having to bolt it, as has to be done in many cases. When the whey is drawn off, and the vat tipped down on one end, the curd is then heaped on each side of the vat, leaving a space in the middle to allow the remainder of the whey to pass off. I may here state that when the "shute," or flood-gate, is not used, there ought to be, in the Cheddar system, a faucet in the vat, to allow the whey to pass off as it drains from the curd. After the curd has laid in a heap on the bottom of the vat for fifteen to twenty minutes, and the original particles of curd have become amalgamated into a solid mass, it is then cut into convenient pieces with a knife, and turned over, and so left until the curd has become sour enough for grinding and salting, which is determined by the taste of the whey that drains from the curd. This whey should now have a sharp, sour milk taste, which can be understood by any intelligent cheese-maker, after a few days' experience. The curd is then torn by hand into strips of two or three pounds weight, and allowed to cool for a short time, in order to allow the butter in it to become solid enough so as not to escape during the operation of grinding. The curd is then ground into pieces, averaging about the size of hickory nuts. Five hundred pounds of curd can be ground by hand, with Macadam's curd mill, in from five to fifteen minutes, according to the toughness of the curd and the muscle of the operator. The salt is then immediately added and mixed thoroughly, at the rate of from $1\frac{1}{2}$ to $2\frac{1}{4}$ pounds per 1,000 pounds of milk, according to circumstances. The curd is then ready to be put into the hoops for pressing.

2d. Mode of procedure when the milk we have to handle is (from whatever cause,) sour, or partially so; and such cases are liable to happen in any factory, however well regulated. You are all aware that when milk is partially sour, it will coagulate in the same time as sweet milk with the addition of considerably less rennet. But to such milk I usually add more rennet, instead of less, so as to have the coagulation occur very quickly. As soon as the rennet has completed its office, I commence cutting and working the curd much more rapidly than usual. In such cases I use very little heat in scalding—seldom heating over 86° or 90°, according to the severity of the case. Indeed, in some instances, when the milk is *very* sour, I do not think that it is advisable to heat the curd at all after coagulation. I reason in this way: just as good cheese can be made without scalding at all, as with it; the reason that we scald the curd (if heating it to a temperature of 98° can be called scalding,) is to develop the acid sooner, and if, when the curd is inclined to develop acid sooner than usual, we heat it to a temperature of 96° to 98°, we hasten the action of the acid, which is the very thing we are trying to avoid. In other words, when the acid in the curd is developing too fast of its own accord, we develop it still faster by

means of heat, and thus aggravate the evil. After this curd is cut up, the whey must be removed from it as fast as it makes its appearance, and as soon as practicable, the vat must be tipped down, and the curd thrown to the upper end of the vat. The curd at this stage is very sloppy, as it contains considerable whey. One person should now cut it into small pieces with a knife, and another be employed in turning the pieces over and piling them up in heaps, so as to liberate the whey, which passes off in a continuous stream. When the curd has assumed a proper consistency it must be ground and salted; the quantity of salt used must be according to the amount of whey contained in the curd, which is generally, in such cases, considerably more than usual. In extreme cases, the whole process, from the adding of the rennet to the mixing in of the salt, can be performed in less than an hour.

To explain why more rennet is needed when the milk is partially sour, I will refer to the address delivered by Professor Caldwell last year, before this Convention, and also to the able and highly useful paper read by L. B. Arnold, Esq., on "Rennet, its nature and use," before the same Convention. These gentlemen demonstrated to us very clearly that the acting principle of rennet consists of minute globules, or spores, which feed upon nitrogenous substances, and when placed in such, at a favorable temperature, multiply very rapidly. Now a quantity of rennet, containing a vast number of these spores, placed in a vat of milk which is highly nitrogenous, at a temperature of 80°, which is favorable to their growth, will multiply in a short time to such an extent as to cause its coagulation. And their action by no means stops here. They have still a very important mission to perform, viz.: that of curing or ripening the cheese. And if the presence of these spores (Micrococci, I think they are called,) in the cheese, cures or ripens it, an excess of them will ripen the cheese more quickly, and *vice versa*. Now we all know that a sour cheese, or a cheese which contains an excess of sour milk spores, (Arthrococci,) takes a much longer time to ripen than a sweet cheese, and *vice versa*. Therefore, to have a cheese cured in a given time, the spores of the Micrococci and of the Arthrococci, must be contained in it in relative quantities. So, when we have a vat of sour milk to handle, where the Artlrococci are in abundance, we must add more rennet to counterbalance their action on the nitrogenous ingredients of the milk, and thereby cause the cheese to ripen much quicker than if less rennet had been added.

I have found by experiment, during the past summer that cheese made from sour milk in the above manner, will cure as fast as other cheese, but they will require more annatto to make them of the same color, these sour milk spores appearing to have a destructive effect upon annatto. I have likewise noticed that such cheese will have more tendency to mould, but the flavor will not be objectionable.

3. When the milk is tainted, or has an excess of putrefactive spores, which are also Micrococci. This tainted milk occurs, in some localities, in hot weather, no matter what care is taken in cleaning the utensils with which it comes in contact, and I think that the

milk is damaged in most cases before it is drawn from the cow. But of course it can be greatly aggravated by being brought into contact with unclean milk-pails, strainers, cans, &c., which have not been properly cleansed, and therefore contain numbers of those putrefactive spores clinging to their seams and crevices, and which spring into new life and activity on being brought into contact with the warm milk. During the past season, from the middle of June to the middle of September, in a factory of over 900 cows, I did not have a vat of milk which was not tainted, most of it very badly, and over one-third of it so much that the curd floated. The cheese made from this milk sold for the highest price in the Little Falls market. In handling such milk, I prefer to have the temperature of the evening's mess about 68° or 70° in the morning, before the morning's milk is added, for two reasons. First, it has been shown that the putrefactive spores are in great abundance in such tainted milk; by leaving the evening's milk through the night at a higher temperature, we promote the growth of the Arthrococci, or sour milk spores, and these check the growth of the Micrococci, and counterbalance their action to a certain degree. Second, when the milk is left through the night at a higher temperature, a great number of the putrefactive spores pass off in the form of gas, especially where the milk agitator is used. This we known by the foul odor it emits when warm, but when the milk is cooled to a low temperature, this gas is not so volatile, and does not escape so readily, as we can perceive by its emitting little or no smell. But the cooling of the milk does not kill the Micrococci; it only partially prevents their escape, and though at the same time cooling the milk, also retards their growth as well as their escape; it also retards the growth of the sour milk spores, and these are a much more efficient agent for the prevention of putrefaction than cooling is. Therefore, I maintain that the less tainted or putrid milk is cooled, so as not to be absolutely sour in the morning, the better the product obtained will be, if the milk be properly handled. I know that some cheese-makers prefer cooling such milk to as low a temperature as possible, and add sour whey with the rennet in the morning, and have very good success, but I prefer the former method, as by it the formation of the putrefactive spores is checked at a much earlier stage of the proceedings. With this difference of cooling the milk, my process is the same with tainted milk as with good milk, until the separation of the whey from the curd. When tainted, we allow the whey to remain on the curd until acid is slightly perceptible, whether the curd floats or not. The whey is then drawn off and the curd handled as before. If the curd is badly tainted, while lying in a mass at the bottom of the vat, it will swell up to twice its original size, like dough under the action of yeast, and when broken, emits a very offensive odor. The exact degree of acidity to be allowed to develop at this point is the most important, as well as the most difficult, thing to determine in the whole management of floating curds, as the odor and taste of both the curd and the whey that drains from it very much resembles acid, and is, in a great many

instances, mistaken for it. The acid ought to be developed just enough to kill the taint, and no more, and the result, notwithstanding the assertions of some to the contrary, will be a fine cheese. After the requisite amount of acid has been determined upon, and the curd ground and salted, (using the same amount of salt as when not tainted,) the curd must be cooled and ventilated as much as possible, before being put to press.

I do not pretend to say that cheese can be made from tainted milk and floating curds, possessing quite as much of the fine nutty aroma, as from curds properly handled which are not tainted at all. But I do assert that I have seen cheese made from floating curds, in several factories during the past summer, that were perfectly close, rich, and meaty, having no objectionable flavor, and which not one expert in ten would object to.

One other fact I wish to mention. It requires more milk when tainted, to make a pound of cheese, than when it is not. One reason for this is, that more acid must be present in such cases, and, of course, the more acid the less cheese. In the Smith Creek Factory, last summer, it took two pounds more milk to make a pound of cheese in July than it did in April.

I have endeavored to tell you how I practice grinding curds. I will now try to tell you why I practice it. In the first place, I think that it requires less milk to make a pound of cheese; in the second place, it does not tax the judgment of the cheese-maker so much, or require so much skill and attention ; and, in the third place, I think that cheese made by the Cheddar process will be closer, and at the same time appear more rich and buttery, and will cure faster. It takes less milk to make a pound of cheese because the whey is drawn from the curd before the acid is perceptible, while in the American system, the whey has to be left on the curd from ten to sixty minutes after acid is detected, in order to insure a good solid cheese, and you all know that sour whey will eat or digest grease from any substance containing it, with which it comes in contact. The longer the curd is exposed to this acidity in the whey the slimier the whey becomes, on account of the grease it has taken from the curd, and, in fact, some cheese-makers determine when the curd is ready to dip into the sink by the sliminess or sudsing of the whey. The quantity of butter which passes off unseen in the American system is certainly more than contained in the small quantity of *white* whey which comes from the cheese when pressing, in the Cheddar system.

During the past season, notwithstanding the general complaint that the milk did not yield well, and the fact that over half of the cheese made at Smith Creek Factory was from tainted milk, we used only 9 9-10ths pounds of milk for one pound of cured cheese. And the reason why the Cheddar cheese will appear more rich and buttery, with the same solidity, is that when the whey is drawn from the curd before the acid is detected, the action of the sour milk spores is retarded, and the rennet, at work in the mass of warm curd, is allowed full play. And as the rennet cures the cheese, it will therefore cure sooner, and, curing sooner, will be richer and more buttery at the same age.

I might state other advantages which are claimed for the Cheddar process, but I have already consumed too much of your time, and exhausted your patience, if not the subject.

At the close of Mr. Macadam's paper, the President announced that a change had been made in the programme of the day, by which the address of Donald G. Mitchell, Esq., of Connecticut, which was set down for the third day, would be next delivered. He then introduced Mr. Mitchell in very flattering terms, as one who, in addition to his purely literary works, had laid agriculturists under especial obligations, by writing so wisely and so well of the advantages and pleasures of rural life, and explaining to the world how to obtain these enjoyments at a small cost. Mr. Mitchell took the floor amid hearty applause, and proceeded to read his lecture "On some of the relations of Science to Farm Practice."

[The reader will find this address in full in this volume, beginning on page 59.]

A vote of thanks was tendered Mr. Mitchell, by the Convention, in acknowledgment of his able and valuable address.

The President remarked to the Convention that the State authorities were desirous to express their interest in the objects and work of the Association, in view of its national character. He had received an assurance of this deep interest from Gov. Hoffman, whom he had invited to be present and attend the exercises of the Association. He had just received a letter from the Governor, expressing his regret that he was unable to be present, and stating that he should certainly have attended the Convention if the invitation had been received at an earlier day. The President said that it was his own fault that the invitation was not sent earlier.

He also remarked that there was a class of men present who had not yet been heard from. He hoped the Convention would hear from them before its adjournment, as its sessions would not be entirely successful otherwise, for it is from the dealers that we are to learn what are the tastes of the consumer and the wants of the market. He knew it was the boast of dairymen that there are fewer middle-men connected with their business than with that of any other agricultural pursuit; but the few which are left to us are important, and can give us a great deal of valuable information. They are mostly men of great energy and of intelligence, who study the demands of the market closely, and are able to tell us many of the present defects in our cheese, if not to point out how to obviate them.

The discussion of matters relating to tainted milk and floating curds, and their remedies, was resumed.

Mr. Arnold, of Tompkins, said he was confident that the chief cause of tainted milk, and its attendant evils, was to be found in the wrong method of carrying milk to the factory. It is carried in tight cans. The cans should be well ventilated. Oxygen in the air destroys the germs upon which putrefaction depends, if it is allowed to come freely in contact with the milk. He gave instances of dairies which had been delivered at his factory, and which were

accustomed to come in a tainted condition when brought in tight cans, but as soon as can-covers, having good ventilation, were used, the milk ceased to come in a tainted condition ;—milk brought five miles in a can without any cover, being in far better condition than milk brought eighty rods in a tightly covered can. He believed that ærating milk on its way to the factory was a perfect preventive of taint, provided the milk is all right when put in the can, and the can is clean.

Mr. Moon, of Herkimer, spoke of the necessity of cleansing with a brush. He does not object to the carrying home of whey in the can, if the cleaning is properly done. He dwelt at some length on the importance of keeping dippers, conductors, strainers, and other things about the factory, clean.

Mr. Farrington, of Tompkins, thought there was something besides cleanliness requisite to prevent tainted milk. The food, drink, treatment, etc., of cows, had something to do with it.

Mr. Wire, of Ohio, thought that if the milk was cooled to 70° as soon as taken from the cows, all seeds of infection in the milk would be destroyed, provided the cows which produced the milk were well fed and well kept.

Mr. Bonfoy, of Herkimer, thought if cows were often salted, or given all the salt they want, it would prove a valuable preventive or corrective of taints.

Mr. Farrington, of Canada, thought the drift of argument indicated the importance of ventilation. With a clear, strong atmosphere, we are not troubled with taint. The atmosphere has much to do with the condition of milk. It develops certain diseases, and why not taints in milk?

The mixing of the warm morning's milk with the cold night's milk, it was thought by one gentleman, developed taint.

Another gentleman thought that dogging cows caused tainted milk. Sowed corn, he found, imparted its own peculiar flavor to milk. He also thought that one cause of tainted milk is by the carelessness of the farmer in not properly ventilating his milk.

Mr. Wire, of Ohio, offered the following resolution :—

Resolved, That nine-tenths of the cases of tainted milk and floating curds would be avoided by cooling the milk to the temperature of 70°, as soon as drawn from the cow.

Mr. Moon, of Herkimer, moved as an amendment to Mr. Wire's resolution, that milk is materially benefited by cooling and stirring before sending it to the factory.

Mr. Chapman, of Madison, thought that æration was the great point.

Mr. Macadam, of Montgomery, thought cooling alone of no value.

Mr. Hubbard, of Madison, found carrying whey in cans very pernicious. Filthy cans are the main cause of taint.

Adjourned until 8 o'clock.

EVENING SESSION.

The Convention re-assembled at 8 P. M., Gen. B. F. Bruce, of Madison, in the chair.

Mr. Chapman, of Madison, offered as an amendment to the amendment of Mr. Wire's resolution, that to prevent tainted milk and floating curds, the milk should be well cooled, well ærated, and the can-slide be ventilated.

Mr. Hawley, of Onondaga, said if ice is put on top of the can, and ice in the can, the milk will not spoil. If the milk is cooled, and the cans are kept perfectly clean and well ventilated, the milk can be drawn any distance without tainting.

Mr. Dick, of Erie, moved that the whole matter of tainted milk and floating curds be laid on the table until Thursday morning. Motion carried.

WHAT SHALL BE DONE WITH THE CREAM THAT RISES ON THE MILK THROUGH THE NIGHT, WHERE NO AGITATOR IS USED?

The consideration of this subject was introduced by L. B. Arnold, Esq., of Tompkins, who read the following paper:—

There are two ways only of utilizing the cream that rises on the night's milk. One is to make it into butter, and the other is to work it into the cheese. There is a difference of opinion as to which is the better way. Some hold that the richness of a cheese does not of necessity depend upon the amount of cream it contains, and that it may be skimmed off as well as not. Others hold that no part of it can be withheld without depreciating the fine quality of the cheese, and are consequently apprehensive that the standard of American cheese is likely to suffer from an extension of the custom.

The practice of skimming, nevertheless, is, year by year, gaining ground, and is likely to continue, be the consequences what they may to our national reputation. So long as skimming will give a better return by twenty-five cents on a hundred pounds of milk, than can be done by making cheese alone, it will be of little avail to attempt to check its progress.

Very few dairymen make butter or cheese for the name or pleasure of it. It is a consideration of dollars and cents that moves them, as it does every body else, and wherever the most of these can be obtained, thither will they go.

