SEVENTH ANNUAL REPORT

OF THE

International Association of Dairy and Milk Inspectors

INCLUDING PAPERS READ AT THE ANNUAL
CONVENTION IN CHICAGO, ILLINOIS
DECEMBER 9-10-11, 1918

"Resolved to serve high ideals,
yet to use practical methods."

COMPILED BY
IVAN C. WELD, Secretary-Treasurer
1120 CONNECTICUT AVENUE
WASHINGTON, D. C.

Price One Dollar

International Association of Dairy and Milk Inspectors

CONSTITUTION AND BY-LAWS

CONSTITUTION

ADOPTED OCTOBER 16, 1911

NAME

This Association shall be known as the International Association of Dairy and Milk Inspectors.

OBJECT

The object of this Association shall be to develop uniform and efficient inspection of dairy farms, milk establishments, milk and milk products, and to place the inspection of the same in the hands of men who have a thorough knowledge of dairy work.

MEMBERSHIP

The membership of this Association shall be composed of men who now are or who have been actively engaged in dairy or milk inspection. Any person who now is or who has been so engaged may make application to the Secretary-Treasurer, and if application is accepted by the Membership Committee, said applicant may become a member of the Association upon payment of the annual dues of five dollars ($5.00).

OFFICERS

The officers of this Association shall be a President, three Vice-Presidents, a Secretary-Treasurer, and two Auditors, who shall be elected by a majority ballot at the Annual Meeting of the Association, and shall hold office for one year or until their successors are elected. An Executive Board, who shall direct the affairs of the Association when not in Annual Session, shall consist of the President, the three Vice-Presidents, and the Secretary-Treasurer.

AMENDMENTS

This Constitution may be amended at any Annual Meeting by a two-thirds vote of the entire membership of the Association. Any member proposing amendments must submit the same in writing to the Secretary-Treasurer at least sixty days before the date of the Annual Meeting, and the Secretary-Treasurer shall at once notify all members of such proposed amendments. All members voting on such proposed amendments shall register their vote with the Secretary-Treasurer on blanks provided by the Association before the date of the Annual Meeting.

BY-LAWS

ADOPTED OCTOBER 25, 1913

ORGANIZATION

The Constitution shall be the basis of government of this Association.

ARTICLE 1

MEMBERSHIP

SECTION 1. Any person eligible for membership under the Constitution who shall file an official application, accompanied by the first annual membership dues of five dollars, and whose application for membership shall have the approval of the Membership Committee, may become a member of the Association for one year.

SECTION 2. Any person having once become a member may continue membership in the Association so long as the annual membership dues are paid. Any member who shall fail to pay annual dues within thirty days after having been notified by the Secretary that said dues are due and payable, shall be dropped from membership. Any member so dropped may, within ninety days, be reinstated by the Membership Committee, upon application filed in due form and accompanied by the annual membership dues for that year.

SECTION 3. A member of the Association may be expelled for due cause upon recommendation of the Membership Committee and a majority vote of the members at any annual meeting. Any member so expelled shall have refunded such *pro rata* part of his membership dues as may not be covered by his term of membership.

HONORARY MEMBERS*

SECTION 4. Members of the Association may elect as honorary members, at any stated meeting, on the recommendation of the Membership Committee, those whose labors have substantially added to the scientific knowledge of milk supply betterment, or those who have been of pronounced practical influence in the improvement of the milk industry. From such members no dues shall be required. They shall have the privilege of attending the meetings of the Association, but they shall not be entitled to vote.

ARTICLE 2

OFFICERS

SECTION 1. The officers of this Association shall be a President, a First, Second and Third Vice-President, a Secretary-Treasurer, and two Auditors, who shall be chosen by ballot at the annual meeting of the Association, and shall hold office for one year, or until their successors are duly elected.

SECTION 2. The Executive Board shall consist of the President, the three Vice-Presidents, and the Secretary-Treasurer.

SECTION 3. The Membership Committee shall consist of the President, the three Vice-Presidents, and the Secretary-Treasurer.

ARTICLE 3

DUTIES OF OFFICERS

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association. He shall examine and approve all bills previous to their payment, appoint

*Adopted October 29, 1915.

all committees unless otherwise directed by vote of the Association, and perform such other duties as usually devolve upon a presiding officer, or are required of him by the Association.

SECTION 2. The Vice-Presidents, in the order of their selection, shall perform the duties of the President in his absence.

SECTION 3. The Secretary-Treasurer shall record the proceedings of the Association. He shall keep a list of members, and collect all moneys due the Association, giving his receipt therefor. He shall record the amount of each payment, with the name and address of the person so paying. He shall faithfully care for all moneys entrusted to his keeping, paying out the same only with the approval of the President, and taking a receipt therefor. He shall, immediately after his election to office, file with the President of the Association a bond in the sum of five hundred dollars, the expense of which shall be borne by the Association. He shall, at the annual meeting, make a detailed statement of the financial condition of the Association.

It shall also be the duty of the Secretary-Treasurer to assist in making arrangements and preparing a program for the annual meeting, and to compile and prepare for publication all papers, addresses, discussions and other matter worthy of publication, as soon as possible after the annual meeting.

SECTION 4. The full management of the affairs of the Association when the Association is not in session shall be in the hands of the Executive Board, as provided in the Constitution.

SECTION 5. It shall be the duty of the Auditors to examine and audit the accounts of the Secretary-Treasurer, and all other financial accounts of the Association, and to make a full report of the condition of the same at the annual meeting.

ARTICLE 4

MEETINGS

SECTION 1. The annual meeting of the Association shall be held at such time and place during the month of October of each year or at such other time as shall be designated by the Executive Board.

SECTION 2. Special meetings of the Association may be called by the Executive Board, of which due notice shall be given to the members by the Secretary.

SECTION 3. Quorum.— Twenty-five per cent of the membership shall constitute a quorum for transaction of business at any annual meeting. Voting by proxy shall not be permitted.

ARTICLE 5

These By-Laws may be altered or amended at any annual meeting of the Association. Any member proposing amendments must seasonably submit the same in writing to the Secretary-Treasurer, who shall then give notice of the proposed amendments by mail to each member of the Association at least thirty days previous to the date of the annual meeting.

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INDEX TO ADVERTISERS

Those who advertise with us are clearly in sympathy with the work of our Association. We are materially benefited by their patronage, and therefore our members and readers should correspond with them FIRST and mention this publication when in need of supplies.

International Association of Dairy and Milk Inspectors

OFFICERS, 1918-1919

President, PROF. JAMES O. JORDAN .....Boston, Mass.
First Vice-President, HOYES LLOYD.....Toronto, Ontario
Second Vice-President, PROF. C. L. ROADHOUSE
Davis, Cal.
Third Vice-President, ERNEST KELLY....Washington, D. C.
Secretary-Treasurer, IVAN C. WELD....Washington, D. C.
Auditors—
PROF. H. A. HARDING .....Urbana, Ill.
DR. HARRY E. STATES .....Detroit, Mich.

COMMITTEES

Subjects which they will study and regarding which they will report at the eighth annual convention.

BOVINE DISEASES—THEIR RELATION TO THE MILK SUPPLY AND TO THE PUBLIC HEALTH

Dr. Thos. E. Maloney, *Chairman*
Dr. R. R. Ashworth
Dr. W. B. Billingsley
Dr. C. E. Eddy
Dr. G. H. Grapp
Dr. L. F. Koonce
Dr. Geo. F. Punteney
Dr. Clarence E. Smith
Dr. H. E. States
Dr. F. P. Woolf
Dr. Hulbert Young

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DISEASES OF MAN—THEIR RELATION TO THE MILK SUPPLY AND TO THE PUBLIC HEALTH

A. F. Stevenson, *Chairman*
Dr. Stanton H. Barrett
Augustus Forrest
H. N. Parker
Prof. C. L. Roadhouse

NEW LEGISLATION AFFECTING MILK AND MILK PRODUCTS

Hermann C. Lythgoe, *Chairman*
Gustaf L. Berg
Prof. J. A. Gamble
Thos. C. Gault
Benj. L. Purcell
M. J. Smisek
Dr. O. P. Thompson

DAIRY FARM INSPECTION

Prof. J. A. Gamble, *Chairman*
Prof. H. A. Harding
Ernest Kelly
Prof. C. B. Lane
Dr. Wm. H. Price
Dr. Clarence E. Smith
Dr. H. E. States

TRANSPORTATION AND MARKETING OF MILK AND MILK PRODUCTS

Russell S. Smith, *Chairman*
Herbert E. Bowman
Dr. C. W. Eddy
Thomas Holt
Prof. C. B. Lane
John Newman
Carl O. Seaman

METHODS OF BACTERIAL ANALYSES OF MILK AND MILK PRODUCTS

Dr. Geo. E. Bolling, *Chairman*
Dr. Leon Banov
Dr. Wm. G. Bissell
L. B. Cook
H. N. Parker
Dr. Harry W. Redfield
Geo. B. Taylor