Those who make cheese for the European market have nothing to fear from the extension of creameries. If the skim-milk cheese is not fit for shipping, and skimming becomes so common as to interfere with the supply of our foreign customers, there is nothing surer than that the price of shipping cheese will advance. The practice will go on, very likely, till there is an equilibrium in profits, for it is now generally conceded that skimming, and making butter, gives the largest returns. I have no disposition therefore either to urge on or to retard its progress, for it will regulate itself in time.

It is not my purpose in this short paper to decide upon what should be done with the cream in question. I only propose to point out a few of the peculiar effects that result from the two modes of using it, by way of opening the subject for further discussion by others.

When the cream rising on the vat through the night is made into

butter, the first effect upon the cheese is to diminish its weight. This effect varies with the condition of the cream when taken off. If its separation from the milk is complete, so that it appears thick, as in cold weather, or when the milk is nearly sour, the loss in weight of curd is inconsiderable, often less than a pound of curd for each pound of butter made. How such a result can occur will more fully appear by and by.

If the cream is thin, and so imperfectly separated as to carry off a considerable per centage of milk with it, the loss sometimes reaches two pounds of cheese for each pound of butter made from the cream. If the cream thus obtained is churned sweet, as is sometimes done for the sake of putting the buttermilk back into the vat, the butter is delicious, while new, but fails in keeping qualities. When kept till properly soured before churning, the quantity is one half greater, and its keeping qualities very much prolonged. A very fine quality of butter is produced in this way. The practice of working the buttermilk from sweet cream into the cheese, has not worked well with me. The buttermilk gives a flavor to the cheese that almost every one dislikes, and the butyraceous material left in the buttermilk, becomes so oily by churning, that it very nearly all escapes into the whey. I can only save in this way the cheesy matter in the buttermilk, which is usually very little.

If skimming had no other effect upon the cheese than the loss in weight, the question of profit and loss in making butter or cheese from the cream, would be easily settled. It would only be necessary to compare the relative prices of butter and cheese with the loss in weight.

But this is not the extent of the influence of skimming. The grass upon which the cows feed always contains more or less of essential oils that give a peculiar flavor and aroma to each species. These oils are secreted with the milk. They are light and volatile, and come to the surface readily and mingle with the cream, and go with it wherever it goes, whether into butter or cheese. They are the cause of that aromatic, or, as it is oftener called, "nutty" flavor, so much admired both in butter and cheese. Epicures are always willing to pay a high price for this delicious flavor in either product. But the dairyman who proposes to skim his milk for cheese, must remember that if it goes into his butter, it can not go into his cheese; and that if he skims his milk, he can not avoid removing from his cheese, either wholly or in part, this "nutty" flavor, no matter what other qualities it may contain.

I have already adverted to the opinion entertained by some that a rich cheese can be made from skim-milk. This is a mooted question. It is the commonly received opinion, in which dairymen generally share, that the more cream the richer the cheese; and with most consumers the color of cream shares the reputation of cream itself.

Before attempting any elucidation of this query, it may be well to define what is meant by a rich cheese. The characteristics of a rich cheese are a soft, salvy texture, when bits of it are mashed between the thumb and finger; yielding easily to pressure; inelastic yet not

crumbling. The particles of which it is composed are united to each other with only a slight cohesion, and, when eaten, separate so easily as to give the idea of melting in the mouth. A cheese having these characteristics is everywhere regarded as rich. One having the opposite qualities, viz.: a hard, tenacious, unyielding texture, is as universally considered poor, no matter how much butter it may contain. It is a peculiar condition of its casein on which the richness of a cheese depends. Has cream anything to do with that condition? It was shown at the last convention that the coagulation of milk, and the fermentation of curd, depend alike on the growth and multiplication of certain very minute organic germs contained in rennet, and to some extent in milk itself; and with just the same ratio that they develop and multiply, do the coagulation of the milk and the fermentation of the cheese advance. Now cream is a powerful stimulant to the growth of these germs. I do not remember to have seen any statement attributing to it any agency, either in the cogulation of milk, or the curing of cheese, and yet it is efficient in both. This assertion may call for a little evidence. The coagulation of milk is more perfect when the night's cream is mixed with the milk than when it is not, all other circumstances being the same. An evidence of this is the fact that the curd made from milk with the cream out, shrinks more in curing than the curd from milk which has the cream in, though the former may appear the drier when it comes from the press; thus giving evidence that the process of curding in the skim-milk has not been sufficiently perfect to separate the usual amount of water from the curd. Though shrinking more in the process of curing, the skim-milk cheese still contains considerably the largest percentage of water, as shown by the analyses of Voelcker and others, which is further evidence to the same end. The excess of water retained in the curd from the feebler action of rennet where cream is wanting, not unfrequently produces a weight of curd fully equal to what would have been produced if the cream had all been in.

A whole-milk cheese cures much faster than one from which the cream has been taken, when situated in other respects alike. Take off the cream one morning and make the milk into cheese, working the curd in the usual way. Next day work the cream all in. Set the results of each day, side by side, on the range and note their conduct. One will cure right along; perhaps puff, or swell. The other stands as a monument of unyielding firmness. After thirty days, apply the trier. One is mellow, rich and ripe. The curd of the other is but little changed. Twenty days, perhaps, after one has gone to market, the toughness of the other begins to give way, and at sixty days' old, if no unfavorable change in temperature has occurred to interrupt its curing, it may appear as ripe and rich as its more precocious neighbor. Cases of this kind are constantly occurring. Who has not seen enough of them to demonstrate the powerful agency of cream in developing and multiplying the germs of fermentation? A full appreciation of this fact is of vital importance, particularly in creameries.

To produce the best results, a curd should cure at a certain rate—

not too fast nor too slow. If it cures too fast, it will huff and become porous, or generate foul gases that will injure its flavor. If too slow, it will become bitter or sour, or some other change than the cheesing process will supervene, and produce effects that can never be removed. In curing a whole-milk cheese, it is generally agreed that the right progress is made at 70°. A curd from milk with the night's cream out will cure no faster at 75° than one with the cream all in will at 70°, and a more thorough skimming will require a temperature of 80° or 85°.

Dairymen seem to have altogether overlooked the important item that removing the cream retards the curing of the cheese, and that to keep up the right progress the sluggish curing should be hurried up by a higher temperature. I visited quite a number of creameries last fall, and not in a single one of them did I find any appreciation of this necessity, though their rigid and stubborn looking cheese were as significant as the index finger on a guide-board.

This whole matter of curing cheese needs to be more thoroughly studied. Manufacturers, with a deep anxiety worthy of their trust, watch very carefully every minute operation in the milk-vat, but too often drop all this watchful solicitude when the curd reaches the curing-room. This ought not to be. The very same agent that makes the milk into curd, makes also the curd into cheese, and is subject to the same laws, and is liable to the same variations, and hence needs the same watchfulness and care. Tons and tons of cheese are spoiled every year for the want of skill in curing; especially is this true of the creameries. The removal of the cream so retards the curing process, that (with the usual treatment,) the naturally hard and tenacious casein is never broken down and mellowed. In most of the creameries I have seen, it is rarely *cured;* it is only *dried* down, and hence suffers all the ill effects of delayed fermentation, and takes on all the hard consistency of *dried curd*, and is sent away at last despised as poor, when, if it had been skillfully cured, it might have attained to a more respectable reputation.

Mr. Chapman, of Madison, thought a distinction should be made between skimming the night's milk and taking off all the cream, as is done in creameries. At his own factory he skims off the cream from the night's milk, and his patrons skim their cans. If he had running water, so as to be able to run an agitator, he would not skim at all. Cream once separated from the milk cannot be again incorporated in it. It may be stirred beneath the surface, but it remains as separate as so much saw-dust.

Mr. Dick, of Erie, said he had practiced skimming milk at his factory, and the cheese made had sold as often at prices above as below the cheese of factories where skimming was not practiced. He agreed with Mr. Chapman in the matter of working cream into curd. He asserted that the rennet had no more effect on the cream than on sweet oil. He could not satisfactorily mix in the cream rising on the night's milk. By making up the night's milk by itself, and the morning's milk by itself, scalding the night's milk lower, and salting the curd less, the cheese from the latter was apparently as good, and it sold as well, as that from the morning's milk.

Mr. Farrington, of Canada West, deprecated skimming the milk, contending that the cream could be worked into the cheese, and that as rich cheese cannot be made without the cream as with it.

Mr. Farrington, of Tompkins, had found that rennet but imperfectly coagulated butter-milk.

Mr. Root, of Pennsylvania, had worked up, during the past year, about 1,000,000 pounds of milk into butter and cheese. He got more butter from slightly sour cream than from sweet cream. He knew nothing of floating curds. Good keeping butter can be made from sweet cream. It is nicer, but more difficult to make. He used salt in cleaning milk utensils, and then scalded with steam. Buttermilk is added to the skim-milk in making cheese. A pound of butter-milk added thus made more cheese than a pound of new milk. He thought the butter-milk improved the quality of the cheese.

Mr. Peebles, of Lewis county, thought it a mistake to advocate skimming milk. It was detrimental to advancement, while dealers were calling for a finer quality of cheese. It is letting down the bars into too large a field, and there is danger that our system of cheese-making, and that the enviable reputation which our cheese is acquiring in Great Britain, will all be impaired temporarily, if not permanently injured.

Mr. Blanding, of Broome, had practiced skimming the morning's milk, and the results had been satisfactory. He thought, however, that a general adoption of the skimming process would lead to deterioration of quality in cheese. He thought the cream could be better mixed with the milk when cold, and before warm milk had been strained into it.

Mr. Schermerhorn, of Oneida, objected to skimming milk. He had heard complaint made of skim-milk cheese offered for sale. His practice was not to skim. A better cheese could be made by not skimming.

Prof. Caldwell said one of the effects of rennet was to make an oil of casein.

On motion, the subject was tabled.

Secretary Weeks then offered the following resolution, which was adopted :—

Resolved, That the thanks of this Association be presented to the proprietor of Bagg's Hotel, of this city, for the compliment paid to them by the band concert, given this evening at that hotel, in honor of the Association.

Adjourned until 9:30 Thursday morning.

THIRD DAY—MORNING SESSION.

The Convention was called to order by the President, about 10 o'clock A. M.

The first business was the discussion on

and was opened by Mr. Church, of Elgin, Ill. He said that he did not know that he could better set forth the principles of the business, than by reading the directions issued by the Elgin Milk Condensing Company to their patrons; and with which all patrons are required to comply. They are as follows:—

1. The milk shall be drawn from the cow in the most cleanly manner, and strained through wire-cloth strainers.

2. The milk must be thoroughly cooled immediately after it is drawn from the cow, by placing the can in which it is contained into a tub or vat of cold water, deep enough to come up to the height of the milk in the can, containing at least three times as much water as the milk to be cooled; the milk to be occasionally stirred until the animal heat is expelled, as below.

3. In summer, or in the spring and fall, when the weather is warm, the bath should be spring water, not over 52 degrees temperature, (a day or a night after a heavy rain excepted,) constantly running or pouring in at the bottom, necessary to reduce the temperature of the milk, within 45 minutes, to below 58 degrees; and if night's milk, to remain in such bath until the time of bringing it to the factory, and to be below 55 degrees; the morning's milk not to exceed 60 degrees when brought to the factory.

4. In winter, or in freezing weather, the bath should be kept at the coolest point, (it need not be running spring water,) by the addition of ice or snow sufficient to reduce the temperature of night's milk speedily below 50 degrees.

5. In spring and fall weather, a medium course will be pursued, so that night's milk shall be cooled within an hour, below 50 degrees, and morning's milk below 55 degrees.

6. The bath and supply of water shall be so arranged as to let the water flow over the top to carry off the warm water. The can in which the milk is cooled shall be placed in water immediately after milking, and shall remain therein until the process of cooling shall be finished.

7. The night's and the morning's milk shall be separately cooled, before mixing.

8. No milk shall be kept over to deliver at a subsequent time.

9. The milk shall be delivered on the platform at the factory, in Elgin, every day except Sunday.

10. Suitable cans of proper dimensions, to transport the milk from the dairy to the milk-works, shall be furnished by the seller, and the cans shall be brought full.

11. The company shall clean and steam the cans at the factory, free of charge, but customers shall keep the outside clean. The pails and strainers employed, shall be by the seller thoroughly cleaned, scalded in boiling water, and dried every morning and night.

12. Immediately before the milk is placed in the cans, they shall be thoroughly rinsed with clean water; and great care shall be taken to keep the cans and milk free from dirt or impurities of any

kind. When cans are not in use, they shall be turned down on a rack, with the tops off.

13. All the "strippings," as well as the first part of the milk, shall be brought. No milk will be received from a cow which has not calved at least twelve days, unless by consent of superintendent or agent, who may determine its fitness sooner by a sample of the milk.

14. The cows are not to be fed on turnips or other food which would impart a disagreeable flavor to the milk, nor upon any food which will not produce milk of a standard richness.

15. It is further understood and agreed by the parties hereto, that if the superintendent or agent of the company shall have good reason to suspect, either from evidence furnished or from the state of the milk itself, that water has been added, or that it has not been cooled as provided, or that it has been injured by carelessness, he shall have a right to refuse such milk, or any further quantity of milk, from the person so violating these directions and stipulations.

16. It is also understood between the parties, that the superintendent or agent shall, at all times, by himself or by his employee, have the privilege to visit and examine the place of keeping the cows and the milking, as well as to have access to the place of cooling the milk and keeping the pails and strainers.

17. And it is further understood and agreed, that if any accident to the works of the company shall occur, to hinder the process of manufacturing, then the company shall immediately give notice of the fact, and thereafter it shall be under no obligation to receive milk under this contract, until it shall be in a condition to manufacture.

Mr. Church then made some explanations of their system. They make it a custom to visit the dairies of the patrons as often as once a week, to see in what condition the pails and strainers and stables are. If the milk comes with an offensive odor, it is sent home. There is no fault found by the patrons with such treatment. The great cause of bad milk there is the feeding of the cows on the weeds in the spring of the year. They oblige their patrons to let their cows stand in the stable and get cool, before they are milked. In visiting dairies they observe what kind of a dog the dairyman has, and give directions that the cows must not be worried by dogging. They take milk by the gallon, not by weight. They save samples of different dairies every day. These samples are kept in tin basins. If there is anything the matter with these samples, they call the dairyman whose milk is wrong into the factory, and show it to him. Nothing is known of the matter by other patrons. Patrons are not allowed to bring poor milk twice in succession. The milk is first taken into a receiving vat, then conducted into small copper vats, which are set into cold water, and cooled, when it is carried into the copper vat, where sugar is mixed with the milk, and the process of heating and condensing the milk then takes place.

Mr. Church was then invited by a vote of the Convention to pre-

pare a paper on the subject, giving full particulars of the process of manufacture, the marketing, &c., of the product.

The committee on the nomination of officers reported, through Mr. Geddes, the following list of officers:—

President—Hon. Horatio Seymour, Utica, N. Y.

Vice-Presidents—Thomas G. Alvord, Onondaga; Anson Bartlett, Ohio; X. A. Willard, Herkimer; E. N. Willcox, Michigan; Henry Wade, Canada West; O. S. Bliss, Vermont; Joseph Tefft, Illinois; Asahel Burnham, Chautauqua; N. W. Woodfin, North Carolina; C. H. Wilder, Wisconsin; Levi Wells, Pennsylvania; John M. Webb, New York city; S. W. Wells, Connecticut; H. Calmes, Kentucky; J. H. Klippart, Ohio; S. A. Bartholomew, Massachusetts; T. L. Harison, New York; C. E. Chadwick, Canada West; C. W. Vroman, Minnesota; S. H. Ellis, Pennsylvania; R. Goodman, Massachusetts; A. R. Camp, Vermont; M. J. Haden, Kentucky; B. F. Bruce, Madison; Newton Chrissey, New York.

Secretary—Gardner B. Weeks, Syracuse, N. Y.

Treasurer—Dr. L. L. Wight, Whitestown, N. Y.

Upon receiving the report, the President proceeded, by a division of the question, to submit the nomination of all the officers, except that of President, to the Convention. While the question was pending, the Secretary, Mr. Weeks, assured the Association that his nomination had been unsought, and he would prefer some of his friends to substitute another name for his own, for the office of Secretary. The President over-ruled the suggestion of Mr. Weeks, and the report was unanimously adopted.

Mr. Geddes then submitted the remainder of the question, the nomination of Hon. Horatio Seymour, as President of the Association. The nomination was heartily ratified by the Convention.

In acknowledging the honor of this appointment, Gov. Seymour said he had derived great pleasure from presiding over the proceedings of the Association at several of its preceding conventions. He had hoped that some other member of the Association would receive the nomination to the position this year. The position had brought him an extensive correspondence with agriculturists throughout the country, from which he learned the lively interest that people of all sections of the country feel in the transactions of this Association. Men of the Southern States, who were lately arrayed against us in arms, had shown their appreciation of the benefits accruing from such organizations, by coming to this section, bringing their wives with them, and endeavoring to learn all that could be learned in the branch of farming in the interest of which this body was organized. He was proud of the Association, that through its influence, and the enterprise of that class of farmers which it comprised, there are now cheese factories in full operation as far away as the southern spur of the Alleghanies. He believed that dairymen are teaching the world new principles of co-operation, in that most important calling of mankind, the pursuit of the husbandman.

One thing which should never be lost sight of in this Convention is the fact that the Association is national in its character. It

is a parliament of farmers from every part of the country that choose to send representatives hither, and the part of the country which is always represented is by no means a small one. In view of this fact, we should be very careful in giving our opinions on different subjects, not to lay them down dogmatically as absolutely true for all sections; but should modify them by the facts that they were the result of observations which were limited by the soil, the culture and other circumstances peculiar to our particular farms or localities. Our experiments should be given for what they are worth; not as ultimate facts for all sections. He concluded with renewed assurance of the pleasure and gratification it gave him to preside over the deliberations of the Association another year.

Mr. Dick, of Erie, presented the following resolution, which was unanimously adopted:—

Resolved, That a committee of three be appointed by the chair to consider the propriety of petitioning the Legislature of this State to make an appropriation for the purchase of one or more experimental farms for the manufacture of dairy products.

The President then introduced to the Convention Joseph Harris, Esq., of the *American Agriculturist* and *Hearth and Home*, who delivered the address on "Fattening Cows on Dairy Farms, which will be found in full from page 75 of this volume.

A hearty and unanimous vote of thanks to Mr. Harris, was passed at the conclusion of his paper.

Mr. O. S. Bliss, Secretary of the Vermont Dairymen's Association read the following paper on the

MANAGEMENT OF A GOOD BUTTER DAIRY.

At this stage in our proceedings it would be superfluous for me to invite your attention to many essential features of the management of a good butter dairy, and I may be excused for deferring to what I deem your feelings in that respect, at the sacrifice of continuity and system in my remarks.

Mr. President: I ask your indulgence while I offer a few desultory suggestions on the subject assigned me—the management of a good butter dairy—rather, however, as the germs from which a discussion may at some time arise, than as a dissertation upon the theme.

The production of good butter is the most profitable of all farm operations, which may be conducted on any considerable scale at points remote from market,—indeed it may well be questioned whether it is not, in proportion to the capital invested and the labor required, more profitable even than market gardening. There is an insatiable demand the world over for good butter, and so inadequate is the supply that the question of cost and profit, to either producer or dealer, is never, or very rarely, raised by the consumer. Good butter is a luxury for which thousands of men of means would gladly pay a price that would be highly remunerative to the producer, could they only be made sure of a constant and regular supply of a uniformly good article. It is said that this demand is fastidious,

and that there is no real lack of good butter in the markets,—a sort of begging the question for which we have no respect, in view of substantial evidence to the contrary, that the most blear-eyed may, if they will, see. That much very good butter is sold below the price which it would command if brought directly to the notice of the consumer, we do not doubt, nor do we accept that condition of things as at all necessary. It is as much a part of the management of a good butter dairy to sell as to make the product. The educating of the public taste is no essential part of the farmer's duty. It is rather his business to cater to it, to make the goods which will invariably bring him the best results, and he cannot hope to do this without having studied well the public demand.

The production of an article which brings the highest quoted price in the market quite satisfies the ambition of most butter makers. They do not know that some few of their neighbors, who always adapt their product to some buyer's taste, invariably outsell them three, five, ten or even twenty-five cents in a pound, and if told so, will not see in the circumstance anything but favoritism, stupidity, or dishonesty on the part of the buyers.

The first step, then, in the management of a good butter dairy is to study well the demands of that class of people who, having the money, are willing to pay it for the gratification of their taste. If the product be brought well up to the standard, then the margin for profit is very broad; if, on the other hand, it must, because of its common or low grade, be sold to supply the necessities of those less able and willing to gratify their taste, there is frequently no margin for profit, and what is least encouraging of all, the common people reluctantly compelled, as they are, to accept the lower grade of goods, are not in the least grateful for the production of a poor article, assuming, perhaps not quite correctly, that if the whole supply was up to the standard, they, too, would be able to gratify their taste while supplying their necessities, without any considerable increase in the expense. There is no other one circumstance so full of promise to the aspiring butter-maker, as that every consumer, from the very lowest upward, is seeking a better article, and is willing to pay something—more or less of course, according to circumstances—for the gratification of taste. The popular motto of the day is, "Get the best." Having settled upon the end to be attained, the means for the attainment of that end will next claim the attention of the dairyman.

It is a favorite theory with many that only rich old pastures, free from weeds, and supplied with pure soft water, will produce the pabulum necessary to the production of good butter. That such pastures are desirable, that they may be coveted and sought by the ambitious and laborious dairyman, without violating the decalogue, does not necessarily imply that they are absolutely pre-requisite to production of good butter. The assimilating powers of the cow are very great—truly wonderful, and it is much more practical saying what she must not eat than what she must, or may, and the *good* dairyman who understands the relations of means to ends, and is not wedded to the absurd theory that all supplemental and extraneous

auxiliaries to the pasture are to be placed on the debit side of the ledger without any corresponding credit, may, on most of the pastures of the northeastern, middle and northwestern States, produce really good butter at a profit, and we believe the red clover fields are not the exception. Our time is not sufficient to permit a full discussion of this subject, and we can only add that it becomes those dairymen who would take high rank as butter-makers, to study well the adaptation of peculiar grasses to the production of butter, and to select and cultivate such of them as are adapted to their specific soils, and to enter upon a thorough system of improvement, not only of pastures, but of meadows. Meantime supplying any deficiencies of either quality or quantity, with a liberal hand, from the soiling plot, the hay-mow, the meal-bin, or the root cellar. It is a fact not generally well understood, however, that every change of temperature affects,—first the quality, then the quantity of milk which the cow will produce, as also the quantity and quality of the food which she consumes,—hence the careful dairyman provides both food and shelter in inclement weather, and finds a profit in so doing. We repeat, the first constituent of a good butter dairy is an abundance of good, rich feed, and if the pastures do not furnish it, which very few do, at all times, the feed must be supplemented and given tone from other sources. The quality of butter depends vastly more upon this matter of rich feed than does the quantity. An abundant supply of good, clean water is also necessary. We do not say pure water, for we understand that to mean distilled water, nor do we take any stock in the soft water theories of some of our friends. Of course a herd of good cows, with suitable accommodations for their quiet and comfort, is essential, and we need not discuss that point. But with these an active mind and discriminating judgment are indispensable. There is no possible hope of the dairyman or dairywoman who can not think and act independently of the time-honored routine handed down to them from a former generation. The fact that this large audience is made up of practical dairymen and dairywomen is a most cheering one, and I need not speak of the results which have been achieved by such gatherings as this; but it is a lamentable fact that if this Association, with all its means of instruction, could be set down bodily into the very heart of most of our butter dairy districts, not one in ten of those most interested in the production of butter could be induced to come in here and take a part in its deliberations, especially with any view to the acquisition of knowledge in the art of butter-making. Some might, in their generosity, come to impart information.

It is an absurd theory, though entertained by some very wise men, that the management of a good butter dairy has become reduced to a science, and that positive rules may be laid down for the guidance of any who would undertake the business. If such is the case, why, in the name of wonder, is this perfectly clamorous, never satisfied demand for good butter, at prices affording a wider margin for profit than any other strictly farming operation, not supplied? I confess, with no little satisfaction, to having found the

standard of good butter constantly progressive, and to having witnessed the total explosion of some of my own pet theories, founded upon the experience of those whose product got up very close to the standard. I confess to having less sanguine opinions upon some points than I held even one year ago, and to a total revolution of opinion upon some others. I have been studying for years the apparatus in use among the best butter-makers far and wide, with a view to ascertaining the effect of temperature upon this branch of business, and the means of controlling it, and the style of rooms and apparatus best adapted to the setting of milk, and all the details of their management; and when I had perfected a scheme, based upon these observations, for perfect dairy establishments, and got the thing "reduced to a science," I took one step more, and undertook to reconcile these deductions, for they could not truly be called anything else, with certain other well observed phenomena. I need not weary you with details of the processes by which I have compared, examined, eliminated ideas and principles, until I was converted from a believer in cold, to an advocate of hot, or at least very warm rooms for setting milk. But the conversion is not, after all, so extreme, so radical, as may appear at first view. The error in the past has been the application of the cooling principle to the room, rather than to the milk direct.

I believe now, as I have in the past, in the absolute necessity of cooling the milk as soon as it is drawn from the cow, to about 58°, after which an increase of several degrees may be permitted, with advantage to both quantity and quality of butter. This opinion is not a result of one, but of many experiments conducted under many varying circumstances, and confirmed by the experience of several most excellent butter-makers. I would recommend, then, as an essential constituent of a good butter dairy, a dairy house or milk room in which a uniform temperature of about 65° can be economically maintained, together with a supply of tanks holding about thirty gallons of water, adapted to setting and properly cooling the milk.

A supply of running water would be most convenient for this purpose, however, it is not indispensable. As a general rule, the amount of water required for cooling a mess of milk in a properly constructed tank, may be very readily supplied from a well, without any very great expenditure of force. We do not recommend the use of ice in butter-making, except in extreme cases, and only in water for cooling milk or cream.

With good cows, good feed, and proper accommodations for setting the milk, there is little difficulty in making good butter, but it must be confessed, after all, that it is, in a sense, an occult science, —there is a sort of sleight about it, somewhat like the "touch" of the cattle buyer, that can hardly be explained by the operator or detected by the looker on, but which must be acquired by experience. We may lay down positive rules for every operation, but the circumstances in which different dairies are situated are so various that those rules, founded upon the highest success in one instance, might not prove just the thing in another. We have seen equally

good butter made by very different processes, that seemed, upon a cursory view, to be almost diametrically opposite.

Our own theory in regard to the process of manufacture is, that milk should be strained directly into the cooler, and the temperature reduced as soon as may be to 58°, after which it may gradually rise to 65° with advantage. If the temperature of the room is above 65°, and there can not be any serious objection to its reaching 70°, more water may be needed after the cooling is once effected, otherwise not. We would skim in 30 to 36 hours, and keep the cream at 65° till slightly acid, after which cool to 58°, and churn twice a week or oftener, as most convenient, always using sufficient prepared annatto to bring the butter to some established standard of color. If the feed is poor, the condition of the animals low, or the weather cold, the temperature of the cream should be increased to 65°, and in extreme cases even higher. Of course this affects the quality of the product unfavorably, and can not well be called a part of the management of a good butter dairy. We use the Blanchard churn for churning, working and salting the butter, and recommend it for hand or power work, as preferable for the production of good butter to any other we have ever seen, not excepting the venerable and superannuated up and down dash.

We draw off the milk as soon as the butter forms little solid particles as large as peas, and rinse twice with water not colder than 60°, gathering the butter in that instead of in its milk, and salt before removing it from the churn.

That class of butter-makers who believe that if there had been a better way, they would have found it out, still insist on working their butter without the use of water, and carrying their grain to the mill with a stone in the other end of the bag. We sincerely pity them, since for all their pains they only get the labor, and not infrequently are compelled to take a lower price for their overworked products. We would pack twenty-four hours after working, and pound it into the tub or package hard enough to exclude the air and all moisture.

The difficulties in the way of production of good butter are want of rich feed, uncleanliness in some or all of the operations, and carelessness in some of the details of manufacture, whereby a want of uniformity of characteristics prevails.

A word in regard to the disposition of the skimmed milk, and we will close. It is a peculiar characteristic of all our American farming, that we seek to sell everything that will bring money, reserving nothing for keeping up the productive capacity of our farms, hence, in almost every instance, we hear it recommended to those farmers who make butter to convert their skimmed milk into skim cheese. Unpopular though it may be, we venture to advise that they do no such thing. It is one of the best arguments in favor of butter-making, that by judiciously feeding the milk the farm may be kept improving, instead of deteriorating, as is inevitably the case with the farm devoted to cheese-making. I have no desire to rouse any spirit of antagonism between the butter and the cheese makers. Each is essential to the well-be-

ing of the other. Our English cousins buy fertilizing material from the ends of the earth to restore their lands, and unless we begin to do something for our lands, we shall, ere long, come to that ourselves, and it is infinitely better to stop selling the last vestige of production. Skimmed milk fed to pigs supplied with waste material from which to make the coarser and absorbent portion of the manure, will pay better than in any other way. One year with another it is a question if the pigs themselves will not pay quite as well as the skimmed cheese, and the manure remain as net profit. I thank you, gentlemen, for your attention.

A vote of thanks was extended to Mr. Bliss for his instructive address.

The President announced the appointment of the following committee :—

Committee respecting an appropriation by the State Legislature for the purchase of experimental farms—Messrs. Dick, of Erie; Curtis, of Oneida, and Platt, of Clinton.

The President announced that the time remaining before final adjournment was open for general discussion on any topic bearing on cheese-making.

Mr. Hawley, of Onondaga, said he had prepared a paper on butter-making, but, in view of the want of time, he offered the following resolution :—

Resolved, That a committee of three be appointed by the Chair to prepare a paper on the manufacture of butter, for publication in our next annual report.

Resolution adopted, and the following named committee appointed :—

Messrs. Hawley, of Onondaga; Lewis, of Herkimer, and Geddes, of Onondaga.

Mr. Farrington, of Canada West, argued against the coloring of cheese, asserting that the coloring does no good, and the labor and expense of coloring are therefore lost.

Dr. Wight did not believe that cheese-makers should make cheese for their own tastes, but for the tastes of the consumer; and these demanded a colored article. He was, therefore, in favor of coloring the product, as long as he could do this, without putting into it any harmful substances.

Adjourned until 1:30 P. M.

AFTERNOON SESSION.

Upon calling the Convention to order in the afternoon, the President suggested that the committee appointed to report on the best plants for soiling be enlarged from a committee of three to one of five, and that they should not limit their report merely to the value of corn as a soiling plant in this State, but what are the best plants for soiling in the different sections of the country? He submitted the following resolution :—

Resolved, That a committee of five be appointed to report at the next meeting of this Association the best crop for soiling, having

regard, in their report, to difference of soil, climate, and other qualifying facts.

Subsequently the Chairman named the following gentlemen to constitute such committee :—

L. B. Arnold, of Tompkins ; Harris Lewis, of Herkimer; T. D. Curtis, of Oneida ; L. L. Wight, of Oneida, and X. A. Willard, of Herkimer.

The following resolution, presented to the Convention by the Rev. Dr. Fowler, of Utica, was read by the Secretary, and referred to a committee appointed to report on the subject at the next meeting of the Association :—

Resolved, That, with a view to the enjoyment of the rest and privileges of the Sabbath, by cheese manufacturers and their assistants, as well as out of regard for the sacredness of the day, the importance of maintaining it unimpaired, for the benefit of the public and of individuals of every class, it is desirable that the delivery of milk to cheese factories on Sunday be dispensed with, and that dairymen are requested to inquire whether this is not practicable, consistent with their interest, and whether the value of the Sabbath would not justify some sacrifice on their part, and that of their families, should this prove unavoidable.

The following gentlemen were named as such committee :—

Messrs. Wm. Blanding, of Broome ; D. H. Burrell, of Herkimer, and C. C. House, of Lewis.

The Secretary then read the following invitation :—

The Managers of the Home for the Homeless, in this city, present their compliments to the members of the Dairymen's Association, now convened here, and will be happy to have them visit and inspect the new Home recently completed on Faxton street.

By Order of the Board of Managers.

Utica, January 11th.

The committee to whom was referred the subject of the feasibility of making juster apportionment to the patrons of cheese and butter factories, for the milk delivered, according to its actual value, rather than to its weight or measure, reported that the time allotted them was too short to enable them to report to this meeting, and requesting that they might be allowed to report to the next Convention.

The President then announced that the business of the afternoon would be general discussion.