ORGANIZATION AND ADMINISTRATION OF MILK CONTROL

Dr. Wm. H. Price, *Chairman*
A. E. Armstrong
Prof. H. A. Harding
A. W. Lombard
H. N. Parker
Ole Salthe
M. J. Smisek
Willard E. Ward

CONSTRUCTION OF DAIRY BUILDINGS AND ITS RELATION TO SANITATION

(a) Stables
(b) Farm Milk Houses
(c) Country Receiving Stations
(d) City Pasteurizing, Bottling and Distributing Plants

Earnest Kelly, *Chairman*
E. F. Burke
Thos. C. Gault
A. N. Henderson
Prof. C. B. Lane
Dr. O. P. Thompson

REMADE MILK

Dr. Harry W. Redfield, *Chairman*
Prof. C. B. Lane
Dr. Wm. H. Price
A. F. Stevenson
Geo. B. Taylor

PASTEURIZATION OF MILK AND CREAM

Fred J. Moore, *Chairman*
C. E. Clement
Prof. C. B. Lane
Hoyes Lloyd
Dr. W. H. Phipps
Dr. Geo. F. Punteney
Prof. C. L. Roadhouse
Benjamin Vener

FOOD VALUE OF MILK AND MILK PRODUCTS

Geo. B. Taylor, *Chairman*
Brooks Brown
A. N. Henderson
Frank A. Jackson
Dr. W. H. Phipps
Wallace F. Purrington
Fred J. Widmayer

RESOLUTIONS

A. W. Lombard, *Chairman*
A. N. Henderson
Dr. Wm. H. Price

"Timely service, like timely gifts, is doubled in value."

MEMBERS

Armstrong, A. E....Supervising Food Inspector, Dept. of Health .....Chicago, Ill.
Ashworth, R. R. ....Chief Food Inspector .....Washington, D. C.

Banov, Leon .....Asst. City Bacteriologist.....Charleston, S. C.
Barrett, Lt. Stanton H. .....Base Hospital No. 80, A. P. O. 909, A. E. F., France
Berg, Gustaf L. .....Inspector of Milk .....Worcester, Mass.
Billingsley, W. B.....Veterinarian, State Dept. of Health of Maryland .....Baltimore, Md.
Bissell, Wm. G.....Chief, Bureau of Laboratories, Dept. of Health .....Buffalo, N. Y.
Bolling, Capt. Geo. E.City Bacteriologist and Inspector of Milk .....Brockton, Mass.
Bourbeau, E. .....General Cheese Inspector.....St. Hyacinthe, Quebec, Canada
Bowman, Herbert E..Inspector of Milk .....Somerville, Mass.
Brown, Brooks .....Dairy Inspector, State Dept. of Agriculture .....Augusta, Maine
Brown, Lucius P.....Director, Bureau of Food & Drugs, Dept. of Health .....New York, N. Y.
Buckland, Thos. A...City Chemist .....St. Louis, Mo.
Burke, A. D. .....U. S. Public Health Service..
Burke, E. F. .....Chief, Bureau of Dairy Products, Dept. of Farms and Markets, Div. of Agriculture, State of New York.....Albany, N. Y.

Carroll, Thos. B.....Milk Inspector, Dept. of Health .....Wilmington, N. C.
Chilson, C. H. .....Formerly Chief Milk Inspector Detroit, Mich. now with A. E. F., France
Clement, C. E. .....Market Milk Specialist, Dairy Div., U. S. Dept. of Agriculture .....Washington, D. C.
Conard, M. E. .....Supervisor of Field Work, Hires Condensed Milk Co...Philadelphia, Pa.
Cook, L. B. .....Dairy Div., U. S. Dept. of Agriculture .....Grove City, Pa.
Coughlin, John J....Food Inspector, Submarine Boat Corporation .....Newark, N. J.
Coughlin, John J....Formerly Asst. Milk Inspector Lowell, Mass.

Eddy, C. W. .....Telling-Belle Vernon Co. ....Cleveland, Ohio

Flanagan, Thos. F....Food and Milk Inspector.....Hartford, Conn.
Forrest, Augustus ...Chief, Bureau of Food and Dairy Inspection .....Birmingham, Ala.

Gamble, James A.....Professor of Dairy Husbandry, Maryland State College of Agriculture .....College Park, Md.
Gauhn, Emmett R....Chief Milk Inspector .....Rochester, N. Y.

Gault, Thomas C.	Chief, Dairy and Food Div., Ohio Board of Agriculture	Columbus, Ohio
Gibbons, John F.	Farm Inspector	New Haven, Conn.
Gimper, Wm. S.	Director of Milk Hygiene, State Livestock Sanitary Board	Harrisburg, Pa.
Grapp, G. H.	State Dairy Inspector, Maryland	Baltimore, Md.
Harding, H. A.	Head, Dairy Dept., University of Illinois	Urbana, Ill.
Henderson, A. N.	With Davis-Watkins Dairy Mfg. Co.	San Francisco, Cal.
Hine, Geo. S.	Harding Cream Co.	Kansas City, Mo.
Holt, Thomas	State Dairy and Food Commissioner	Hartford, Conn.
Hornaday, W. A.	City Dairy and Milk Inspector	Greensboro, N. C.
Horton, Clarence W.	Milk Inspector	Swampscott, Mass.
Hughes, Wm. V.	Food Inspector	Harrisburg, Pa.
Huntington, H. I.	U. S. Public Health Service.	Little Rock, Ark.
Jackson, Frank A.	Chairman, Board of Food and Drug Commissioners of Rhode Island	Providence, R. I.
Jordan, James O.	Inspector of Milk	Boston, Mass.
Kelly, Ernest	In charge Market Milk Investigations, U. S. Department of Agriculture	Washington, D. C.
Kerr, A. H.	Milk and Dairy Inspector, Health Dept.	Norfolk, Va.
Koonce, L. F.	Milk and Meat Inspector	Raleigh, N. C.
Lane, C. B.	In charge Scientific Dept., Supplee Alderney Dairy	Philadelphia, Pa.
Lockwood, Ralph F.	Milk Inspector and Health Officer	Warwick, R. I.
Lombard, Alfred W.	Dairy Bureau Agent	Boston, Mass.
Lloyd, Hoyes	Department of the Interior.	Ottawa, Canada
Lythgoe, Hermann C.	Director of Div. of Food and Drugs, Mass. State Dept. of Health	Boston, Mass.
Maloney, Thos. E.	Veterinarian, Board of Health	Fall River, Mass.
Master, Melvin F.	Inspector of Milk	Lowell, Mass.
Moore, Fred J.	City Milk Inspector	Detroit, Mich.
McGrath, John J.	Inspector of Milk	Salem, Mass.
Newman, John B.	Supt. Div. of Foods and Dairies, State Dept. of Agriculture	Chicago, Ill.
Park, John H.	City Food Inspector	Harrisburg, Pa.
Parker, Horatio N.	City Bacteriologist	Jacksonville, Fla.
Phipps, W. H.	Supervisor of Production, Missouri Dairy Co.	Kansas City, Mo.

Price, Wm. H.	U. S. Public Health Service	Washington, D. C.
Punteney, Geo. Fred.	Dairy and Milk Inspector, U. S. Public Health Service	Little Rock, Ark.
Purcell, Benj. L.	Dairy and Food Commissioner of Virginia	Richmond, Va.
Purrington, W. F.	Scientific Asst., U. S. Public Health Service	New London, Conn.
Redfield, Harry W.	Bacteriologist, U. S. Bureau of Chemistry	Washington, D. C.
Rive, Henry		In Canadian Army
Roadhouse, C. L.	Professor of Dairy Industry, University of California	Davis, Cal.
Roshon, Harry B.	Formerly Milk and Meat Inspector	Reading, Pa., now in U. S. Army
Rothery, W. H.	Milk and Meat Inspector	Auburn, N. Y.
Salthe, Ole	Asst. Director of Bureau of Food and Drugs, Dept. of Health	New York, N. Y.
Scarboro, W. T.	Meat and Milk Inspector	Winston-Salem, N. C.
Seaman, Carl O.	Health Officer	Manchester, N. H.
Sharwell, Samuel G.	Chief Dairy and Food Inspector	Newark, N. J.
Shaw, A. G.	Inspector, U. S. Public Health Service	Columbus, Ga.
Simpson, C. W.		In Canadian Army
Smisek, M. J.	Milk and Dairy Inspector	St. Paul, Minn.
Smith, Clarence E.	Health Officer	Columbia, S. C.
Smith, Russell S.	Market Milk Specialist, Dairy Div., U. S. Dept. of Agriculture	Washington, D. C.
States, H. E.	Director, Dairy and Food Dept., Dept. of Health	Detroit, Mich.
Stevenson, A. F.	Sanitary Engineer, U. S. Public Health Service	Washington, D. C.
Taylor, Geo. B.	Milk Specialist, Dairy Div., U. S. Dept. of Agriculture	Washington, D. C.
Terrell, Truman C.	City Bacteriologist	Ft. Worth, Texas
Thompson, O. P.	State Dairy Inspector	Waterloo, Iowa
Vener, Benjamin	Asst. Market Milk Specialist, Dairy Div., U. S. Dept. of Agriculture	Washington, D. C.
Wakeman, B. R.	Sanitary Supervisor, State Dept. of Health	Hornell, N. Y.
Ward, Willard E.	Agent, Board of Health, for Milk and Food Inspection	Brookline, Mass.
Weld, Ivan C.	Investigator for Chestnut Farms Dairy	Washington, D. C
Widmayer, Fred J.	Food and Milk Inspector	Scranton, Pa.
Woolf, F. P.	Chief Meat and Milk Inspector	Mobile, Ala.