Mr. John R. Chapman, of Madison county, now read the following address upon the general subjects of tainted milk, floating curds, and kindred matters :—

I had the honor to make an address to this Association on the 9th day of January, 1867, upon the subject of "What are the requisites for purity of flavor in cheese, and how can it be procured?" Since that time I have had an enlarged experience, as a practical dairyman who runs a factory and makes his own cheese, and also visits a great number of factories during the season of cheese making, being thereby enabled to form very correct conclusions upon the

causes which produce such varying effects in the difficult art of making cheese, of a quality good enough to meet the wants of the home and foreign market. In the address above mentioned I commenced with the statement, that to be enabled to make first-class cheese "*the cheese maker must have pure sweet milk in his vat when ready for the rennet to be mixed with it.*" My experience from that time to this, has fully confirmed me in this belief; and it is at this time, the belief of our best cheese-makers. During the first five years of cheese-making, after the permanent inauguration of the cheese factory system by Jesse Williams, cheese makers had little more to do than watch the presence of acid in the milk and whey, and combat its quick developement by quick working and light salting. But the last three years have added to their difficulties a general and almost universal presence in the milk of, what experts term, *fœtid fermentation*, a condition which produces those soft, sour, and floating curds, which is the most fruitful source of trouble of our most expert cheese-makers. I think it is not difficult to trace this general change from acid to putrid fermentation, and in doing so, I will take up no more time than is absolutely necessary to render myself intelligible. In the early years of the factory system, factories were built up and run in those locations only which their physical characteristics had stamped as dairy regions by the presence of indigenous June grass and white clover, and nurtured by running streams of spring water. Three years ago the factory system was crowded into regions where the land is low and sour, wet and swampy, and also into regions where the water for the cows is supplied by stagnant ponds. I have noticed for the last two years that Mr. Bartlett has complained of the fœtid fermentation producing floating curds in the Ohio factories, and, very correctly, I think, reasoned that the stagnant ponds of water from which the cows took their drinking water was the prominent cause of such fœtid fermentation. Now, the best method of combating this fœtid fermentation, is to make the milk up into cheese, fresh, night and morning. Then, if you are troubled with floating curds, you may safely come to the conclusion that there is a deep settled *general cause* for them, and in my opinion, this stagnant, stinking water, drank by the cows, *is that cause.* My friend D. Hart, of the Lenox Factory, near Canastota, tells me that he set milk during the drought last summer, in pans, to test its keeping qualities; and he noticed that some of his patron's milk would, immediately after setting, begin to throw up bubbles, and expand so much as to run over the edge of the vessel. The cows which produced this milk had no water to drink except what they could get from stagnant shallow ponds. I know another factory, in Madison county, in which soft, sour and floating curds were the rule all last summer, although cheese was made twice in twenty-four hours; and I also know that the cheese-maker is a very competent and careful workman. The great majority of the cheese makers of Central New York are very expert in their profession, and if they get decent milk, they will make as much out of it, both in quantity and quality, as possible; but patrons ought to know and understand that, if they cannot, and do not, send good milk, the cheese-maker will not, because from it, he cannot, make good cheese.

Another cause of tainted milk within Madison county, and counties contiguous, during the last season in particular, has been the very general presence of cow pox, brought into the dairies of those counties by cows purchased and brought in from Canada. This disease went through a whole dairy from a single Canada cow as a starting point; and the men who milked the cows took the cow pox, and some of them, by rubbing their eyes thoughtlessly with their hands, during milking time, took the vaccine matter into their eyes so sadly as almost to blind them for a time. This cow pox commences with pustules on the teats, which milking renders into cracks, from which is squeezed a nasty amount of blood and matter, a part of which inevitably finds its way into the milk, and which will inevitably produce fœtid fermentation, and consequently floating curds, in intensity, proportioned to the heat and condition of the atmosphere. I know of factories in Madison county which have been much troubled during last summer from this vaccine matter, so that they have not been able to keep up the good character which their cheese had always previously enjoyed.

I am of the opinion that the extreme heat, night and day, unexampled in the memories of cheese-makers, had much to do with the failure of nearly all our factories to make first class cheese during the months of June, July and August. I think that this high temperature of last summer denotes the limit or latitude to which cheese factories can be successfully operated. I am aware that high altitude from the sea, and the proximity of ranges of mountains, do modify temperature on lower levels, to a certain extent. But any latitude that will, year in and year out, average a temperature for June, July and August as high as ours last summer, is not a very desirable place for a cheese factory.

The sudden growth and spread of cheese factories has been very injurious to the system, by calling suddenly into existence a great number of patrons who do not know, and some of them seem to be unwilling to learn, how to take proper care of their milking pails, milk cans and strainers. However, a skillful cheese-maker can soon detect this class of men, and he alone is to blame if he permits any slackness in this direction to trouble him, premising that he has power to stop a patron's milk from coming to his factory. In one direction our schools and cheese factories are identical in consequences; a poor school teacher makes careless scholars, and a poor cheese-maker makes slack patrons. The milk-can of every patron ought to be washed out every morning, as soon as it comes from the factory, with soft soap and warm water, and then scalded thoroughly *with boiling water*, not tepid water; and the pails must be of tin, well cleansed, and scalded also; and no neglect must be allowed during hot weather, from the 20th of May to the 1st of October. Every patron of every factory in the Union ought to have these instructions driven into him, either by constant appeal from the maker, or one of the committee. A printed set of rules and directions to patrons, would be of immense benefit.

I make cheese in my own factory, known as the "Orchard Factory," from 180 cows, sixty of which are furnished by myself and

son. During the whole of last season I made once a day; my own and my nearest neighbor's milk went into a No. 13 Ralph Vat every night, altogether 100 cows' milk. This milk was never cooled lower than the atmosphere, and was several times left at 78° Fahrenheit at 10 o'clock at night. I had eight other patrons who brought their milk from a distance of from one to two miles, once a day, in the morning, and one of these patrons brought the milk of twenty-four cows. They cooled and aerated their milk over night, immediately after milking, and took such good care of it that during the whole season I never had a floating curd, and only once in May and once in June did I have any trouble, and that was from an excess of acid.

If my patrons could and did take such good care of their milk, why cannot others do it? They can, *if they will have the pride to do it.* I am proud of my patrons, and they are proud of me. They, individually, do the best they can for all of us, and I do the best I can for all of us. We get as much for our cheese as any other factory in our section, and we are satisfied. I wish here to state one fact in relation to cooling milk. I am satisfied that when milk is kept in cans over night, there is no advantage in cooling it any lower than the temperature of the atmosphere. One of my patrons brought the milk of fourteen cows two miles to my factory last season, once a day, *and he never cooled his milk with water.* He aerated and cooled it by the atmosphere alone. He used two milk cans, placing them on the side of his milk-wagon; he milked all his cows into one can, and placed a pail upon the ground under the can, and opened the faucet so that a fine, thin stream of milk fell into the pail a distance of about three feet, the wind and the draught forcing the air through it, which absorbed the animal heat, and equalized the temperature of the milk to that of the atmosphere: and this is all that any one can get, unless he has spring water to run through his vat or cooler. He ran the milk out of one can into the other, and back again, twice, and then left it till morning. He then brought his night's milk in one can, and his morning's milk in the other. Running a factory on this plan is sailing close to the wind, and it can only be done by strict care, cleanliness, and every day the use of hot water in and on every vessel and implement used in the factory. A great patriot has said that "eternal vigilance is the price of liberty." Eternal vigilance, eternal cleanliness, and eternal hot water is the price of good cheese, with a long string of other eternals as conditions precedent and antecedent.

There is another wide-spread cause of fœtid fermentation, produced by the tight can-slide. The common can-slide is the most unscientific implement used in the factory business. As now constructed, its perfect action consists in being so tight that none of the air contained in it can escape, and the consequence is that this confined air becomes heated and impregnated so much with the animal heat of the milk, in long journeys, that when you raise the can-slide at the factory, a hot stinking smell salutes you so effectually, that it sickens and nauseates you. As a matter of course, the milk in the can is in quite as bad a condition as the air, and on the high road

to putrefaction. The remedy for all this is very simple—simple as rolling off a log. Take your-can slide to the tinsmith's and have four holes, one inch in diameter, punched through the top at right angles, and half way from the centre to the outside, *and then suspend your can-slide* from a bar or rod placed loosely across the top of the can, by means of straps, with a buckle and holes, letting the top of your can-slide down to within 4 or 6 inches of the surface of the milk. The heated air will then escape, and a very little milk will sometimes be driven through the holes, but it will do no harm.

I think that a hook might be fastened to the top edge of the can-slide so as to hitch it on the edge of the milk can, and be thus preserved in cleanliness; because the outside of the can ought to be washed every day, and then no taint could be produced by contact of slide and can.

I am now going to say a few words to cheese-makers. I am certain that *all trouble* in cheese factories can not be saddled upon the milk patrons—a certain amount is due to the laziness and incapacity of the cheese-makers. But the blame for this generally rests upon the shoulders of the committee. They often employ a cheese-maker without any inquiry as to his antecedents. The rapturous volubility, and the glorious self-recommendations of the cheese-maker, dazes the mental vision of the committee-man. However, he soon gets an eye opener, when the cheese fetches 6 or 8 cents, instead of 14 cents. Mr. Committee-man then flies round and beats the bush, and then finds out that his cheese-maker never had any character or capacity as a good workman. He ought to have had, at the commencement, recommends from reliable and honorable men, so that if he finds things going wrong in the factory, he will have to hunt for the cause outside of the ability of the cheese-maker, and this will shorten the hunt considerably.

Nearly all of our cheese-makers are slow in hunting up slack patrons. By a very simple process you can discover who take care of the milk-pails and cans, and who do not. In hot, muggy weather it is very easy to find out who are milking in wooden, and who in tin pails. I did it two years ago, and any other cheese-maker can do it. I will describe it. Procure two tea-cups for each patron, scald them with boiling water, and set them, in scalded milk pans, bottom up. Dip out of each patron's can, by using the cup alone, a cup full of milk, set it on a shelf, with the initials of the patron written on a piece of paper, and placed under each cup, and do this night and morning. Taste each patron's milk at 12, 2, 4, and 6 o'clock on the day you are making up their milk, and taste it by pouring out a small portion into a cup kept for this purpose. The milk of those patrons which changes first, especially at 12 and 2 o'clock, requires looking after. If you persist in this system of setting milk, for two or three days, and always find the same patron's milk changing first, you may rest assured that he is slack in something, and it is your duty to find it out. You may find it to be lack of cleanliness, or perhaps because some of his cows give fevered milk after calving in hot weather, and mourning for the calf after it has been deaconed. You will find a great deal of

trouble in May and June from cows giving heated, fevered milk during the running season. You will be troubled with fœtid fermentation in milk, which is produced from cows who drink stinking, stagnant water; and you must make your mind up, if you know the fact, and if you cannot get rid of this class of milk, to work it up in a vat by itself, and not injure other patrons by mixing this unsound milk with their sound milk, and so spoiling the whole. Sell this cheese separately, and make a dividend for it separately, and thus let each tub stand upon its own bottom.

Brother Dairymen, I congratulate you upon the success which has hitherto attended our calling, during the years which we have made cheese under the auspices of this Association. We, and the country, owe much to the leading minds who originated, and those who now foster and sustain this best conducted of all societies for perfection in the production of one of the staples of human life. We meet once every year for interchange of views and opinions, for the grasp after skill and knowledge which we learn from those who are, by their education, and calling, and standing, exemplars in the fields of practical and theoretic science. The great dairying interests of the United States owe much to the late Jesse Williams. He, like a great many of our greatest men, invented but little; but, by combining, and applying, and directing, he introduced the Cheese Factory system, and proved its practicability.

To another gentleman does this Association owe much of its success. I allude to X. A. Willard, Esq., and I wish to let him know that his past exertions in behalf of dairymen are duly appreciated by the reflective portion of them.

Before I conclude, I will state that in this address I have been prompted by an ardent desire to urge our factory men diligently to seek a higher standard in the manufacture of cheese. We shall have to stand or fall upon the merits of our own productions. Probably in a few years we shall have to meet with much more competition in the markets of the world, than now exists. Let us aim to be ready to meet that competition with better productions. I am under the impression that the climate of England, with the tractability of its people, will produce a much higher average quality of cheese than we now do. We have large tracts of land fully equal in pasturing power to the average of the English pastures. But we have a hot climate to contend with, and we are making cheese in sections of country totally unfit, from scarcity of good water and sweet feed.

Mr. Schermerhorn, of Oneida, gave some of the results of his observations while in England, regarding dairying there. Some of the cheese are colored, and some not. High color is not recommended. The Derbyshire cheese, among others, is not colored. He considered American dairymen behind English dairymen in the care of stock, while the Americans are ahead in cheese-making.

Mr. Curtis, of Oneida, from the committee appointed to make application to the State Legislature for an appropriation for the purchase of an experimental farm for dairy purposes, stated that as

the members of that committee lived so far apart, and would find it difficult to get together, he would submit the following resolution as a substitute for the one previously adopted :—

Resolved, That the President, Secretary, and Treasurer of this Association be constituted a committee to make application to the Legislature of the State of New York, by petition, in person, or both, for an appropriation for the purchase of an experimental farm for dairy purposes.

Mr. Lewis, of Herkimer, moved that action on the resolution be postponed until the next Convention of the Association. Motion carried.

Mr. Macadam, of Montgomery, offered a resolution to the effect that it was the sense of the Convention that the dairymen of the country strive to adopt all practicable means for increasing the home consumption of cheese, and that to this end it recommend that each should keep on hand some small hoops for the manufacture of small cheeses, such as seem to be required by the home trade, and that a portion of each factory's make be softer than is required for shipping, and such as our home markets demand; and that a portion be made without color.

As the main object of the resolution was to commit the Association to the policy of favoring the increase of home consumption, it was adopted without opposition.

Hon. Harris Lewis, of Herkimer, said factory cheese made for shipping purposes are too large to be kept at home, and the poorest cheese is retailed at home for the highest price. This ought not to be. He urged the making of cheese of suitable size and of the best quality for the retail trade, and urged that the cheese should not be colored.

Mr. Hawley, of Onondaga, urged the making of the best cheese for the home market.

Dr. Wight, of Oneida, offered the following resolution :—

Resolved, That when this Convention shall adjourn, it adjourn to meet again in Utica on the second Tuesday of January, 1872, and that the session continue three days.

Resolution adopted.

After some desultory discussion upon various subjects, the Convention reached a final adjournment, about 4 P. M.

BUTTER.

REPORT OF THE COMMITTEE APPOINTED BY THE CONVENTION TO PREPARE AN ARTICLE ON BUTTER-MAKING.

Your committee, appointed at the late Convention, for the purpose above indicated, would respectfully report as follows:—

They have, with considerable care, examined a large number of the Annual Reports of the N. Y. S. Agricultural Society, of the American Institute, and of the Agricultural Department at Washington, with a view of culling therefrom such suggestions as seemed to be specially valuable, and, if not particularly new, yet certainly such as have not been put in general practice.

They find that the major part of the articles contained in the volumes referred to, have either been made public and widely disseminated, or are of such a character as not to merit reiteration here. Below will be found a few articles, or portions of articles, which we have thought of sufficient value and importance to be embodied in the Annual Report of the Association. We will here add, by way of keeping some of these fundamental truths before the dairy public, a few facts and suggestions.

Prof. G. C. Caldwell, in his address before this society in January, 1870, clearly proved that the immediate cooling of milk as soon as drawn from the cow, would certainly prolong the sweetness of the milk. He as plainly showed, that in order to keep milk utensils in a sweet and fit condition, they must be thoroughly rinsed in *boiling water*, after being used.

Milk should be drawn from the cow in a perfectly neat and cleanly manner, and strained into one large vessel, where it should be gently stirred for one minute in order that the cream from the entire mess may be ready for skimming at the same time.

YIELD.

In the Transactions of the American Institute for 1851, we find a table showing the yield of milk, butter and cheese, from the best known cows, English and American, for fifty years, from which we extract the following:—

	qts. milk,	lbs. butter,	lbs. cheese.
Average of best dairies, British,	1,700	210	450
Individual cows, "			600
" " American,	1,670	207	625

Mr. Horstall (of England,) states that the greatest amount of butter obtained in his dairy from a given amount of milk, was in December, 1854, from cows on stall food, when it reached 27¼ ounces from sixteen quarts of milk.

In the dairy of Hon. Zadoc Pratt, of Greene county, N. Y., in 1859, there was required to make a pound of butter 14 42-100 quarts of milk; in 1860, 11 1-5; in 1861, 10 42-100 quarts.

TEMPERATURE OF THE DAIRY ROOM.

All authorities agree that the milk-room should be cool and airy, —a northern exposure being preferred—and a good circulation of pure air at all times secured. The temperature of this room should not vary greatly from 60°.

CHURNING THE MILK.

Mr. R. L. Pell, in the Transactions of the American Institute for 1858, says:—"I think the chances of obtaining good butter at all seasons of the year, are greater when the whole milk is churned, which is the usual practice in the mountain districts of Switzerland, where they find it necessary to raise the temperature with hot water to 65° before churning, which they think does not injure it, if the water is put in while the dasher is in motion.

The advantages of churning the entire milk, instead of the cream, are,

1. A proper temperature can be obtained summer and winter.
2. Two hundred gallons of milk will yield six per cent. more butter than the cream would, if taken off and churned separately.
3. With proper attention to the food of the animals, butter of the same quality can be obtained all the year round.
4. No particular attention to change of method is necessary at any time, the churning is alike simple in all seasons."

SKIMMING THE MILK.

The cream should be removed as soon as the milk is slightly soured, and, if possible, it should be immediately churned.

In winter, there is danger that by too great exposure to cold, either before or after skimming, the cream may become bitter.

If the churning cannot be performed at once, the cream should be put into glazed earthen or tin vessels, and maintained at a temperature of about 60°. At every addition of cream the whole mass should be gently stirred.

New cream and old must not be mixed just before churning.

CHURNING.

The cream should be churned when at a temperature of 58° to 63°, according to the weather.

The churning should be moderately done, as a rapid motion of the dash or crank is less favorable to the production of the most and the best butter. The churning should last from forty-five to sixty minutes, or even more.

WASHING THE BUTTER.

In Orange county, N. Y., the butter is thoroughly washed in cold spring water. In the Philadelphia method, after the buttermilk has been drawn off, ice-cold water is twice added.

For further information regarding churning, washing, working, salting and packing the butter, your committee refer to the following article by Prof. S. W. Johnson, of Sheffield Scientific School, Yale College, which article your committee deem so valuable as to copy entire from the American Agricultural Annual for 1868 (published by Messrs. Orange Judd & Co., N. Y. :)—

MILK AND BUTTER.

For a number of years the Experiment Station of the Royal Agricultural Academy of Sweden, in Stockholm, has been occupied with chemical investigations upon milk, its composition and alteration, and the products obtained from it in the making of butter and cheese. In this paper are given the results of some of these researches, which have been ably conducted by Prof. Alexander Muller, and his assistant, Dr. Eisenstuck. Many of the statements are indeed not new to the dairyman, are, in fact, widely recognized as in accordance with sound practice; but they have this value, that they are the results of experience rendered positive and incontrovertible by exact experiment, with the aid of chemical analysis. In common practice and observation many of the conditions needful for arriving at the truth are wanting, and the circumstances of the experiment are vaguely understood and fluctuating. Hence the results obtained by a skilled and precise experimenter, fully posted in the practice of dairying, and equipped with all the methods and instruments of experimental science, are peculiarly valuable.

Composition of Milk.—Analyses were made of the mixed milk of fifteen cows,(five Ayrshire, five Pembrokeshire, and five Swedish cows,) which were highly fed and milked at 6½—7½ A. M., and 5½—6½ P. M. These analyses, extending throughout a whole year, gave the following average result:—

Fat, (butter)	4.05	
Alluminoids, (casein, etc,)	3.32	
Sugar of milk	4.71	
Ash	0.73	
	12.81	
Dry matter		12.81
Water		87.19
		100.00

The fluctuations during the entire period were remarkably small. The lowest percentage of water observed was 85.92, and the highest 88.35. In but four instances did the water fall below 86.6, and in but four did it rise above 88. The composition of the milk of uniformly well-fed cows is therefore very uniform, and scarcely

varies throughout the year, whatever may be the change in temperature, weather, etc.

Morning and Evening Milk exhibit a constant, though slight difference in compositon, which, in general, consists simply in containing *half a per cent. more fat at night than in the morning. In the morning milk this fat is replaced by almost precisely the same quantity of water.*

Further investigations showed that the proportion of fat is influenced somewhat by the time that passes between the milkings,—is, in fact, less the longer this time. Thus milk, taken after an interval of

10 hours, contained	4.36	per cent.	of fat.
11 " "	4.31	"	"
12 " "	3.97	"	"
13 " "	3.97	"	"
14 " "	3.51	"	"

Taking into account the greater quantity of milk obtained in the morning, the absolute amount of fat yielded by the cow is rather more at morning than at night.

Average Composition of the Products obtained from Milk in making Butter.—In making butter, 100 parts of milk yield, on the average, in round numbers, the following proportions of cream, butter, etc., provided the cream rises in a cool apartment, so that no sensible evaporation of water takes place :—

Buttermilk	6.0	
Butter	4.0	Calculated without salt.
Water removed from butter by salting	0.1	
	10.0	
Cream	10	
Skimmed milk	90	
	100	

The average per centage composition of these products is given in the subjoined table :—

	New Milk.	Skimmed Milk.	Cream.	Buttermilk.	Butter.†	Brine.‡
Fat	4.00	0.55	35.00	1.67	85.00	0.00
Alluminoids *	3.25	3.37	2.20	3.33	0.51	0.39
Milk sugar	4.50	4.66	3.05	4.61	0.70	3.84
Ash	0.75	0.78	0.50	0.77	0.12	0.86
Water	87.50	90.64	59.25	89.62	13.67	94.91
Total	100.00	100.00	100.00	100.00	100.00	100.00

*Casein and albumen.

†Unsalted.

‡Brine that separates on working after salting ; salt not included.

When is Milk or Cream Ready for Churning?—It is well known that it is very difficult, if not impossible, to bring butter from fresh milk, or from thin cream that gathers upon milk kept *cold* for 24 hours. It has been supposed that milk should *sour* before butter can be made. This is an error, numberless trials having shown that sweet milk and sweet cream yield butter, as much and as easily as sour cream, provided they have stood for some time at medium temperatures. It is well known that the fat of milk exists in minutes globules, which are enclosed in a delicate membrane. It was natural to suppose that in fresh milk this membrane prevents the cohesion of the fatty matters, and that, when, by standing, the milk or cream becomes capable of yielding butter after a short churning, it is because the membrane has disappeared or become extremely thin. Experiments show, in fact, that those solvents which readily take up fat, as ether for example, dissolve from sweet milk more in proportion to the length of time it has stood at a medium temperature.

Readiness for churning depends chiefly upon the *time that has elapsed since milking*, and the *temperature to which it has been exposed* in the pans. The colder it is, the longer it must be kept. At medium temperatures, 60°—70° F., it becomes suitable for the churn within twenty-four hours, or before the cream has entirely risen. Access of air appears to hasten the processs.

The *souring of the milk or cream* has, directly, little to do with preparing them for the churn. Its influence is, however, otherwise felt, as it causes the casein to pass beyond that gelatinous condition in which the latter is inclined to foam strongly at low temperatures, and by enveloping the fat globules hinders their uniting together. On churning cream that is *very sour*, the casein separates in a fine granular state, which does not interfere with the "gathering" of the butter. Even the tenacious, flocky mass that appears on gently heating the sweet whey from Chester cheese, may be churned without difficulty after becoming strongly sour.

Cream churned when *slightly sour*, as is the custom in the Holstein dairies, yields butter of a peculiar and fine aroma. Butter made from sour cream is destitute of this aroma, and has the taste which the Holstein butter acquires after keeping some time.

The circumstances that influence the rapidity of souring are chiefly *temperature* and *access of air*. When milk sours, it is because of the formation of lactic acid from the milk sugar. This chemical change is the result of the growth of a microscopic vegetable organism, which, according to Hallier's late investigations, is of the same origin as common yeast. Like common yeast, this plant requires oxygen for its development. This it gathers from the air, if the latter have access; but in comparative absence of air, as when growing in milk, it decomposes the latter (its sugar,) and the lactic acid is a chief result of this metamorphosis. If milk, which by short exposure to the air has had the microscopic germs of the ferment-plant sown in it, be then excluded from the air as much as possible, the ferment, in its growth, is necessitated to decompose the milk sugar, and hence the milk rapidly sours. On

the other hand, exposure to the air supplies the ferment partially with free oxygen, and the milk remains sweet for a longer period. Such is the theory of the change. Muller's experiments confirm this view by demonstrating that free exposure to the air, or, better, a supply of pure oxygen gas, retards the souring of milk; while confinement from the air, or replacing it with pure nitrogen, hastens this change. That low temperatures should prevent souring, is in analogy with all we know, both of ordinary chemical change, and of changes that depend upon vital operations.

Muller found that milk exposed at a temperature of 70° F. to a stream of pure oxygen gas for seventy-seven hours, was but faintly sour near the surface layer, and somewhat more at a little depth; while the same milk in pure nitrogen became equally sour in sixty-two hours, and in seventy-seven hours was thoroughly sour and curdled.

Milk kept in an open pan at a temperature of 34° F., remained perfectly sweet for eight days.

Stirring of cream does not promote souring, but rather hinders it by increasing access of air; it may be advantageous in making the souring uniform.

The temperature while churning which is most favorable for gathering the butter with the proper softness and adhesiveness, is 66° to 70° F. The melting point of butter made on dry hay is slightly higher than that produced on grass, or while feeding with oil-cake; correspondingly we find that, in winter, it is customary to churn a few degrees warmer than in summer. Sour cream may be cooled by direct addition of water, but sweet cream is thereby prevented from yielding its butter. In the latter case, cold skim milk may be used, or the cream should be cooled by water external to the churn.

Aeration of the Cream during churning is of little importance. Neither chemically nor mechanically does a stream of air favor the separation of the butter in any perceptible degree. On the contrary, cream that is cold and slightly sour, is thereby converted into a mass of froth from which it is exceedingly difficult to make butter.

The duration of churning, as is well recognized in practice, is of great influence on both the quality and quantity of the butter. Half an hour, at least, is considered essential by experienced dairymen for churning, when the volume of cream is considerable, and an hour or even more is not thought too much.

The object of churning is to bring the fat globules of the cream or milk, which, by standing a suitable time, have become divested of their envelopes, into contact, so that they unite to a coherent mass. The gentler the motion to which the cream is subjected, the more slowly goes on the process of agglutination, and the closer and finer the union takes place. By slow churning the butter leaves the churn in a nearly finished condition, and requires a comparatively small amount of working to complete its preparation. On the contrary, when butter is made to come in a few minutes by violent agitation, as in the strife for the repute of quick work in

case of trials of new churns, there is obtained, instead of good butter in dense and large clumps, a doughy mass consisting of little balls of fat mixed with buttermilk and cream, and full of air bubbles, which no skill in working can convert into good butter.

While it is true that violent churning will produce a greater weight of so-called butter, it is demonstrated by chemical analysis that the milk or cream thus treated does not yield so much of its fat as is obtained by slower and gentler agitation. The greater weight of the product is due to the admixture of buttermilk, which is retained in the spongy mass.

The fact that churning must go on for some time before any visible change is effected in the cream, and that the butter "comes" somewhat suddenly, is due to the exceeding minuteness of the fat globules, of which myriads must unite before they attain a size visible to the unaided eye.

Washing Butter.—To prepare butter for keeping without danger of rancidity and loss of its agreeable flavor, great pains is needful to remove the buttermilk as completely as possible. This is very imperfectly accomplished by simply working or kneading. As the analysis, before quoted, shows, salting removes but little besides water and small quantities of sugar. Casein, which appears to spoil the butter for keeping, is scarcely diminished by these means. Washing with water is indispensible for its removal.

In Holland and parts of Holstein it is the custom to mix the cream with a considerable amount of water in churning. The butter is thus washed as it "comes." In Holland it is usual to wash the butter copiously with water besides. The finished article is more remarkable for its keeping qualities than for fineness of flavor when new.

The Holstein butter, which is made without washing, has at first a more delicious aroma, but appears not to keep so well as washed butter.

Swedish butter, made by Gussander's method, in which the cream rises completely in twenty-four hours, the milk being maintained at a temperature of 60° to 75° F., is, when prepared without water, the sweetest of all. If, however, it is to be kept a length of time, it must be thoroughly washed before salting.

Salting.—Immediately after churning the mass consists of a mixture of butter with more or less cream. In case very rich cream (from milk kept warm) is employed, as much as one-third of the mass may be cream. The process of working completes the union of the still unadhering fat globules, and has, besides, the object of removing the buttermilk as much as possible. The buttermilk, the presence of which is objectionable in new butter by impairing the taste, and which speedily occasions rancidity in butter that is kept, cannot be properly removed by working alone. Washing, as already described, aids materially in disposing of the buttermilk, but there is a limit to its use, since if applied too copiously, the fine flavor is impaired. After working and washing, there remains in the butter a quantity of buttermilk or water which must be removed if the butter is to admit of preservation for any considerable time.

To accomplish this as far as possible, salting is employed. The best butter-makers, after kneading out the buttermilk as far as practicable, avoiding too much working so as to not to injure the consistence or "grain" of the butter, mix with it about 3 per cent. of salt, which is worked in layers, and then leave the whole twelve to twenty-four hours. At the expiration of this time, the butter is again worked, and still another interval of standing, with a subsequent working, is allowed in case the butter is intended for long keeping. Finally, when put down, additional salt (one-half per cent.) is mixed at the time of packing into the tubs or crocks.

The action of salt is *osmotic*. It attracts water from the buttermilk that it comes in contact with, and also takes up the milk-sugar. It effects thus a partial separation of the constituents of the buttermilk. At the same time it penetrates the latter and converts it into a strong brine which renders decomposition and rancidity *difficult* or *impossible*. Sugar has the same effect as salt, but is more costly, and no better in any respect.

Independently of its effect as a condiment, salt has two distinct offices to serve in butter-making, viz.: 1st, to remove buttermilk as far as possible from the pores of the butter; and 2d, to render innocuous what cannot be thus extracted.

It hardly need be stated that the salt must be as pure as possible. It must be perfectly white, must dissolve completely in water to a clear liquid untroubled by any turbidity, without froth or sediment, must be absolutely odorless, of a pure salt taste without bitterness, and in a moderately dry room must remain free from perceptible moisture.

Again, the salt must have a certain degree of fineness, to adapt it to its uses. The best salt consists of delicate, four-sided, hopper-shaped crystals, recognizable as such by the aid of a low magnifier. Salt in this form presents a large surface to the buttermilk, and thereby ensures the formation of *large drops of brine*, which admit of removal in the process of working.

Coarser salt, and salt consisting of cubic crystals, cause indeed the separation of buttermilk in large drops; but the operation takes too long a time, and the salt cannot be diffused equally throughout the butter without using too large a quantity. Again, any coarse salt grains remaining in the butter crackle unpleasantly between the teeth and give too strong a salt taste when encountered in eating. Very fine salt, on the other hand, becomes so extremely diffused in the butter, that the minute droplets of brine which it forms by dissolving in the buttermilk cannot unite to form drops large enough to admit of working out. When, however, the butter has been worked with coarse salt, nothing can be better than fine salt to pack with. While inspection with a magnifier will enable one to note the form of the crystals, some more definite statements as to their proper dimensions may be useful. In this respect the best salt is that which has the most crystals that range from one-twentieth to one-tenth of an inch in diameter.

KINDS OF SALT.

As regards the purity of different kinds of salt, some of those in use in this country deserve notice here. The Turk's Island salt has a repute not justified by any facts. As commonly sold in the coarse state, it is extremely dirty and impure. Much of the fine table salt commonly sold in New England, in Connecticut at least, is also impure and not fit for use. The purest salt made in this or any country that the writer is acquainted with, came some years ago from Syracuse, N. Y., where the ingenious processes of Dr. Goessman were then employed. If, as we suppose, the same processes are in use now, the "Onondaga Factory Filled Salt" must take a rank second to none as regards purity and freedom from deleterious ingredients, especially the chlorides of calcium and magnesium. This rank, we believe, it has assumed in the estimation of all who have given it a fair trial. The brand "Onondaga Factory Filled Dairy Salt" corresponds closely with Dr. Muller's description of the best salt for removing buttermilk. It is seen by the microscope to consist very largely of their shallow, hopper-shaped crystals, or thin lamina probably resulting from the fracture of such crystals. In dimensions the crystals are perhaps a trifle finer than Dr. Muller recommends. By sifting on meshes of one-thirtieth of an inch, the coarser part would leave nothing to be desired in working butter, and the finer portion would be perfectly adapted for it putting down.