Yates, John W. .....Milk and Pasteurizing Plant Inspector .....Kansas City, Mo.
Young, Hulbert .....Manager, Walker-Gordon Laboratory .....Baltimore, Md.

HONORARY MEMBERS

Evans, Wm. A.....Editor, Health Dept., *Chicago Tribune* .....Chicago, Ill.

Pearson, Raymond A.President, Iowa State College Ames, Iowa

Woodward, Wm. C..Commissioner of Health.....Boston, Mass.

SEVENTH ANNUAL CONVENTION

CHICAGO, ILLINOIS

DECEMBER 9, 1918

FIRST SESSION

The Seventh Annual Convention of the International Association of Dairy and Milk Inspectors was called to order by President A. W. Lombard, of Arlington, Mass., at 10.30 A.M.

Mr. John B. Newman, Superintendent, Division of Foods and Dairies, Illinois State Department of Agriculture, welcomed the Association to Chicago and presented a paper on "The Resources and Development of Agriculture and the Dairy Industry in Illinois."

President Lombard expressed the appreciation of the Association for the cordial welcome extended. He called the attention of the members to the meetings of the American Public Health Association, and to the fact that the program of the Food and Drugs Section of that Association and of our own Association was so arranged as to avoid conflicts, so that members could attend all sessions.

Mr. Ernest Kelly, of the U. S. Department of Agriculture, addressed the convention on "Modern Developments in Dairy and Milk Inspection."

The report of the Committee on Cost of Dairy and Milk Inspection, prepared by Mr. Hoyes Lloyd, of Toronto, was in the absence of Mr. Lloyd read by Dr. Maloney, of Fall River, Mass.

Mr. A. E. Armstrong, Supervising Food Inspector for the city of Chicago, addressed the Association briefly, describing the work done by his department.

At 12 o'clock the convention adjourned, to meet again at eight in the evening.

SECOND SESSION

The second session of the convention was called to order by President Lombard at 8 o'clock.

In the absence of Mr. A. F. Stevenson, Chairman of the Committee on Diseases of Man—Their Relation to the Milk Supply and to the Public Health, a brief report of the Chairman was read by the Secretary.

Dr. Wm. H. Price, of the U. S. Public Health Service, reported for the Committee on Organization of Milk Control.

Mr. Thomas C. Gault, Chief of Dairy and Food Division, Ohio State Board of Agriculture, addressed the Association regarding the dairy and milk conditions in Ohio.

Dr. J. S. Abbott, of the Bureau of Chemistry, U. S. Department of Agriculture, was introduced and addressed the Association briefly.

Dr. John J. Lintner, of the Bureau of Animal Industry, U. S. Department of Agriculture, presented a carefully prepared paper on "Methods of Detecting Tuberculosis in Cattle."

Dr. Pease, of New York City, also made a brief address.

The Association adjourned at 10.30, to meet again at 2 o'clock, Tuesday afternoon, December 10th.

TUESDAY, DECEMBER 10TH

THIRD SESSION

The convention was called to order by President Lombard at 2 o'clock. Mr. Ernest Kelly reported for the Committee on Rules and Regulations Necessary for Securing a Clean and Safe Milk Supply.

Prof. James O. Jordan reported for the Committee on Legislation Affecting Milk and Milk Products.

Prof. W. A. Stocking, of Cornell University, spoke briefly, as did also Dr. Harry W. Redfield, of the U. S. Bureau of Chemistry.

Dr. George F. Punteney, Dairy and Milk Inspector, U. S. Public Health Service, Little Rock, Ark., made a brief address.

The report of the Committee on Bovine Diseases—Their Relation to the Milk Supply and to the Public Health, prepared by Prof. C. L. Roadhouse, of California, was read by Dr. Maloney, of Fall River, Mass.

Dr. Wm. H. Price, U. S. Public Health Service, presented a paper on "The Control of Milk Supplies in Seven Southern Extra-Cantonment Zones."

Dr. O. P. Thompson, Chief State Dairy Inspector of Iowa, read a paper on "The Market Milk Situation in Iowa."

At 4.45 the convention adjourned, to meet again Tuesday evening at 8 o'clock.

FOURTH SESSION

The convention reconvened at 8 o'clock. President Lombard, presiding, presented Dr. W. G. Bissell, in charge of laboratories, Department of Health, Buffalo, N. Y., who spoke on "Methods Employed and Results Obtained in An Endeavor to Improve Milk Supplies."

Dr. Wm. A. Evans, Health Editor of the Chicago *Tribune*, addressed the Association regarding some of the present day problems.

After considerable discussion the convention adjourned at 10.30 o'clock, to meet again Wednesday afternoon at 1.30 o'clock.

WEDNESDAY, DECEMBER 11TH

FIFTH SESSION

The Association convened at 1.30 P.M. President Lombard, presiding, granted the request of Dr. A. W. Hinman, of Dundee, Ill., who spoke briefly on the necessity for greater cleanliness in the production and marketing of milk.

Dr. H. A. Harding read a paper on the subject of "Simplified City Milk Inspection." Mr. Tucker, of the Indiana State Board of Health, led in the discussion of the subject, and was followed by several others.

A paper by Mr. Geo. B. Taylor, "A Report on Questionnaire to Health Officers Concerning Control of the Milk Supply," was in Mr. Taylor's absence read by Mr. Kelly.

Mr. J. H. Sasseen read a paper on "Quality of Milk Furnished Government Cantonments."

The following papers and reports prepared by members and committee men who were unable to be present were read by title and referred to the Executive Board:

Report of Committee on Dairy Farm Inspection, J. A. Gamble, Chairman.

Paper, "The Sediment Test as Applied in Dairy Inspection," Mr. Willard E. Ward.

Paper, "The Market Milk Situation in Minnesota," Mr. M. J. Smisek.

Paper, "Observations on the Pasteurization and the Subsequent Handling of Milk in City Milk Plants," Mr. Russell S. Smith.

Paper, "The Pasteurization of Milk," by Mr. F. J. Moore.

BUSINESS SESSION

The auditors reported the accounts of the Secretary-Treasurer had been examined and found to be correct. The annual report of the Secretary-Treasurer was then

presented and was adopted by the Association, which also expressed its appreciation by a vote of thanks.

The Association voted that the names of all members in the Army or Navy service in foreign countries be continued as members of the Association for the coming year.

The Committee on Resolutions reported, and the following resolutions were adopted:

1. *Resolved,* That it is the sentiment of this Association that the providing of an adequate supply of safe milk is a vital public health problem.

2. *Resolved,* That the members of the International Association of Dairy and Milk Inspectors owe the Secretary-Treasurer, Ivan C. Weld, a debt of gratitude for his earnest and efficient efforts in behalf of the organization. His endeavors have not only been a prime factor in the maintenance of this Association, but also in its development.

The Association then proceeded to elect officers for the ensuing year as follows:

President, Prof. James O. Jordan, Boston, Mass.

First Vice-President, Mr. Hoyes Lloyd, Toronto, Ont.

Second Vice-President, Prof. C. L. Roadhouse, Davis, Cal.

Third Vice-President, Mr. Ernest Kelly, Washington, D. C.

Secretary-Treasurer, Mr. Ivan C. Weld, Washington, D. C.

Auditors, Dr. Harry E. States, Detroit, Mich.;
Dr. H. A. Harding, Urbana, Ill.

President Lombard then addressed the Association briefly, after which the convention finally adjourned.

ADDRESS OF WELCOME

ILLINOIS—THE GREATEST FOOD STATE

JOHN B. NEWMAN, *Superintendent of the Division of Foods and Dairies,* Illinois Department of Agriculture

It is my pleasant duty today to extend to you hearty and cordial greetings in behalf of the State of Illinois, at this, the Seventh Annual Convention of the International Association of Dairy and Milk Inspectors. We are gratified to have given here in the principal city of our State a program dedicated to so worthy a purpose. Illinois is especially well equipped to appreciate the importance of a meeting of this kind. You will find us in a receptive mood, ready and anxious to embrace and make the most of this opportunity for enlightenment that we may learn of better methods to safeguard and improve the food supply.