Your committee question whether the amount of salt suggested by Prof. Johnson is sufficient to preserve butter for any considerable time.

PACKING.

None but perfectly air-tight firkins, made of white oak staves, at least one-third heavier that the usual make, should be used for packing. To neutralize the odor and sap of the wood, and to drive from the cells of the wood the air which taints the butter, the firkins ought to be thoroughly soaked with *hot brine* made from the same kind of salt with which the butter is cured, and not used over and over again, until the bitter taste of the wood has destroyed the use of the brine, but thrown away after each firkin is scalded. After the firkin is thus prepared, pack the butter solidly, putting on the top of it a clean, white cloth, and cover the cloth with a layer of the same kind of salt, one inch in thickness. Fill to near, but *not quite to top* of salt with brine, and place on top of all a clean flat stone; then put the butter in a dry cellar, having no connection with any vegetables or matter that imparts odor, and there watching that the salt is always just above the brine, let it remain until disposed of.

In closing, we will add a suggestion in regard to packing. As now done, in many cases, a heavy wooden pounder is employed. There is reason to believe that this severe usage injures the grain,

and therefore the quality of the butter. Perhaps it may be found that a steady pressure, under a cheese-press screw, or by any simple application of a lever, will be found to be better.

All of which is respectfully submitted.

LEWIS T. HAWLEY,
GEORGE GEDDES,
HARRIS LEWIS.

SOILING FOOD.

BY A. L. FISH, ESQ., OF HERKIMER COUNTY, N. Y.

It has been my habit for thirty years to annually grow corn for soiling dairy cows, at the rate of one acre to ten cows. I plant early, so that it will mature and be ready to be fed by the first of August. I deem it unfit to feed till it is fully in blossom, and forming ears, when it is found to be sweetest, and contains most saccharine matter. The ground is marked for rows, three feet apart, running north and south, to admit the sun's rays to strike the ground between them. The seed is planted in hills, eighteen inches apart in the row, with six to ten seeds in a hill, and tilled like any corn crop. The evergreen sweet corn is preferable to other varieties, as it remains green and succulent longer. The advantages of planting in rows and hills, are, that the plant grows rapidly on good ground, and requires all the influence of sun, heat, light and air, that can be given it, to perfect its physical growth. Being in rows gives opportunity to move the ground by cultivation, and freer access to those elements than when sown broad-cast or in drills. Corn, like other plants, is most nutritious when it is making its master effort to produce its fruit, then it will make the most flesh, and the most and best quality of milk.

The advantages of soiling in August and September are, that it relieves pastures from being grazed too close in a season of slow growth, and gives opportunity for them to recuperate for fall grazing; keeps up a good flow of milk through the season of flies and grasshoppers, and makes better butter and cheese than any other forage, except the flower of grass-feed, which is an exception to any other forage I have ever used. My usual custom and best success has been in turning the sward late in the fall, and drawing on from twenty to thirty loads of manure to the acre; the after sward is well dragged to get loose dirt to mix with the manure. When ready to plant, I spread the manure and pulverize it well with the soil. I plant and till well, like any other corn crop. The result is from forty to sixty thousand pounds of green weight per acre, and one hundred pounds of this fodder, fed alone, per day, on experiment, makes thirty pounds of milk and three pounds of cheese, or one and a quarter lbs. of butter. Thus a product of from twelve to eighteen hundred pounds of cheese is obtained, or from five hun-

dred to seven hundred and fifty pounds of butter from one acre of ground.

FLOATING CURDS; BY A. L. FISH, ESQ., OF HERKIMER COUNTY, N. Y.

My experience with floating curds is limited to my acquaintance with cheese factories. Before cheese factories were built, I had the supervision of from fifty to one hundred farm dairies annually, from 1844 to 1855, to improve their quality for export trade, during which time I neither saw or heard of a floating curd.

I built a cheese factory in 1864, and run the milk of one thousand cows. In the month of August I had one vat of floating curd, supposed it to be caused by the milk being too long on the road, as some of it was brought five miles, on wagons. August 12th, 1870, my attention was called to a floating curd in my own dairy. I immediately set to work to find the cause. The milk of three proprietors was made together in my room, all of whom fed their cows whey. I made a portable partition to divide the milk in the same vat, stopped feeding whey to my own cows for three days, after which their milk made sound curd. The others were fed sour whey, as usual, and their milk made floating curds. Feeding whey was discontinued for three days, it then all made sound curd. Five healthy cows of my own were fed twelve quarts of whey each that had stood forty-eight hours, one feeding produced milk that made floating curds. After repeating the experiment by alternating the feeding of old whey to a portion of the cows, and not to others, and working the milk of each in the same vat at the same time, and alike in all respects, the milk from old whey produced floating curds, when the other did not. Hence the conclusion, that keeping whey to raise cream at the factory, then being taken home by the patrons and kept longer in stale tubs or vats before feeding it to the cows, is a fruitful cause of floating curds, so prevalent the past season.

By the use of the portable partition, various experiments were made, showing the effect of different kinds of forage upon the milk; also the effect of the juice or sap of plants when mixed with the milk in one part of the vat. After the milk is warmed, and rennet added, and mixed with the mass, the partition is quickly placed in the vat, dividing it into several parts, and whatever property is to be added, is quickly done, so that the general treatment shall be the same in all respects in working the several curds. It also gives opportunity to vary the treatment of the different curds, to show the result of varied practice. By this process, the juice of clover leaves, gathered in the morning dew, and added to the milk, caused the curd to float. Hence the conclusion that the condition of forage may be chargeable with imparting to milk a tendency to floating curd, when, by the aid of sour tainted whey, the work becomes complete.

There are other infectious taints that effect the condition of milk and the flavor of cheese. Breathing tainted air, drinking water from filthy pools, milking in tight stables that are illy drained and venti-

lated, forage in a decayed state, are all predisposing causes, and when combined, are sure to make the factoryman trouble.

As a remedy for floating curds, and other defects in factory cheese, I would suggest that the patrons meet together and agree upon such a system of feeding and other habits, calculated to produce pure milk, of an even quality, and elect one of their number to examine the premises of each patron often, to see that no causes (such as are named in a schedule,) are allowed to exist to vary or injure a uniform quality of milk.

Such an arrangement, strictly adhered to, and carried out by each patron, would result in less cheese out of flavor, and less floating curds, than are common in cheese factories.

COMMUNICATION FROM J. B. OLCOTT, ESQ., OF HARTFORD, CONN.

Having recently learned to make cheese, an article of daily food, through a trial in my family, of Swiss cheese, I am sorry to miss the hearing of Prof. Caldwell's talk about foreign cheese-making. I hope he and other gentlemen present—some of whom may be acquainted with American experiments in making cheese after the Switzer pattern—will be put to the question, so that the peculiarities of the Swiss method may be made plain.

Swiss cheese, as it appears in our market, is almost invariably sound, nutty and sweet, and coming in packages of some 150 or 160 pounds weight each, must command the attention of the dairyman. It is, of course, appreciated by the Germans, whom, with the constantly increasing number of wealthy and intelligent people that have eaten it abroad, constitute a very respectable body of consumers, with tastes well worth the study of the trade. Before the European war, this cheese retailed for 35 to 50 cents per pound, and is now much higher.

We have also the little white cream curds of Neufchatel—the sample I have seen, possibly of American manufacture—retailing for 60 cents. This form of dairy product ought to commend itself to systematic farmers who like to trade direct with the consumer. One too far from the city or village to get the highest price for his milk in bulk, might well condense it into the shape of the tiny cream cheeses of Neufchatel. I can see nothing about them except their rich, buttery flavor, differing from the pots of lean curd which every housewife, who has handled milk, knows how to prepare for the tea-table. And many an over-worked and under-paid dairy woman, might exclaim at the sight of them, that she should be right glad to make the best of milk into such shape for half the money. And perhaps I should add—as in the minds of some people, there is a notion that foreign cheese is always strong and disagreeable in odor and taste—that this cheese is eaten, not as a condiment, but as a staple article of food, by men, women and children, who refuse the ordinary cheese in market as too rank with rennet and fermentation.

For my own family supplies I am forced to look among the plain,

old-fashioned cheese of private dairies—made, probably, after the traditional English, Irish and Scotch patterns—(and rather uncertain picking I find,) for an article so simple and palatable as a lunch, in the old way, with bread.

A year or so ago, I was at some pains to enquire in New York concerning Swiss cheese. One importer wrote me that there had been many attempts to make cheese of the same quality here, but these had uniformly failed. He said we lacked the "Alpine grass." As all American progress in the useful arts has been over, and in spite of a thousand failures, this did not satisfy me. Our country is too broad and too varied, to make such an objection valid against all sections. I pursued my enquiries, and succeeded in finding a Swiss retailer of cheese in New York, who had a stock of both imported and American "Sweitzer kase," and among the latter I found several cheeses that would pass with credit among connoisseurs of the foreign article. This retailer was in the habit of buying cheese among his countrymen in westward states. The maker of these good cheeses, he said, had sold his farm and was moving farther west. Of course a dairyman on the move could not be expected to compete in quality with the products of dairies over the water, backed by the constant experience of hundreds of years.

Except in a mousing way, about home, here my enquiries ceased; and with regret that I cannot get fresher, sweeter and better cheese, made in the same way—as I firmly believe can be done—from our own dairies, I have remained a consumer of such imported Swiss cheese as the grocers of this city select for this market.

To any one interested, I can give names among our first grocers who would be glad to sample the goods of an American dairyman upon their own counters. Whether a trial in manufacture could be best made by a factory, or a single dairyman, I am too ignorant upon the subject to say. I opine that a factory might follow where an individual had opened the way.

The Swiss undoubtedly have some "kinks" in making cheese "that can wait and travel for a market" worth our learning, and I suspect that the path to pecuniary success in this direction, lies, not in any attempt at literal imitation, but in a thorough examination and understanding of their ways—(perhaps involving the experience of an ambitious American cheese-maker while doing journey-work in Switzerland,)—adapted to our circumstances.

TESTING MILK IN FACTORIES.

EXTRACTS FROM AN ARTICLE BY L. B. ARNOLD, ESQ., IN PRAIRIE FARMER (CHICAGO) ANNUAL FOR 1871.

The use of the lactometer is based on the difference in weight of a given quantity of water, milk, cream, and skim-milk. A vessel that will hold just 100 ounces of distilled water, will hold 103 ounces of milk, 98½ ounces of cream, and 103 6-10ths ounces of skimmed milk. These numbers are respectively the specific gravity of the materials named. Different authors vary these numbers a little. I give them as I found them by careful tests of grass-fed

milk. In using the lactometer, the liquid to be tested must be brought to the temperature on which the grading of the instrument is based, usually 80 degrees, (as frequently 60°.)

In testing skimmed milk, the lactometer is useful. Since the lightest part of the milk—the cream—has been taken off, skimmed milk is specifically heavier than whole milk, and consequently the lactometer will not sink so low. * * * Saving out the "strippings" has the same effect as skimming the milk. The use of the lactometer determines the specific gravity of the milk in which it floats. It does nothing more. If a sample of milk is found to be light, it may have been occasioned by watering, or from containing an unusual amount of cream. Testing in the Per Cent Glass will indicate which has been the cause.

In testing skimmed milk, we place the sample in one *per cent glass*, and into another a sample of milk known to be pure. Both are tried with the lactometer. If it stands alike in each, both are pure; if it sinks deeper in the suspected milk, it has been watered. By adding water to the pure milk until the lactometer sinks as deep as in the other, the *exact per cent. of watering* will be shown.

[To the above it may be added that when using the lactometer, a much more reliable test can be obtained if the instrument is placed carefully into the liquid, so that it will not go much if any below the point where it will finally settle. When placed into the fluid in such a manner that nearly the entire length of the stem is dampened, the instrument is to some extent loaded with this dampness, and settles into the liquid a trifle lower than it otherwise would do.]

CONDENSED MILK.

Condensed milk can also be made an article of export. Indeed it already has assumed a place in the shipping trade. This is shown from the official returns recently received at the Bureau of Statistics, which makes the total value of condensed milk exported from New York in 1869 to be $79,652. The exports are not confined to one country, but to several, for the statistics show that condensed milk to the value of $21,770 went to England, $14,900 to Australia, $9,494 to the States of Columbia, $9,176 to China, $8,116 to Brazil, $3,087 to Cuba, $3,093 to the British West Indies, and $1,757 to the Danish West Indies.

The business is in its infancy, and has not attracted the attention of dairymen to any considerable extent, but the time must come, we think, when it will be developed into a very important branch of the dairy. Probably no kind of dairying to-day is so profitable as the manufacture of condensed milk.—*X. A. Willard, in Rural New Yorker.*

THE CHEESE TRADE—1869 AND 1870.

The following tables are copied from the columns of the Utica *Herald*:—

We give below full tables of the cheese trade for the years 1869 and 1870, showing the receipts of boxes of cheese in New York city, and the exports, the highest quotation in Liverpool and New York, and the highest price of gold for each week of the two years. The totals of 1870 show a healthy growth, both in production and foreign trade, over 1869. The average highest quotation of gold from the first week of May to the close of the year 1869 was 131⅜; and for the same portion of 1870, 117. The average highest quotation of cheese in the city for the same period of 1869 was 18¼c., and of 1870, 15⅛c. If we allow for the price of gold for the two years, the average price in 1869 will be found to be about 1¼c. higher than during the past year:—

1869.		Receipts.	Exports.	Price in Liverpool.	Price in New York.	Price of Gold.
January	9	2,359	9,547	73s.	20 c	135⅛
	16	1,928	8,065	73s.	20 c	136
	23	2,012	6,086	74s.	21 c	136
	30	855	4,765	74s.	21 c	136
February	6	2,269	2,208	74s.	21 c	135⅝
	13	1,317	4,042	74s.	22 c	135⅝
	20	2,837	1,300	74s.	22 c	133⅝
	27	1,045	848	74s.	22 c	132
March	6	364	610	74s.	22 c	130¾
	13	1,278	580	74s.	22 c	131
	20	1,423	621	74s.	22 c	131
	27	2,693	1,133	74s.	22 c	131
April	3	1,107	1,220	74s.	22 c	131½
	10	1,258	2,480	76s.	22 c	133
	17	3,508	3,041	79s.	23 c	133
	24	1,219	5,317	76s.	21 c	133
May	1	3,382	5,317	80s.	23 c	135
	8	4,280	2,370	83s.	23 c	138
	15	9,028	4,236	83s.	23 c	139
	22	14,520	7,076	82s.	23 c	141
	29	12,038	8,700	82s.	23 c	140
June	5	22,247	14,179	80s.	22 c	138⅝
	12	22,202	18,564	79s.	21 c	139
	19	34,250	32,250	78s.	19 c	136¾
	26	42,571	38,685	73s.	18 c	137
July	3	46,118	34,249	67s.	16 c	137
	10	33,137	42,008	64s.	15½c	135⅞
	17	47,501	45,153	62s. 6d.	15 c	135½
	24	54,098	44,141	61s.	15 c	136½
	31	62,527	49,681	62s.	15½c	136½

1869.		Receipts.	Exports.	Price in Liverpool.	Price in New York.	Price of Gold.
August	7	94,642	65,329	62s. 6d.	16 c	136½
	14	61,716	59,357	62s.	16 c	134
	21	51,857	34,803	62s.	16 c	132
	28	50,492	47,753	62s.	16½c	134
September	4	44,977	39,294	61s. 6d.	16½c	136½
	11	31,976	29,197	61s. 6d.	16 c	135½
	18	34,367	19,500	61s. 6d.	16 c	137
	25	47,523	33,656	63s.	16½c	136
October	2	81,337	27,600	64s.	16½c	130
	9	24,872	47,280	65s.	16½c	130
	16	38,958	28,401	67s.	18 c	130
	23	57,359	15,997	67s. 6d.	19 c	131
	30	45,325	6,237	69s. 6d.	19 c	129
November	6	35,671	11,381	69s.	18¾c	127
	13	35,159	7,716	69s.	18 c	127
	20	24,910	6,387	68s. 6d.	18 c	126½
	27	35.551	8,446	68s.	18 c	124
December	4	34.627	9,274	68s.	17⅜c	123
	11	26,628	2 687	68s.	17½c	123
	18	22,733	18,890	68s.	18 c	120½
	25	8,286	4,606	68s.	18 c	120½
	31	6,530	4,020	68s.	18 c	120½
Total		1,332,017	926,411			

1870.

January	8	3,450	2,726	70s.	17¾c.	122
	15	4.040	1,703	71s.	18 c.	121⅜
	22	3,362	7,813	71s.	18 c.	120¾
	29	5,540	4,103	72s.	18 c.	121
February	5	3,789	6,604	72s.	18 c.	120⅞
	12	4,000	2,600	72s.	18 c.	119¾
	19	4,992	2,740	73s.	18 c.	118¾
	26	3,791	3,628	74s.	17½c.	115½
March	5	1,484	5,735	73s.	17½c.	113¾
	12	1,500	11,017	71s.	17 c.	112
	19	5,266	7,478	70s. 6d.	16 c.	112
	26	6,726	6,956	69s.	15½c.	111½
April	2	5,815	14,705	70s. 6d.	15½c.	111½
	9	8,791	8,627	71s. 6d.	16 c.	113½
	16	6,956	6,378	71s. 6d.	17 c.	113½
	23	4,576	7,396	73s. 6d.	17 c.	113½
	30	9,543	10,293	74s.	17 c.	115
May	7	4,554	9,639	74s.	17 c.	115
	14	8,868	9,484	74s.	17 c.	115
	21	13,270	11,233	74s.	16½c.	114½
	28	18,722	12,636	72s.	16 c.	114½
June	4	16,324	15,750	68s. 6d.	14½c.	114½
	11	19,088	22,842	68s.	14½c.	113½
	18	14,025	36,861	67s.	14½o.	113
	25	40,247	40,084	66s.	14½c.	111
July	2	55,355	47,500	66s.	14½c.	112
	9	25,274	45,378	64s.	14½c.	112
	16	72,830	51,401	63s.	14½c.	116¾
	23	58,546	59,056	63s.	14½c.	119¾
	30	64,491	50,751	63s.	14½c.	121½

1870.		Receipts.	Exports.	Price in Liverpool.	Price in New York.	Price of Gold.
August	6	66,291	58,090	63s.	14¼c.	121½
	13	58,352	60,587	62s. 6d.	14 c.	117⅝
	20	31,546	41,886	62s.	14 c.	114¾
	27	32,069	39,354	61s. 6d.	14 c.	116⅝
September	3	60,106	37,819	61s. 6d.	14 3.	114
	10	69,324	62,007	61s. 6d.	14 c.	114
	17	60,268	42,082	61s.	14¼c.	114
	24	62,239	24,453	61s.	14¼c.	113
October	1	61,607	31,431	64s.	14½c.	114
	8	38,006	24,491	65s.	15 c.	113½
	15	43,792	19,880	66s.	15 c.	113½
	22	28,279	12,022	67s. 6d.	15¾c.	113
	29	60,619	28,033	69s.	15¾c.	111½
November	5	53,330	18,844	69s. 6d.	15⅞c.	110⅝
	12	63,251	19,931	69s. 6d.	15¼c.	111½
	19	40,695	19,245	71s. 6d.	16 c.	112⅝
	26	28,338	20,539	71s. 6d.	16 c.	111⅝
December	3	64,361	34,627	72s. 6d.	16 c.	111½
	10	59,489	23,059	72s. 6d.	16½c.	110¾
	17	32,316	22,733	72s. 6d.	16½c.	110¾
	24	13,174	13,935	73s.	16½c.	110⅝
	31	11,636	6,663	73s.	16½c.	110¾
Total		1,592,403	1,184,687			

SUNDAY CHEESE-MAKING AND FEEDING WHEY.

I think it was proved conclusively at the late Dairymen's Convention, that good, fine-flavored cheese could not be made from low, sour pastures. Then how can a cow manufacture sweet, pure milk that will keep, and not taint, and make fine flavored cheese from putrid whey fed to her, instead of sweet pasturage. I wonder our cheese-buyers do not first inquire, when visiting our factories, if sour whey is extensively fed by the patrons to their cows.

I think they will never find fine cheese, that will retain its flavor, when this is done. In regard to the Sunday manufacture of cheese, I think it may be dispensed with without much inconvenience or loss to any one concerned. Our manufacturers, I believe, are almost to a man very desirous for such a change. I have conversed with many on this subject, and, without an exception, they have said they would be very glad to have the Sabbath for rest. Now, if all the patrons would agree to keep their Sunday milk at home to make their butter from, then all the milk produced during the six working days, may be delivered at the factory, enabling the manufacture of about as much cheese in the six days as is now made in seven (as most of our patrons keep out their milk some time during the week to make their butter.) This would save at least one-seventh the cost of labor, fuel, and the use of the apparatus, so that those running cheese factories could well afford to make cheese at a reduced price.

Our factories under the present system are places of public resort on the Sabbath for young men and young women, who go there for frolicking and amusement, which has always been a great nui-

sance, and the manufacturers know not how to remedy this evil, as many of the persons referred to are sons and daughters of their patrons.

I hope that at our annual factory meetings soon to be held, the subject of Sunday cheese-making will be candidly discussed, and that many will try the six days's system, and rest on the Sabbath, according to the commandment.—*Utica Herald.*

HERKIMER, N. Y., January 24, 1871.

FACTORY REPORTS FOR 1870.

NEW YORK.

ONEIDA COUNTY.

Willow Grove Factory, Trenton.—Whole number of pounds of milk received, 3,699,299; number of pounds of cheese made, 363,-302; number of pounds of milk required to make a pound of cheese, 10 1-10; number of cheeses made, 5,414; average weight of cheeses, 67 104-1,000 pounds; number of sales made, 24; total amount received from sales, $51,763.23; paid for use of factory, and for all supplies used in making and boxing cheese, $3,996.31; paid A. Westcott, the maker, $2,361.47; paid patrons pro rata, $45,571.52; average price per pound net to patrons, 12½ cents; highest price per pound for cheese sold, was 16 cents; average price per pound for cheese sold, was 14¼ cents.

A series of resolutions was passed at the annual meeting, not only making the patron responsible for the well being of the society, but making the manufacturer responsible for cleanliness and careful proceedings appertaining to cheese making in every respect. A committee was appointed whose duty it shall be to examine weekly the factory appurtenances, the adjustment of the scales, the books, etc., and the general management of the manufacture. The maker is held strictly responsible to perform his obligations by his employers—the patrons.

It is a duty incumbent upon the patron to deliver his milk strained and in good condition. He is obligated, by a resolution of the society, to use his best endeavors to keep clean his cans, pails, etc., and have a watchful care in milking, and as far as possible, cool his milk prior to delivering at the factory. The patrons hire the factory and its appurtenances, paying 40 cents per hundred pounds of cheese for the use. They pay the maker a certain per cent per hundred pounds for his services. The patrons furnish the necessary articles for the maker. If a patron is found in fault by the delivery of impure milk, etc., he is to be dealt with by his associates with the severest penalties that the law prescribes. It is the imperative duty of the maker to examine the milk and cans,

and, if found in fault, to report the same immediately to the committee.

A committee of four are appointed as salesmen. Tin pails are the only ones allowed in this factory, either by the patron or manufacturer. The patrons, the stock holders and manufacturer are determined to continue Willow Grove Cheese Factory, what it ever has been, a first class institution.—STORRS BARROWS, Secretary.—*Utica Herald.*

Weeks Factory, Verona.—Season began April 11th; closed November 4th; whole number of cows, 700; average number perhaps 600; pounds of milk received, 2,211,432, which made, in green cheese, 234,325 pounds, and of cured cheese, 221,061 pounds. Shrinkage, 13,376 pounds, or about 6 per cent.; pounds of milk required for one pound of green cheese, 9 43-100; of cured cheese, 10 pounds. Twenty-two sales of cheese were made, at prices ranging from 16 cents down to 13½ cents, one sale made at the latter figure, the average price obtained for the cheese during the season being 14 28-100 cents per pound. Net to patrons per one hundred pounds of milk was $1.24 1-5.—G. MERRY.

Rome Association Factory.—Whole number of pounds of milk received, 2,546,555; number of pounds of cheese made, 252,685; number of pounds of milk required for one pound of cheese, 10 78-1000; number of cheeses made, 3,516; average weight of cheeses, about 72 pounds; number of sales made, 12; highest price per pound cheese sold, 16 cents; whole amount of cash received from sales of cheese, $35,546.46; average price per pound, net, to patrons, 12⅝ cents; amount paid for use of factory and fixtures, $840; whole amount expenses (including rent of factory;) charged patrons for making 100 pounds of cheese, $1.44; amount paid Alonzo Fraser, the maker, $1,578.28.—HENRY L. ADAMS, Treasurer.

Lee Center Factory.—Whole number of pounds of milk received, 1,973,849; number of pounds of cured cheese made, 198,448; number of pounds of milk required to make a pound of cured cheese, 9 94-100; number of cheeses made, 2,917; average weight about 68 pounds; number of sales, 10; total amount received from sales, $27,782.72; highest price per pound for cheese sold, 16 cents; lowest price per pound for cheese sold, 13¼ cents; average price per pound for cheese sold, 14 cents; whole amount of expenses charged patrons for making 100 pounds of cheese, $1,80; amount paid Samuel Robards for making and furnishing, $3,572.06.—E. F. WENTWORTH, Salesman and Treasurer.

Stittville Factory.—Number of pounds of milk, 2,754,345; number of pounds of cheese, 267,271; total amount of money received, $38,065.01; average price per pound, 14.24 1-5; net to patrons per pound, $12.64 1-5; amount of milk to make a pound of cured

cheese, 10.3. Commenced April 11th; closed November 6th.—A. G. Bagg, Jr., Cheese-Maker.

R. E. Wilcox's Factory, Sauquoit.—The season began April 25th and closed November 11th. Number of pounds of milk received, 402,387, from which 38,294 pounds of cured cheese were made; cheese not highly colored. Average weight of cheeses, 54 pounds; number of cheeses made, 709. Pounds of milk to one pound of cured cheese,—April 25th to May 20th, 11.19 lbs.; May 20th to June 1st, 10.02 lbs; June 1st to June 16th, 10.22 lbs.; June 16th to August 1st, 11.06 lbs.; August 1st to August 21st, 10.63 lbs.; August 21st to September 23d, 9.98 lbs.: September 23d to November 11th, 10.15 lbs.: average for the season, 10½ pounds. Patrons paid $1,93 per hundred pounds for manufacturing; average price per hundred, $13.15.—Geo. D. Dunham, Secretary.

Hampton Association, Hampton.—Factory opened April 25th; closed October 31st; amount of milk received, 1,476,223 pounds; amount of cured cheese made, 147,099 pounds, 10.04 pounds of milk to one pound of cured cheese; price for making, 75 cents per 100 pounds; amount charged to patrons for making, furnishing, boxing, and selling, $1.90 per 100 pounds. Number of sales, 12; whole amount of sales, $20,103.10; average price per 100 pounds, $13.65. Capital stock of company, $3,100, ten per cent. dividend paid to stockholders, and four per cent. in the hands of the Treasurer, for repairing dry-house.—H. Johnson, Secretary and Treasurer.

MONTGOMERY COUNTY.

Glen Factory, Glen.—Factory opened April 20; closed November 22d; greatest number of cows, 725; number of pounds of milk received, 1,855,541; number of pounds of cured cheese made, 181,600; amount of money received, $24,554.67; cost of manufacturing, $3,632.02; number of pounds of milk to one pound of cured cheese, 10.21; amount divided among patrons, $20,922.65; average price of one pound of cheese, 13½ cents; price of pound of milk, net, 1⅛ cents; average weight of cheeses, 65.4 pounds; highest sale per pound, 15¼ cents.—J. V. S. Edwards, Treasurer.

Smith Creek Factory, Fort Plain.—Greatest number of cows, 1,000; average number of cows, 900; number of pounds of milk received, 3,123,155; number of cheeses made, 4,724; number of pounds of cheese sold, 315,384; number of pounds of milk for pound of cured cheese, 9 9-10; amount of cash received for cheese, $46,529.61; average price per pound of cheese, 14.753; average value of one pound of milk, 1,489. Factory opened March 19th; closed December 9th. Cheese manufactured by Alex. Macadam, after the Cheddar process, using the curd-mill.—J. Harvey Smith, Secretary.

Root Factory, Root.—Whole number of cows, 775; average number, 700; pounds of milk, 1,933,734; pounds cured cheese, 185,462; size of cheeses, sixteen inches; pounds of milk to one pound of cured cheese, 10 42-100; cheese sold at Little Falls, average price, 13 83-100; price for making and furnishing, 2 cents; heating apparatus, O'Neil's vats; whey fed to hogs at factory; ground our curd with Macadam's curd mill; found it of great benefit, and especially in floating curds. Think it of great utility in producing a uniformity of cheese.—Seth Allen, Manufacturer.

MADISON COUNTY.

S. Jordan Factory, Brookfield.—Length of season, seven and a half months (April 4th to November 20th); whole number of cows, 425; average number, 400; pounds of milk received, 1,319,059; cured cheese made, 136,553 pounds; sold at factory, 4,362 pounds; highest price received, 15½ cents; lowest, 13¼ cents; average price received, 13 8-10 cents; pounds of milk required for one pound of cured cheese, 9 66-100; cheese made in 16 inch hoops; average weight of cheeses, 66½ pounds; number of cheeses made, 2,051; cost of making, $1.25 per hundred pounds, including rent of factory; cost of boxing, bandage and all other expenses, 74 cents per cwt.; whole amount of money received, $18,892.78.

Included in the expenses is 15 cents per hundred for drawing the cheese to the railroad. The cheese were colored for a short time, early in the season, but uncolored the rest of the time.—D. B. Stillman, Secretary. E. C. Miller, Manufacturer.

New Woodstock Factory.—Began making cheese April 13th, and ended October 29th; received 2,435,475 pounds of milk, which made 244,611 pounds cured cheese; received for cheese, $33,750.17; pounds of milk to one pound cured cheese, 9 95-100; average price per pound for cheese, 13 8-10 cents; received for making and furnishing, $2 per 100 pounds. There were 53 patrons, and 840 cows.—Gunn & Cook, Proprietors.

Valley Factory, Stockbridge.—Commenced April 5th, and closed Nov. 19th. Received milk from an average of 475 cows; pounds of milk received, 1,681,900; made 171,787 pounds of cured cheese; pounds of milk to pound of cured cheese, 9 78-100; whole amount cash received, $23,831.91; average price per hundred, $13.87; net price per hundred for milk to patrons, $1.20¾ cents.—C. Adams, Maker.

HERKIMER COUNTY.

North Fairfield Factory.—Factory opened March 18th, and closed November 14th. Greatest number of cows at any time, 500; pounds of milk received, 1,628,723; cheeses made, 2,843; pounds of cheese made, 168,217; pounds of milk to a pound of cured cheese, 9 68-100; number of sales of cheese, 20; amount of

cash sales, $24,948.10; cost of making and selling, $3,484.71; amount apportioned to patrons, $21,463.35; average price of pound of cheese, 14 83-100; average price of 10 pounds of milk, 15 31-100; average price of 100 pounds of milk after deducting cost of making and selling, $1.31¾; number of rennets used, 430. Of these 330 were received from patrons, and each rennet, on an average, coagulated the milk for 462 pounds of cheese. The other 100 rennets were bought in market and called "butcher's rennets;" each rennet coagulating the milk for 158 pounds of cheese. Highest price received for cheese, 16 25-100 cents; lowest, 14 cents.—B. B. Moon, Manufacturer.

LEWIS COUNTY.

Sulphur Spring Factory, Lowville.—Commenced making cheese May 3d, and closed October 21st. Received 1,597,088 pounds of milk; made 157,102 pounds cheese, which were sold in six sales at prices ranging from 12 to 14½ cents, averaging 13 62-100; whole receipts from cheese, $21,086.40; expenses for making and furnishing, at $1.55 per 100 pounds, $2,435.06; made 1,857 pounds whey butter by the Egger process, which brought $499.94, or about 27 cents a pound; average pounds of milk for one pound cheese, 10 16-100; average gross value of 100 pounds cheese, with whey butter added, $13.74; average net value of 100 pounds cheese, $12.07; average net value of 1,000 pounds of milk, $11.88.

As showing the effect of extreme drouth, I have compiled a table comparing the different months of 1870 with the corresponding months of 1869, and showing the per centage of gain or loss as compared with June, 1869.