The history of Illinois is one that chronicles notable success in almost every field of industry. Soil, climate, markets, and a sturdy, public spirited, loyal citizenry are leading factors that contribute to her wealth and usefulness. Agriculturally, Illinois is supreme. Nowhere have the farmers of this nation responded with greater energy and more patriotism than in Illinois in answer to the appeal for food to help win the war. We are proud of her mighty achievement as the nation's premier food producer, but are none the less alert to the grave responsibilities that are now even more acute in order that we may do our share to the utmost in fighting off the specter of starvation that menaces the nations of war-harassed Europe, in addition to meeting the domestic requirements. Although an armistice is in effect, the United States is still feeding the world. In Washington, Government officials are convinced that the food requirements are as pressing as ever

and we will have to keep stimulating production. There is an ever-increasing cry from the nations abroad for foodstuffs and this country is the only one with resources sufficient at this time to relieve the situation to any appreciable extent.

The subject of Food may be broadly classified under five divisions: production, manufacture, storage, distribution or marketing, and consumption. In weighing the importance of Illinois in this respect, let us take up the agricultural phase under the heading Production.

PRODUCTION

First in corn, first in farm crops and first in aggregate farm wealth. This is the record supported by Government statistics which makes Illinois the most important agricultural State in the Union. In addition, Illinois is the center of production in the United States according to value of crops and animal products. Comprising an area of thirty-five million acres of productive farm land, nine-tenths of which is in improved farms operated by progressive and successful farmers, this State has enacted a leading role in responding to the plea for maximum production of foodstuffs.

Aggregate Farm Wealth: The aggregate farm wealth of Illinois is approximately $4,000,000,000, a sum two-thirds the amount raised by the nation for the Fourth Liberty Loan. This includes land, buildings, implements, machinery and live stock.

Farm Crops: The figures supplied in the "Monthly Crop Report," United States Department of Agriculture, show that Illinois in 1917 produced the greatest wealth in crops of any State, the value of the thirteen leading crops being placed at $774,679,000. Next in line is Iowa with $712,974,000 for the same item, then Texas with $646,-966,000. Under the heading, "hypothetical value of all crops," Illinois has to her credit $842,042,000; Texas,

$788,983,000, and Iowa, $783,488,000. Her farmers could within a single year buy and pay for all the railroads in the State, and if they should go out of business this year they would realize a sum equal to twenty times the total capitalization of all the banks in Illinois.

Corn: Eleven million acres of corn were planted in 1917. This acreage comprises about one-third of the land area of the State, and about one-tenth of the total corn crop acreage of the United States, and one-seventeenth of the world's corn crop acreage. The number of bushels produced was 418,000,000, and the value on farm price basis, December 1st, was $459,800,000. Iowa produced 410,700,000 bushels valued at $443,556,000.

Two Illinois corn crops would build three Panama Canals, and leave enough over to pay $5,000,000 annually on upkeep and repairs during a period of twenty years.

In addition, there is produced in Illinois great quantities of grain, hay and other crops which makes our grand total for crop production a well balanced one.

When the Federal Government asked Illinois to increase its winter wheat acreage 4%, it increased it 10% and put 250,000 acres more into winter wheat—my own county one-fifth of entire increase.

Live Stock: In scientific farming, Illinois has blazed the way. Our farmers have learned the value of lime, legumes and phosphates as practical means for insuring permanent soil fertility. With corn the leading crop and the world's greatest live stock market close at hand, a strong incentive is supplied for breeding and raising the highest type of farm animals. The aggregate value of cattle, hogs, sheep, horses and mules in Illinois for 1917 is placed at $445,000,000. In the production of high-grade live stock Illinois is justly famous. Her pure-bred herds supply the foundation stock for farms in many sections of the country. Four million hogs—twenty million hens.

Dairy Cattle: Illinois is also adding to the permanence of soil fertility through extensive dairy operations. With over two and a half million persons in one city alone dependent for the most part on the dairy farms in the State for the supply of market milk, the development and improvement of the dairy herds receive every encouragement. Government statistics for 1917 place the number of milch cows in the State at 1,057,000, and their value at $89,950,700. It is estimated that returns from the sale of milk, cream and dairy products are over fifty million dollars annually.

MANUFACTURE

The world's greatest packing industry, centered in Chicago, puts Illinois in the lead as to the meat supply. The returns for meat sold are estimated at $500,000,000 a year or one-fourth of the aggregate sales for Chicago's output of manufactured goods. The total sales of meat and the by-products of the packing and allied industries for the entire country are over $1,500,000,000. About one-third of this industry is handled in Chicago alone.

In the manufacture of condensed and evaporated milk, Illinois is in the front rank, the production of this product for the first six months of 1918 being 108,004,675 pounds, according to returns in the War Emergency Dairy Products Survey. The total amount for the same period of all milk products manufactured, exclusive of ice cream, was 132,545,142 pounds. The ice cream manufactured in this six months' period was 3,190,903 gallons. These figures include only the factories reporting and do not include the butter and other dairy products made on the farms. If this same rate were maintained the year round, the annual production of condensed and evaporated milk for 1918 would amount to 216,009,350 pounds, and for all manufactured milk products exclusive of ice cream, 265,090,284 pounds.

STORAGE

Chicago is the greatest cold storage center in the world. Charles J. Brand, Chief of the Bureau of Markets, in answer to an inquiry on this subject wrote as follows:

"We have taken from our records figures which show that the total storage space, including the packing houses, is approximately 449,020,000 cubic feet for the entire United States. In the State of New York there are 55,-111,857 cubic feet of cold storage capacity, while in New York City there are 22,755,030 cubic feet. Within the State of Illinois our records show that there is located approximately 102,406,000 cubic feet, while in the City of Chicago there is located 91,593,000 cubic feet, from which it would seem you could secure some data to prove the importance of Illinois and Chicago, especially in the matter of the centralization of foodstuffs. These figures include public, private and combined cold storage warehouses and packing plants. They do not include breweries."

DISTRIBUTION

Chicago is the largest transportation center in the world. There are thirty-eight railroads terminating in Chicago, representing 100,000 miles of railroad lines, which is 40 per cent of the railway mileage of the United States. All these trunk lines are connected by belt lines in and around the city, and of the 4,000 miles of trackage in the city, 1,400 miles represent belt lines which greatly expedite the transfer of freight. On the southwest side of the city is one of the largest freight yards in the country, known as the "Clearing Yards." These yards alone have a capacity of more than one thousand freight cars daily.

Nearly all the grain of this country and Canada is sold through Chicago. In 1916 there were received in Chicago 74,944,000 bushels of wheat, 102,376,000 bushels of corn, and 161,244,000 bushels of oats, while the shipments were

61,187,000 bushels of wheat, 61,782,000 bushels of corn, and 116,875,000 bushels of oats.

CONSUMPTION

Measuring the amount of food consumed by the population, Illinois is the third largest food consuming State and Chicago is the second largest food consuming city. The population for Illinois, January 1, 1917, is given by the Bureau of the Census at 6,193,626, being exceeded only by New York and Pennsylvania. Chicago's population is now estimated at over 2,700,000, being exceeded only by New York City.

FOOD IMPORTANCE SUMMARIZED

Illinois is first in corn, first in farm crops, and first in aggregate farm wealth. The largest stock yards and meat packing industry are here. It is the most important cold storage center and the greatest food distributing State. It is the third largest food consuming State.

CHICAGO'S MILK SUPPLY

The municipal milk supply, in a large measure due to the constructive work of such organizations as this one, is steadily being improved, and progress in this direction opens up a vast field for study and research, demanding as it will always demand, consistent and unremitting effort. With the exception of New York City, Chicago, because of the volume handled, offers the greatest opportunity to study and investigate this problem, and in this connection I believe you will be interested in some statistical information relating to the source and distribution of the milk produced in what is known as the Chicago Milk Zone, or the territory to which municipal inspection or supervision extends. I am indebted to Dr. J. P. Kilcourse, Chief of

the Food Inspection Bureau of the Chicago Department of Health, for the following statistical information:

> The average daily consumption of milk in the City of Chicago is 800,000 quarts, of which 78 per cent is bottled milk.
>
> The source of supply is from approximately twenty-five thousand dairy farms in Northern Illinois, Southern Wisconsin, Northwestern Indiana, Southwestern Michigan, and Eastern Iowa.
>
> The number of pasteurizing, bottling, condensing and receiving stations also located in the foregoing territory outside of Chicago, the product from which is marketed in Chicago, is 197, 80 of which are in the State of Illinois.
>
> The amount of milk pasteurized in the country is 75 per cent of the total amount consumed.
>
> Transportation is by means of twenty-five steam and electric roads, the product being received at eighty-five city platforms. A few firms transport their milk from the country to the city by auto truck.
>
> The amount of milk pasteurized and bottled in the country is 65 per cent of the total amount consumed.
>
> There are eight certified milk farms, the product of which is marketed in Chicago. Four of these are in Wisconsin and four in Illinois.
>
> The total number of milk depots in Chicago is 658; pasteurizing establish-

ments, 279; milk bottling establishments, 113; bottled milk depots, 206; distributing stations, 2; cream depots, 10.

The number of wagons used in distribution, both wholesale and retail, is 2,976.

All the bottled milk is pasteurized.

Apart from the food situation there are many things to interest you in Chicago; our parks and boulevard systems, the "made land" constituting Grant Park which gives us the greatest centralized park of any city in the country, the Field Museum, now nearing completion in this park, erected at a cost of nearly ten million dollars, our five million dollar municipal pier which surpasses anything of the kind. Our post office does the largest business of any in the country. There are more telephones per capita in Chicago than in any other city, and more than in England, France, Germany and Russia. More vehicles pass daily over Rush Street bridge than London Bridge.

In this way I might continue to enumerate at considerable length the many things in which this city excels. But such an enumeration would be incomplete were I to leave out a most important factor bearing on Chicago's greatness. This is coincident with the gathering here today.

In 1912 the International Association of Dairy and Milk Inspectors opened its first annual meeting at Milwaukee, Wis. In 1913 you very wisely selected Chicago. You liked it so well here that you returned to us again the next year. Then Washington, D. C., captured the honors. Springfield, Mass., was the next lucky city. For the sixth annual meeting you repeated your visit to Washington, so that for a while Chicago was compelled to share honors with that city; but now that you have come back to us again for the third time, you have added materially to the triumphs of this great city in Illinois and have put us in

the lead again. We knew you would come back even when scared away by the "flu."

And so, I repeat, we are proud to have this congress of dairy and milk officials convene in our midst. We know from past experience that the deliberations you are about to engage in and conclusions arrived at will have a far reaching effect on the public welfare. No subject is more worthy of sincere effort than the one to which you are pledged; namely, the safeguarding, proper regulation, and improvement of this greatest of all foods—M I L K. We are glad to welcome you to our State and city; we hope you will have a most delightful time while you are here; we hope your convention will be a great success, and we hope your present visit will make you want to come again. Therefore I bid you a most hearty welcome to our State. The Almighty might have made a better land—but He didn't.

"We can trust people of intelligence who are well fed."

MODERN DEVELOPMENTS IN DAIRY INSPECTION

ERNEST KELLY, *in Charge Market Milk Investigations*, U. S. Department of Agriculture, Washington, D. C.

The question has often been raised as to whether or not dairy inspection is a science. I maintain that it is a science in the true sense of the word. However, there are two kinds of sciences which may be termed exact sciences and inexact sciences. Certain sciences which operate along clearly defined lines may be classified as exact sciences; under such a heading would come the science of mathematics. In the inexact sciences belong certain groups of technical procedure which are subject to change from time to time. It cannot be denied that changes do occur in scientific methods. For instance, aeronautics is a science, but a relatively new one, so that many changes are occurring and may be expected.

It is interesting to note how changes in sciences occur. This is usually by means of three steps, which may be designated as follows: First, thought; second, experiment; and third, application. In the beginning man conceives a new theory. His next step is to prove the application of this theory on one or two individual cases under laboratory conditions. The third step, which makes the theory of general use to mankind, is to prove whether or not the theory as applied under laboratory conditions is universally applicable. In this connection it is interesting to note what the word practical really means. The dictionary tells us that practical means, "capable of applying knowledge or theory to practice." So then, a man who has a theory without being able to give it general application is no more practical than the man who adheres to general procedures from a blind duty to precedent without knowing why he is pursuing such a course.

Changes which occur in sciences are more radical and

quicker in new sciences and complex sciences. This needs no explanation. As dairy inspection is both new and complex we must look for considerable changes in our technique. These changes have been a very considerable cause of the dissatisfaction which has obtained relative to dairy inspection. Because of this fact great keenness and adaptability is required of dairy inspectors. Any changes which are made disturb existing conditions and the inspector or those in authority must be particularly careful to see that the changes are thoroughly justified. In the past there have been two kinds of changes: Those based on the unfounded whim of inspectors; and those which have been based on newly found facts.

The most marked changes which have occurred in our idea relative to dairy inspection may be generally defined as follows: 1. Emphasizing certain essentials in sanitation. 2. Valuing results rather than the ways of achieving them. 3. Greater emphasis on the pasteurization of milk. 4. A greater understanding by dairymen, milk dealers, inspectors and consumers of each other's viewpoint.

It may be well at this time to outline briefly the main essentials in dairy sanitation as I see them. They have been already very thoroughly set forth by the committee on rules and regulations necessary for securing a clean and safe milk supply, which reported at our last annual meeting. Roughly, the essential factors may be divided into two parts: First, the protection from specific diseases; and second, the protection from high bacteria counts. In regard to protection from specific diseases particular attention should be paid to the health of cattle, including the tuberculin test; the purity of the water supply; sewage and waste disposal; and the health of those who come in contact with the milk. Protection from high bacteria counts can be secured largely through having clean cattle, small-topped milking pails, sterilized utensils, and promptly and efficiently cooling the product.

At this point comes the dividing line between two schools of sanitarians. One school believes that at this point the functions of the health department cease; while the other school believes that there are other factors which are well worthy of the consideration of those in authority. As far as I am concerned, I believe that the other factors which I will outline are an important part of the milk problem and the health department cannot afford to neglect them. One of these factors is the provision of necessary safeguards in general cleanliness. In other words, general sanitary conditions on the farms and in the milk plants will throw a protection around milk production and handling which may serve to avert disaster in case of any slip. As an illustration of this point I might cite the use of safety devices over machinery in factories. Farsighted employers of labor protect so far as possible all belts, gears, cogs, and other moving parts from possible contact with employees. It may be reasoned that employees by being careful may avoid accident, but the human element is so fallible that the additional safeguards are necessary. Just so in dairy sanitation. With changing help, lack of proper supervision, etc., the dairy which is reasonably clean is guarded to the utmost against slips which may occur in methods. Another feature which should not be forgotten is the standpoint of common decency and its effect on the morale of milk handlers. It cannot be denied that the man behind the cow is one of the chief factors in the production of clean milk, and the morale of such a man is toned up to a considerable degree by clean, neat surroundings. The economical side of dairying is an important one to health officials. The researches of McCollum and Goldberger show conclusively that milk is a vital necessity to the health and wellbeing of the human family. Therefore, I consider that the provision of an adequate supply of milk at all times is as much the work of the health department as is sanitary supervision. Encouragement of economic produc-

tion, then, seems to be a legitimate function of the dairy inspector and it is well within his province to point out to dairymen the economical advantages of certain details such as simply built, easily cleaned stables; light, ventilation, bedding, and other things which contribute to the health and comfort of the cattle, as well as other factors. Cleanliness as an advertising medium has been somewhat neglected. The dairy industry is just beginning to open its eyes to the possibilities of advertisement and I predict that development along this line will be very great within the next few years. As all advertisers must base continued sales on the quality of the product, for this reason it will well profit the dairy industry to have their house so in order that no criticism can be leveled at the conditions which surround milk or its products during production or handling. There are many foes of the industry who would be glad to avail themselves of any laxity which might obtain.

In conclusion let me reiterate a few of the points already mentioned. First, dairy inspection is a true science, though it is a changing one due to its newness and complexity. Developments are rapid and inspectors must be alert to pick out those fundamentals which have been thoroughly demonstrated as universally applicable and spend their main effort on them. At the same time they must not entirely neglect other factors which may have a lesser effect on the quality of the product, but are desirable for a number of very potent reasons.

DISCUSSION

MR. ARMSTRONG: How many dairy farms would you assign to one inspector? How many inspections would you make during a year?

MR. KELLY: Best results are obtained by permitting a man to use judgment as regards the frequency of inspection. He may, under certain conditions, spend a whole day ad-

vantageously on one farm. I have no definite number of farms in mind that may be assigned to one man.

PRESIDENT LOMBARD: Dairy farms may be inspected as often as the men can do the work. We reinspect first those who need help. Those dairies that are below the proper level may be inspected two or three times as frequently as others maintaining a higher standard.

MR. KELLY: Laboratory work will indicate when sanitary inspections should be made.

MR. NEWMAN: We get better results by working in a small territory until it is cleaned up. We use the permit system and cancel permits when men do not clean up.

DR. HARDING: There are two theories regarding milk inspection. First we inspected milk for fats, solids, etc. In 1900 we began inspecting sources of production and methods of production. We finally became skeptical, and in checking up sanitary inspection with laboratory work we find there are two ways by which we can attempt to control supplies. We can accomplish results in both ways.

"Aims of a high order may not be entirely fulfilled and yet at that may often prove more valuable than those of a lower order entirely fulfilled."

REPORT OF COMMITTEE ON COST OF DAIRY AND MILK INSPECTION

HOYES LLOYD, *Chairman*

Your committee has endeavored, in spite of many difficulties, to gather some definite information on the subject before it. Very many factors influence the cost of the dairy inspection service because of enormously different conditions throughout the continent of North America. One of the chief difficulties has been to obtain unit costs. For example, it is a difficult matter to know exactly how much it costs to inspect a dairy farm, but without such unit figures it is impossible to arrive at any comparative amounts which can be used to direct our effort.