Lbs of milk in 1869 from 570 cows.	lbs of milk in 1870 from 720 cows	per cent. for 1869 as compared with June, 1869.	Comparative product of 570 cows in 1870.	per cent. for 1870, as compared with June 1869.	per cent. of loss or gain.
May....199,170	264,512	59	209,405	62	gain 3
June...335,794	388,861	100	307,848	91	loss 9
July.. .332,058	329,581	98	260,918	77	" 21
Aug... 277,385	286,718	82	213,096	63	" 19
Sept... 231,793	229,593	69	174,636	52	" 17
Oct... .133,665	106,823	39	84,568	25	" 14

Comparative yield of milk for 1870 is 83 per cent. of 1869, reckoned to October 21st, the time of closing for 1870. Yield of cheese for 1870 is 78 per cent of 1869, being a deficit of 22 per cent, of which 17 is in quantity of milk, and 5 per cent. in quality. The revenue derived per cow, as compared with 1869, is but 65 per cent., being a deficit of 35 per cent.

In view of the above exhibit, it is needless to say that soiling has not been generally practiced here the past season, and the lesson it conveys might be profitably heeded by all.—C. L. Sheldon.

Leyden Association, Leyden.—Statement commencing April 19th and ending October 31st:—Pounds of milk received, 1,069,659;

made 114,609 pounds of green cheese; amount of cured cheese sold, 107,733 pounds, for $14,465,61; shrinkage, 6,876, or 6 per cent.; average price for cured cheese sold, $13.42 7-10 per hundred pounds; 9 33-100 pounds of milk made one pound of green cheese through the season; 9 92-100 pounds of milk made one pound of cured cheese through the season; expenses for materials, including drawing cheese, Treasurer and Secretary's services, and insurance on cheese, 74 cents per hundred pounds.

In April	9 76-100	pounds of milk	made 1	pound of green	cheese.
" May	9 39-100	do	do	do	do
" June	9 30-100	do	do	do	do
" July	9 60-100	do	do	do	do
" Aug.	9 75 100	do	do	do	do
" Sept.	9 12-100	do	do	do	do
" Oct.	8 62-100	do	do	do	do

Total number of cows 370
do do hogs 57
Average price for feeding hogs $2.07
do do feed for do 4.34

ELA MERRIAM, President.
L. S. LOOMIS, Treasurer.

TOMPKINS COUNTY.

McLean Cheese Manufacturing Association, McLean.—Commenced making cheese April 29th, and closed November 12th; whole number of cows, 525; pounds of milk received, 1,926,610; pounds of cured cheese, 200,261; pounds of milk required for a pound of cured cheese, 9.62; number of cheeses made, 2,600; average weight of cheeses, 77 pounds; number of sales made, 11; highest price per pound for cheese sold, 15¾ cents: whole amount of cash received for cheese and whey butter, $28,974.19; average price to patrons, $12,468; amount paid for use of factory and fixtures, $680.89: amount paid John Schermerhorn, maker, for labor, and furnishing everything, which includes boxes, bandage, salt, annatto, rennet, wood, and boxing cheese, and making the whey butter, $3,324.34.—A. B. LAMONT, Salesman.

RENSSELAER COUNTY.

South Berlin Factory, South Berlin.—Pounds of milk received, 716,263; pounds of cheese, 70,777; pounds of milk to pound of cheese, 10.12; average price per pound for cheese, 13.45.

ST. LAWRENCE COUNTY.

Pierrepont Factory, Pierrepont.—Received 884,097 pounds of milk, making therefrom 93,787 pounds of cheese; average number of pounds of milk to one of cheese, 9.42; average number of cows, 420. Season commenced May 1st; closed September 30th; made five sales of cheese; average price per pound, 13.65 cents.—F. A. MORRISON, Secretary and Maker.

ALLEGANY COUNTY.

Simpson Factory, New Hudson.—Commenced making April 8th; closed November 8th; received 1,959,556 pounds of milk, from which was made 3,334 cheeses, or 196,072 pounds; sold at an average price of 15 cents per pound. Number of cows about 700.

CATTARAUGUS COUNTY.

East Ashford Factory.—Commenced April 11th, and closed November 19th; pounds of milk received, 1,269,375; pounds of cheese made, 129,961; number of cheeses made, 1,838; average weight of cheeses, pressed in 17-inch hoop, 70 pounds; pounds of milk per pound of cured cheese, 9 76-100; average price per pound, 13¾ cents; highest number of cows during the season, 550.—Geo W. Davis, Maker and Secretary. Joseph Demmon, President.

Gowanda Factory, Gowanda.—Commenced making cheese April 6th, and closed November 28th; total number of cows, 430; pounds of milk received, 1,508,319; pounds of cured cheese made, 158,900; pounds of milk to one of cured cheese, 9.49; average price per pound, 13.82 cents; average price of milk per 100 pounds to patrons, $1.27 1-10; price paid for making and boxing, $1.85 per hundred; average weight of cheeses, 57 pounds. The season was very warm, and milk unusually poor. We think it an advantage to grind floating curds, and salt them a little higher.—F. H. Hooker, Maker.

DELAWARE COUNTY.

Franklin Creamery, Franklin.—Whenever a report is given to the public which ignores or evades the all-important question of net proceeds to patrons, the reasonable inference is that the figures would be, if published, discreditable to the management of such factory. For the benefit of all parties concerned, the manufacturers and patrons, as well as the public, it is far better that the truth should be told, though it reveal light net receipts and general ill luck.

Example: The Franklin creamery was run from May 15th to October 15th. Whole number of cows, 913; average number of cows, 880; number of pounds of milk received, 2,310,569; number of pounds of butter made, 78,459; number of pounds of cheese made, 124,966; average price of butter delivered seven miles to railroad, nearly 39 cents; average price of cheese for May, August, September and October, 8½ cents. The June and July cheese were sold for two to five cents per pound, except about one ton which are worthless and not included in the above. Net cash to patrons for each 100 pounds of milk, from $1.32 to $1.35.

I give some indefinite figures, as the accounts are yet unsettled.

It may be asked why the June and July make of cheese should have been sold as low as two cents to five cents. I answer, they were sold on a market glutted with *poor skimmed cheese*, to which

class they very properly belonged, owing, if not to incompetency on the part of the undersigned, who has been superintendent for the last three years, then to over-supply of milk, too little water, and too hot weather, rendering it impossible to keep milk until skimmed without a sufficient development of decomposition to lessen the chances of keeping cheese through excessive and long continued hot weather. Our cheese for 1870 may be divided into four classes, viz.: Good, fair, poor and rotten cheese, and yet the reader will please look back to the net cash proceeds for comparison, which I believe to be favorable to our factory, as $1.25 per 100 pounds of milk is about the average of whole-milk cheese factories. Our patronage for the coming season will be one-half less than last, and it is hopeful that all creameries in the State will show a large falling off in patronage, as skimmed cheese will be entirely thrown out of the market if the amount made should be materially increased, or even equal the amount made last season, and notwithstanding creameries have heretofore paid patrons more than cheese factories, it must certainly be allowed that the prospect for the future is not encouraging to creamery interests; and, indeed, it seems that the dairy portion of the farmers of the State may look with some solicitude upon the rapid development of their particular branch of industry, especially in the Western States. Yet those farmers who act wisely press forward in the prosecution of whatever branch of industry they are principally engaged, and allow fluctuations and reactions to so regulate the prices of any farm product, that in a term of years it shall prove profitable to the producers.—E. S. Munson.—*Utica Herald.*

WISCONSIN.

Cold Spring Factory, Whitewater.—Commenced April 18th, and closed November 5. Highest number of cows, 150.

	No. lbs. milk Received.	No lbs. cheese Made.	No lbs. milk to 1 lb. cheese.
April.	8,811	850	10.36
May.	53,417	5,650	9.45
June.	75,010	7,740	9.69
July.	79,251	7,960	9.95
August.	70,788	7,164	9.88
September.	59,113	6,127	9.64
October.	41,237	5,032	8.29
November.	4,297	588	7.30
Total.	391,924	41,111	

Average number of pounds of milk to one pound of cured cheese, 9 53·100.—R. Wheeler, Proprietor.

MINNESOTA.

Riverside Factory, Rochester.—Erected May, 1870; commenced May 26th, and closed October 3d; in operation 131 days;

received the milk of 180 cows; number of pounds received, 375,-814; number of pounds of cured cheese, 38,727: average number of pounds of milk for one pound of cheese, 9.7, during the season. —C. W. Vroman, Manufacturer. Jones & Vroman, Proprietors.

CHAUTAUQUA COUNTY.

Asahel Burnham's Factories at Sinclearville and Arkwright.—Commenced making cheese April 11th, and closed November 19th; received 5,243,003 pounds of milk; made 529,705 pounds of cheese; received $70,068.87; average price received per pound for cheese, 13.23 cents; number of pounds of milk to make one pound of cheese, 9.89; value of 100 pounds of milk, after deducting expenses, $1.13 4-10; number of patrons, 126; whole number of cows' milk sent to the factories, 1,734. The following is a correct statement of cheese made in my factories:—

Years.	No. of cows' milk sent to the factories.	No. of lbs. cheese sold, to be consumed in county.	No. of lbs. cheese sold to be shipped.	Whole No. of lbs. cheese made.	Amount of money rec'd for cheese.
1864.....	467	2,621	119,048	121,669	$ 23,368 07
1865.....	1,492	6,123	367,669	373,792	61,623 88
1866.....	1,740	6,718	465,890	472,608	76,807 51
1867.....	2,433	7,288	747,311	754,599	101,727 96
1868.....	1,766	13,890	446,942	460,832	67,412 39
1869.....	1,835	4,414	669,122	673,536	90,969 70
1870.....	1,734	23,151	506,753	529,904	70,068 87
	11,467	64,205	3,322,735	3,386,940	$491,978 38

The average price received per hundred for cheese for the last seven seasons is $14.52; the whole number of pounds of milk received for the last seven seasons is 32,627,906: the average number of pounds of milk to make one pound of cheese, 9.63; the average worth of 100 pounds of milk, after deducting all expenses, $1.33⅓. In the year 1868, I made a few small cheeses which were taken by the patrons and others. In the year 1870 I made quite largely of small cheeses, which were taken more readily than they would have been if they had been large. It costs more to make them than it does large cheeses—say about one-half cent per pound for making and about one-half cent per pound more for shrinkage. For grocery trade, they are better than large ones, for the retailer does not have to cut them, and there is no waste in that way, which is equal to one cent a pound.

I think that the home consumption of cheese would be very much increased, if farmers that send milk to factories would always have a plate of good cheese on their tables, and take a little pains to speak to their friends, when they dine with them, about the economy

and convenience of cheese as an article of food. It is for the interest of every dairyman to help make a home demand for his product, and every dairyman ought to look to his interest. There is not cheese enough made in the United States to supply our home trade, if it should go into general use, as it does in England. My motto is, let every dairyman do his part by sending pure, clean, sweet, unskimmed milk to the factory, so that our factorymen can give our patrons a cheese that every man, woman, and child will not be without. We can in this way make a better market than can be found in any other part of the world.—ASAHEL BURNHAM.

CONDENSED REPORTS.

The following Table gives the number of cows, amount of cured cheese, average price, average pounds of milk to one of cured cheese, and average weight, for the several Factories from which full Reports have been received:

Name of Factory.	Location.	Whole number of cows.	Amount of cheese made.	Average price per 1,00 lbs.	Average weight.	Average lbs. milk for 1 lb. cheese.
Willow Grove	Trenton, Oneida Co.	900	363,302	14.25	67	10.10
Weeks	Verona, " "	700	221,061	14.28	60	10 00
Rome Association	Rome, " "	750	252,685	14.06	72	10.78
Lee Center	Lee Center, " "	650	198,448	14.00	68	9.94
Stittville	Stittville, " "	800	267,271	14.24		10.30
Wilcox	Sauquoit, " "	150	38,294	13.15	54	10.50
Hampton Association	Hampton, " "	450	147,099	13.65		10.04
Glen	Glen, Montgomery Co.	725	181,600	13.50	65	10.21
Smith Creek	Fort Plain, " "	1,000	315,384	14.75		9 90
Root	Root, " "	775	185,462	13.83		10.42
South Jordan	Brookfield, Madison Co.	425	136,553	13.80	66	9.66
New Woodstock	New Woodstock, " "	840	244,611	13.80		9.95
Valley	Stockbridge, " "	600	171,787	13.87		9.78
North Fairfield	N. Fairfield, Herkimer Co.	500	168,217	14 83	60	9.68
Sulphur Spring	Lowville, Lewis Co.	450	157,102	13.62		10 16
Leyden Association	Leyden, " "	370	114,609	13.43		9.92
McLean "	McLean, Tompkins Co.	525	200,261		77	9.62
South Berlin	S. Berlin, Rensselaer Co.	270	70,777	13.45		10.12
Pierrepont	Pierrepont, St. Lawrence Co.	420	93,787	13.65		9.42
Simpson	New Hudson, Allegany Co.	700	196,072	15.00		9.99
East Ashford	E. Ashford, Cattaraugus Co.	550	129,961	13.75	70	9.76
Gowanda	Gowanda, " "	430	158,900	13.82		9.49
Burnham's (3)	Chatauqua Co.	1,734	529,705	13.23		9.89
Riverside	Rochester, Minnesota.	180	38,727			9.70
Cold Spring	Whitewater, Wisconsin.	150	41,111			9.53
		15,044	4,622,786	13.90	66	9.95

cers in the country, and the Dairy and Table Salt particularly in those localities where Butter and Cheese are made for exportation. In this connection we refer with a great deal of pleasure to Gardner B. Weeks, Esq., late of Verona, now of Syracuse, the Secretary of the American Dairymen's Association.

We would refer to the Report of the Committee of the State Fair at Buffalo, in 1867, published in our advertisement in the Report of the American Dairymen's Association for 1867, from which we make the following extracts:

"We pronounced in twenty-five cases the Butter cured with Factory Filled Salt, made at the New York Mills, Syracuse, to be the best, as compared with its alternate package, cured in the same dairy, with Ashton."

And again, "We come now to an article of Salt, manufactured by the Salt Company of Onondaga, which more nearly and intimately interests the farmers and the people generally, that is the Dairy or Butter and Cheese Salt." Also, "We unhesitatingly pronounce that the same is the EQUAL OF ASHTON for the preservation of Butter and Cheese."

Extract from the Report of the Butter and Cheese Committee at the State Fair at Rochester, 1868: "Your committee find as they have examined the Cheese Reports, the Cheese has been invariably salted with the best quality of Onondaga Salt." And again, "A competitor salted several packages of Butter with each kind of salt, (Onondaga Factory Filled and Ashton), and requested the committee to closely examine each package and see if they could determine from the quality of the Butter which kind of Salt was preferable; the result of the examination was, your committee could see no difference in the Butter, and the maker, (who is an expert in butter,) stated to your committee *that he was not able to detect any difference*, and *only knew* which was Ashton or Onondaga by the *mark* he put upon the packages. The committee wish to add to the above report the fact that all of the butter to which were awarded premiums was salted with Ashton, *excepting* the butter made by Miss Clara Clark, which was salted with Onondaga Salt; this Butter was *superior to any other Butter on exhibition*, and is recommended to the Executive Committee as entitled to a special premium."

Extract from Professor S. W. Johnson's (of Sheffield Scientific School, Yale College,) article in the American Agricultural Annual for 1868, on "Milk and Butter."

"Much of the fine table Salt commonly sold in New England, in Connecticut at least, is also impure and unfit for use. The purest Salt made in this or any other country that the writer is acquainted with, came some years ago from Syracuse, N. Y., where the ingenious processes of Dr. Goessman were then employed. If, as we suppose, the same processes are in use now, (they are) the Onondaga Factory Filled Salt must take rank *second to none* as regards purity and freedom from deleterious ingredients, especially the chloride of calcium and magnesium. This rank it has assumed, we believe, in the estimation of all who have given it a fair trial. The brand Onondaga Factory Filled Dairy Salt corresponds closely with Dr. Muller's description of the best Salt for removing buttermilk."

The Salt Company of Onondaga guaranty that their Factory Dairy Filled Salt is as pure and as good as any in the world, and that all kinds of Salt manufactured by them will bear favorable comparison with the best brands of any other manufacture of a similar kind of Salt, fine or coarse.

SYRACUSE, March, 1871.

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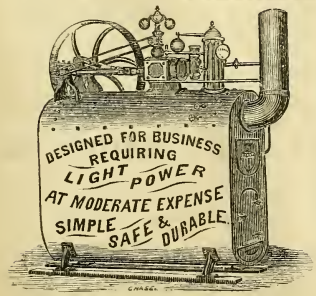

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