The unit cost for any one kind of inspection indicates to a certain extent the manner in which the work is done. Let us consider the case of a milk-shipping station inspection. If the station be near at hand and the inspector merely looks through the station the cost for that particular inspection would be low. If the station is farther away and is visited by a competent, well-paid official, our unit cost increases. It increases still more when such a man stays for several days and makes bacterial, chemical and dirt tests of all milk received at the station. In addition to the inspector's railroad fare, it then becomes necessary to pay his board bill while the inspection is in progress and to pay the cost of the various tests made on the milk received.

It would be an impossibility to include within the scope of this report such explanations as have been received by the Committee concerning conditions which qualify the information as to unit cost or which cause the cost to be higher or lower than should be the case normally.

To consider these qualifying circumstances fully would require an intimate survey of the conditions and milk

inspection system used in the various municipalities. Consequently, we furnish in the following tables the statistics which we have received and leave any deductions to the individual investigator.

Table I is for municipalities which were able to give the information in approximately the required form. They are grouped according to population thus:

(a) 1,000,000 up
(b) 500,000 to 1,000,000
(c) 100,000 to 500,000
(d) Below 100,000

The reason for this is obvious because the problem in the small or medium-sized municipality is very different from that in the large city.

A large proportion of milk inspection cost must be charged to personal service and when first-class men are paid good salaries, which is not necessarily the case, the total and per capita costs are higher. In the possible case of poor and expensive service we have a serious wrong which, in duty to ourselves, we cannot condemn too strongly.

Table II contains the total and per capita costs for such municipalities as could not, for various reasons, furnish unit costs.

All figures given must be considered as estimates. The proportion of health department or other overhead expense which is chargeable to the milk inspection service has been a difficult problem. Some of these problems have been handed on to the committee and we have found it necessary in more than one instance to estimate the cost of maintenance of one or more automobiles of a well-known type used largely in milk inspection service. It has been necessary to alter slightly some figures furnished us for this or similar reasons and if we have

erred it has only been in an effort to arrive at comparable and comprehensible results.

Several States have furnished us with interesting information but as their work is more or less of a supervisory or advisory nature we have omitted the costs incurred by them from our summaries.

We have no finite conclusions to make. Apparently at a cost of three or four cents per capita an efficient milk inspection service can be obtained and perhaps under exceptional circumstances the milk supply can be controlled efficiently for less. With this as a basis it is obvious that small municipalities should enter into combination with their neighbors. If this combination provides a population of 100,000, $3,000.00 can be raised for milk inspection at the nominal cost of three cents per capita. The reported tables can best be studied in reference to each municipality's requirements and we believe it wise to leave the ultimate conclusions to be determined in this way.

Money saved must not be forgotten in viewing the cost of milk inspection. In one city of about 500,000 the amount saved through improved butter-fat content and elimination of watered milk, since an efficient system of milk inspection has been in force, has been about $400,000.00 per annum. This is a saving of 80 cents per capita at a cost of 3 cents per capita, or a net saving of 77 cents per capita per annum. This enormous saving, which would more than pay for the entire health department work of the city in question, does not include the saving in human lives which we all know results from an efficient control of the milk supply.

TABLE I

Municipality	Population	Number of Dairy Farms	Number of Inspections	Cost of Each Inspection	No. of Receiving Stations	No. of Inspections	Cost of Each	No. of Retail Dairies	No. of Inspections	Cost of Each Inspection	No. of Stores	No. of Inspections	Cost of Each Inspection	Misc. Premises	No. of Inspections	Cost of Each Inspection	Total Cost	Cost Per Capita
(a) Chicago, Ill.	2,596,681	18,000	17,839 (6 Mos.)	$1.22	209	641	$1.39	738	21,980	$0.72	5,198	.....	.....	50,000	104,190	$0.36	$50,000	$0.0192
(b) Detroit, Mich.	800,000	6,500	7,741	1.00	127	included in farms	0.85	58	1,359	0.90	4,000	4,500	$0.135	.....	.....	....	25,000	0.0312
Montreal, Que. . . .	640,000	7,000	5,609	1.68	23	23	1.68	442	2,431	0.26	3,120	11,144	0.26	8,670	8,670	0.26	19,125	0.0298
San Francisco, Cal. . .	560,000	204	1,571	4.39	5	298	1.49	52	2,670	1.49	500	801	1.49	.....	.....	....	12,429	0.0221
(c) Toronto, Ont., Canada.	489,680	2,000	2,288	3.93	10	48	7.81	78	1,641	3.92	1,653	4,474	0.34	445	1,645	1.25	19.381	0.0309
Washington, D. C. . .	365,000	1,139	4,423	1.99	7	.....	....	40	725	....	2,300	14,415	.....	684	4,500	....	15,500	0.0424
Indianapolis, Ind. . .	300,000	3,000	6,000	0.18	40	80	0.18	2	8	0.15	1,500	6,000	0.10	1,500	6,000	0.28	2,800	0.0093
Columbus, Ohio . . .	225,000	1,792	4,495	0.97	21	288	....	16	576	0.82	800	3,691	.....	100	1,200	....	7,860	0.0349
Oakland, Cal.	210,000	72	648	3.70	22	198	....	20	1,040	1.73	500	.....	.....	70	70	1.00	8,000	0.0380
Scranton, Pa.	150,000	800	1,925	0.62	5	7	1.25	14	196	1.00	320	461	0.24	1,185	1,185	0.04	2,750	0.0183
Fall River, Mass. . .	131,358	425	4,580	0.37	....	.....	....	72	1,444	0.37	645	1,546	0.37	132	1,147	0.37	4,598	0.0350
Youngstown, Ohio . .	125,000	430	750	0.75	12	300	0.50	25	100	0.50	280	450	0.25	347	684	....	1,200	0.0095
(d) Manchester, N. H. .	80,000	775	550	1.25	25	65	0.50	29	187	1.10	200	200	0.50	59	59	0.50	2,041	0.0255
Brookline, Mass. . . .	36,000	621	694	1.57	63	105	2.38	39	610	1.51	91	585	0.77	153	525	0.76	4,100	0.133
Warwick, R. I. . . .	15,000	75	450	....	....	.....	....	....	.....	....	5	.....	.....	.....	.....	....	450	0.0300
Swampscott, Mass. . .	7,621	3	12	1.00	....	.....	....	...	.....	....	43	175	1.00	16	192	1.00	600	0.0787

TABLE II

Place	Population	Expenditure	Per Capita Expenditure	Remarks
(a) New York, N. Y..	.5,500,000	$100,000	$0.0181	
(c) Buffalo, N. Y. . . .	476,000	15,000	0.0315	
Kansas City, Mo.. .	350,000	10,000	0.0285	Does not include laboratory.
Harrisburg, Pa. . .	275,000	3,900	0.0141	Includes Dauphin, Cumberland and York Co.
Bridgeport, Conn. .	173,000	2,000	0.0115	
New Haven, Conn. .	160,000	5,491	0.0343	
Syracuse, N. Y. . .	160,000	3,200	0.0200	
Memphis, Tenn. . .	150,000	3,600	0.0240	
Spokane, Wash. . .	141,000	3,500	0.0248	
Grand Rapids, Mich.	135,000	10,592	0.0784	
Salt Lake City, Utah	130,000	2,800	0.0215	
Springfield, Mass. . .	117,000	4,460	0.0381	
Vancouver, B. C. .	103,000	2,500	0.0242	Personal service only.
(d) Somerville, Mass.. .	92,000	3,300	0.0358	
Wichita, Kan.. . .	80,000	4,250	0.0531	
Winston-Salem, N. C.	50,000	564	0.0112	24 retailing farms.
Arlington, Mass. . .	17,000	500	0.0294	

DISCUSSION

MR. KELLY: We are indebted to the committee for the facts presented. A point has been brought out which appears to have been overlooked by a great many people and which I believe is very important. This deals with the economic benefits to a community when dairy inspection results in a better milk supply. Every year a large amount of a valuable food product is lost when milk and cream sour due to faulty methods of production and handling. Dairy inspection, properly performed, would eliminate a great deal of this loss. Two instances of this loss have come to my attention lately. One creamery in a northern State returned last summer over $2,600 worth of milk and cream to farmers because it was in unsatisfactory condition. This material was either sour,

of high acidity, or had disagreeable flavors and odors. A milk plant in one of the southern States received from July, 1917, to June, 1918, 49,949 gallons of sour milk. It is not reasonable to suppose that proper inspection would have saved all of this sour milk, but if half of it had been saved, say 25,000 gallons, at an average valuation of 35 cents a gallon, it would have resulted in the saving of $8,750 worth of sweet milk and cream. Of course, the sour product had some food value and cannot be counted as a total loss, but it certainly was not of the same value to the community as a similar quantity of sweet milk would have been.

MR. ARMSTRONG: We are not down to the fine points, but we are trying to work out a plan along Mr. Kelly's lines. We formerly had sixteen men in field work, but because of unusual conditions we now have only eight men in the field. Our main effort has been along educational lines, including the improvement of buildings and keeping of better cows, weighing of milk, keeping of accounts, clean utensils, dry milking, and the prompt and thorough cooling of milk. Personal visits must improve bacteria counts.

"All are born to observe order, but few are born to establish it."

REPORT OF COMMITTEE ON DISEASES OF MAN —THEIR RELATION TO THE MILK SUPPLY AND TO THE PUBLIC HEALTH

A. F. STEVENSON, *Chairman*

The Committee on the Diseases of Man—Their Relation to the Milk Supply and to the Public Health has no formal report to offer to the Association this year. The high pressure under which the various committee members have been working during the past year has forced them against their wishes to omit this committee work.

In general it may be said that although the country has not been free from milkborne epidemics during the past year, no large and striking outbreaks have been reported. This is probably due in a large measure to the awakening of the country to the fact that health measures are vitally important in the organization of an army. All organized health bodies have paid particular attention to water and milk as possible sources of danger, and in many instances the Army has used military authority to force the safeguarding of milk fed to soldiers. All such cases have had a decided educational effect on the people in general, and will without doubt result in a permanent raising of the sanitary quality of the milk supply of the country.

The nutritional studies reported by this committee at the last meeting have been continued. The change in the chemical constituents caused by heating milk is being studied in great detail. This work is of great scientific interest, but practically, aside from the fact that heated milk is probably not identical with raw milk, the results obtained so far are of minor value.

In general it may be said that the importance of milk as a carrier of disease is generally becoming considered by the laity as well as by the health authorities of first importance, and great strides are being made to safeguard such supplies.

REPORT OF COMMITTEE ON BOVINE DISEASES —THEIR RELATION TO THE MILK SUPPLY AND TO THE PUBLIC HEALTH

PROF. C. L. ROADHOUSE, *Chairman*

THE TUBERCULIN TEST

Some States and cities of the United States have passed general tuberculin testing laws or ordinances. The enforcement of many of them has not been permanent, due to legal proceedings on the part of the dairy owners. Compulsory tuberculin testing of dairy cattle has been more successful in towns and smaller cities where producers are also distributing. In these instances the producer feels more responsibility than where he sells to a dealer.

The Chief of the Bureau of Animal Industry has stated that 10 per cent of dairy animals in this country would probably react to the tuberculin test. Some individual States and districts would show a percentage much higher than this.

For large cities we cannot look immediately to the tuberculin test to keep the milk free from tubercle bacilli. Compulsory tuberculin testing has not been entirely successful because the cooperation and good will of the owner is essential to cleaning up a diseased herd. Giving the dairy owner the choice of either having his cows tested regularly by an official veterinarian or pasteurizing the milk would seem to give better promise of good results. California and Oregon have such a law which includes all dairy products except cheese and the enforcement is working out satisfactorily.

THE LOSS OF ANIMALS IN CERTAIN DAIRY HERDS

The average life of a dairy cow has been placed at six years. This figure seems low at first, but when we begin

keeping records we then realize the considerable loss of dairy animals each year. One member of the committee has kept a careful record of the loss of animals in two large certified herds. The figures are given below.

Cows Sold or Died From Herd No. 1 During 1917. Cows in Herd, 299

Condition	*No. Animals*
Mastitis	22
Unprofitable milkers	17
Reactors	11
Old and broken down	8
Deaths from natural causes and accidents	5
Abortion	4
Non-breeders	4
Chronic bloat	1
Total	72

Diseases Treated in Herd No. 1, Jan. 1, 1918 to Sept. 26, 1918

Metritis	24
Retained Placenta	14
Abortion	14
Mastitis (presumably infectious)	16
Mastitis (from known injury)	13
Foul feet (*Bacillus Necrophorus* infection)	10
Reactors	8
Impaction of rumen	13
Total	112

Cows Sold from Herd No. 2 during 1917
Cows in Herd, 152

Unprofitable producers	7
Non-breeders	6
Reactors	4
Deaths from natural causes and accidents	3
Mastitis	2
Old and broken down	2
Abortion	1
Total	25

UDDER TROUBLES AFFECTING QUALITY OF MILK

Mastitis.

From the record of Herd No. 1 it will be noticed that more animals were affected with udder trouble than any other condition, there being twenty-two cases during the year. This number of cases of mastitis is not unusual during the year in a herd of 300 cows. This condition is one of the most annoying to the careful dairy inspector. It usually begins as a single inflammation of the udder, causing a caked condition of the glandular tissue which generally is only a temporary disturbance. If the condition is severe it may develop into garget, in which there is pus formation, and it may take a chronic form. Chronic inflammations of the udder may leave the udder abnormal, causing the secretion of abnormal milk for long periods of time, and may cause lumps or abscesses in the udder tissue. If these remain permanently the animal should be permanently removed from the milking herd.

Another condition resulting from mastitis is salty milk. The udder is generally free from lumps but one quarter is left smaller than normal. When walking along behind a herd of cows in stanchions the abnormal-shaped udders can be readily observed by one who is accustomed to look-

ing for such conditions. An udder giving a small quantity of salty milk from one quarter is more objectionable than a non-functionating one, since most milkers will draw the salty milk into the pail with the milk from the good quarters.

Analysis of twenty-five samples of salty milk varying from slightly salty to very salty in taste were examined chemically and bacteriologically at the University of California with the following general results:

Salty milk on the average is high in bacteria content as compared with normal milk from the normal quarters of the same udder, the highest samples showing 83,000 bacteria per c. c. It is low in specific gravity, low in solids not fat, low in fat and is slightly lower in its lactose content. Considering these results, we are abundantly justified in objecting to such milk being used.

Bloody Milk.

Bloody milk is not uncommon, occurring as a result of injury and inflammation of the udder. Since bloody milk is an indication of udder disturbance, milk from such cows should not be used.

Cowpox.

The round reddish lesions of cowpox occurring on the surface of the teats and udder of cows are deep-seated enough to cause some slight inflammation of the adjoining udder tissues. For this reason and for the reason that there is a very close relation between cowpox and the smallpox of man, we are justified in the position that milk from such cows should not be used; and for the protection of other cows good dairy practice requires the removal of such affected animals from the herd and milking them last to avoid the carrying of the infection to other cows on the hands of the milker.

Procedure for Safeguarding the Milk.

In all instances of udder trouble in cows where one

quarter of the udder is affected, the milk from the other apparently normal quarters should also be discarded. Although milk from the adjoining quarters may appear to be normal, a careful examination will frequently reveal small curd particles in the milk, indicating slight derangement. The dairy inspector is justified not only in insisting that such milk be withheld from the regular supply, but he should plan to have such animals actually separated from the herd during milking, in order to guard against mistakes being made by the dairy employees.

"The digestive functions of children may be disturbed by milk produced by infected udders. We have not paid enough attention to the possible result of diseased animals."

THE SEDIMENT TEST AS APPLIED TO DAIRY INSPECTION

WILLARD E. WARD, *Agent, Milk and Food Inspection,*
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During the past year, with its calls for cooperation with Governmental agencies in increasing dairy and other food products, the increased cost of essentials incident to milk and dairy inspection, and the consequent drain upon our time and available appropriations, many of us have no doubt encountered difficulties, the solutions of which have taught us valuable lessons. Such of these lessons as have proved of distinct merit and brought out new methods of control should be disseminated among our members that we may grasp every opportunity that will assist us to maintain and increase the standard of our work during the coming period of reconstruction. I will therefore endeavor to point out briefly some of the advantages which may be derived by an intelligent use of the sediment test as applied to dairy farm inspection.

Some three years ago it occurred to me that if various State boards of agriculture who make use of the sediment test in competitive clean milk contests found it the best method of determining awards, it might at least be useful to the dairy inspector in locating those dairies which require attention or exclusion.

For my first experiments I selected a small dealer's supply consisting of six nearby dairies, scoring from 51 to 67. I noted the condition of barns, cows, milking utensils, etc., one day, and took a sediment test with temperature of the milk from each dairy at the dealer's plant the following morning. From an examination of the cotton filters through a powerful magnifying glass and also the microscope I was enabled to become familiar with conditions which caused the different forms of dis-

coloration and sediment. By reversing the procedure and taking the sediment tests first the peculiar characteristics of the sediment under the glass made it possible for me to point out with surprising accuracy what the farmer had done or left undone in those cases where unclean filters were found, the extent to which the cows had been cleaned before milking, the kind of bedding used, whether the milk or cans had been exposed to various forms of dust, and upon the cleaner filters, whether the stable air had been free from dust during milking. Various of the more common forms of contamination were also indicated. I continued this for several months and noted the difference in the filters after the cows had been housed for the winter. These filters gradually became so nearly alike and free from discoloration and sediment that I was obliged to move and also extend my field of operation. This was due to the fact that the farmers found that I was comparing their methods of producing and handling milk, and as their interest grew, made such corrections as to render the dairies unsuitable for my purpose. Incidentally this emphasizes the educational value to the farmers.

I then made use of dairies in districts located at distances varying from 10 to 140 miles. The procedure followed was to make the sediment tests and take temperatures at receiving plants or railroad platforms in the country, making notations as to what conditions I could expect at the dairies from an examination of the filters, then making an inspection and scoring each dairy. Lest my enthusiasm might lead me to misinterpret the scores I had a competent dairy inspector score the same dairies alone, and his scores tallied very closely with my own. A comparison of the cotton filters with the dairy scores more firmly convinced me that the sediment test combined with the taking of temperatures at country receiving stations was a pretty safe guide as to just where inspections could

be made to the best advantage. I found further that particles of insoluble fat and casein indicated that the cans had been returned by the dealers improperly washed, while discolorations from burnt carbon were satisfying evidence that the interiors had been exposed to train dust in transit. While these conditions suggest the uses that the sediment test may be put to in other phases of milk inspection work, they clearly indicated what producers had been negligent through not re-washing their cans.

During the past year, when it became evident that I could not give all contributing dairies the usual attention, I made use of the sediment test in connection with the inspection of cream dairies. To further satisfy myself as to its practicability I again had a veterinarian, experienced in dairy inspection, score the dairies while I remained at the receiving station taking temperatures and making sediment tests of the same dairies he was inspecting.

Of the 16 dairies done the first day, the inspector reported 4 as dirty (average score 49.4); these showed very dirty filters. He reported 4 as passable, but deficient in cleanliness (average score 54.4); these showed cloudy filters. The remaining 8 the inspector reported as clean to passably clean (average score 59.4); of these I found 1 cloudy, 1 slightly discolored, and 6 clean filters. Of these 16, the temperature of 2 dirty, 1 cloudy, and 1 clean, was high enough, considering the length of time the milk was on the road, to indicate improper cooling.

The second day 18 more dairies were covered. The inspector reported 5 as dirty (average score 50.1); these showed very dirty filters. He reported 3 as passable but deficient in cleanliness (average score 54.8); 1 showed dirty and 2 cloudy filters. The remaining 10 the inspector reported as clean (average score 65.8); I found 2 slightly discolored and 8 clean filters. Of these 18 the temperature of 2 dirty, 1 cloudy and 1 clean, was high, again indicating improper cooling.

It can thus be seen that had I gone entirely by the cotton filters and temperatures and even inspected the dairies which showed cloudy filters, all dairies which really needed attention would have been covered at a great saving in both time and cost.

To arrive at a more definite conclusion as to the saving in time and money, in October I employed the sediment test method to 61 milk dairies in a district some 130 miles distant. These dairies had been inspected in July, involving 38 hours' working time, 4 days' and 4 nights' absence, with an actual cash outlay of $53.35. In applying the sediment test I found 6 dirty and 18 cloudy filters and 2 additional high temperatures. In inspecting these 26 dairies, the working time consumed was 17 hours, with 2 days' and 2 nights' absence, and actual cash outlay of $25.40. I might note that the automobile and hotel expenses were kept proportionately the same for both trips, a considerable saving in gasoline and oil being effected on the second trip by reason of the fewer dairies visited. I have as a result of my observations reached the following conclusions:

> Where several inspections of dairies are made each year this filter method can be used to eliminate the re-inspection of the better dairies, and thus allow more concentration upon the poorer ones.
>
> Where appropriations will provide for infrequent inspections only, its use will provide maximum efficiency by pointing out with reasonable certainty, where the available time and money can be spent to the best advantage.
>
> Where no dairy inspections are made it can be used to exclude unclean milk.

And finally, when microscopical observations are made, it is a reliable agent in locating organisms from diseased cows.

For convincing the farmer that certain sanitary corrections should be made, by showing the filter and making a test in his presence, the test has, in my experience, proved of inestimable value. The average producer will respond to suggestions when shown definite results of his carelessness or neglect, and I have made it a point to let him see the cotton filters both through the magnifying glass and the microscope.

The results of the bacteriological examinations of samples from the mixed supplies of raw milk taken at the city receiving plant before and after the dairy inspections were carefully studied. In the case of the cream dairies the bacteriological content decreased after inspection by both methods in about the same proportion. In the case of the 61 milk dairies, however, the average bacterial content of the last 4 samples taken before the July inspection was 264,200; the first 4 after inspection averaged 153,200; in October the last 4 samples taken just before inspection by the sediment test method showed an average of 162,450; the first 4 after inspection averaged 80,050.

I do not, however, attribute this greater proportional decrease to the method used, for atmospheric and transportation conditions enter too largely into the bacterial variation of a long distance mixed supply, but the observations made certainly did not point to any serious deficiency in the sediment test method.

The city of Boston is handling its dairy inspection along the lines I have indicated, but instead of the sediment test, the dairy inspectors have been trained to make quick determinations of the bacterial content by Breed's method at the country receiving stations. In looking into this

method, which is practically the same as Winslow's water test, I have found that experts do not agree as to its reliability when applied to milk. Granting, however, that it is efficient, it can be classed only as a milk control measure, for it does not indicate the cause for dirty milk, nor does it provide a practical educational demonstration to the producer, and it therefore is a negligible factor in the practical inspection of dairy farms.

My twenty years' experience as a milk and dairy inspector has convinced me that the best system is the one which exercises adequate supervision over the milk supply from its source of production to its ultimate consumption, with the maximum effort put forth upon its clean and sanitary production. I therefore suggest the use of the sediment test only as an agent in utilizing our available time and money to the best advantage, as an instrument of detection for excluding unsanitary milk, and possibly to some, as a stepping-stone to a wider field of action, but by no means as a substitute for dairy inspection itself. Any sound inspection system must include provision for educating the farmer as to the necessity for cleanliness and proper handling of his milk, and this can best be done by intelligent personal contact. I consequently do not agree with Dr. Bissell, of Buffalo, that the supervision of the milk supply can be limited to removing dirt by clarification followed by pasteurization, under municipal supervision. Although I cannot dispute the value of this method as a measure of control, it would be contrary to the progress of civilization to stop the educational process at this point. Pathologists have amply demonstrated that certain toxic productions of bacterial growth in unclean milk, which are soluble and are not destroyed either by heat or clarification, are responsible for various forms of intestinal disorders in infants, while from a practical viewpoint, we have but to look into the systems of inspection employed in the production and handling of less essential

food products to realize that it would be unsafe to relax control over the production of a food so vitally essential to infant life.

"A just chastisement MAY *benefit a man, though it seldom does; but an unjust punishment changes all his blood to gall."*

METHODS OF DETECTING TUBERCULOSIS IN CATTLE

DR. JOHN J. LINTNER, Bureau of Animal Industry, U. S. Department of Agriculture. *In charge Tuberculosis Eradication Work, State of Illinois*

Tuberculosis is a chronic, contagious, infectious disease of man and domestic animals. It is one of the oldest diseases known; lesions of this disease have been found in the bones of Egyptian mummies. Moses, in his laws (Book 3, Chapter XXII), forbade the consumption of the meat of animals which were affected with tuberculosis. History records it from the earliest times.

Cattle are the most susceptible of all animals to this disease. The development of tuberculosis is usually so slow that years may elapse before any symptoms point to its presence. The disease in its slow and chronic course does not exert a harmful influence on the general condition of the animal, which explains that an animal may be fat, have good appetite, smooth glossy coat, and be apparently in the pink of condition, yet may frequently be extensively affected, without exciting the suspicion of the owner. Such an animal may be passing the germ causing tuberculosis in the feces, or by an occasional cough infect the premises, subsequently carrying the infection to other animals in the herd. From these conditions mentioned, it will be readily understood how the greater part of the herd may become infected and much damage done before a symptom develops to serve as a warning. The disease is prevalent in all parts of this country, especially so in the neighborhood of large cities.

The symptoms by which tuberculosis is recognized or suspected in a living animal cannot be relied on with certainty. Any of the symptoms may sometimes be caused by some other disease and not one is characteristic of tuberculosis alone. Even if we exclude the

early stages of tuberculosis, in which no clinical symptoms are observable, it is only rarely possible, even in advanced stages of the disease, to recognize it with absolute positiveness.

The methods employed by the human physician in making physical examinations in detecting the disease and aiding him in forming his suspicions and opinions are not practicable and adaptable for the larger animals. In animals, the skin and chest walls are thicker, organs larger, and the sounds of breathing not so readily detected as in the human subject.

Symptoms pointing to the existence of tuberculosis are as follows:

General running down in condition, loss of flesh without apparent cause. Rough coat; over the withers, back and loins the hair may appear in dull patchy areas. Shrewd buyers of cattle who have had considerable experience with the tuberculin test absolutely refuse to invest in a cow showing such symptoms.

Cough is only present when the disease is attacking the lungs or some part of the breathing apparatus.

Enlargement of the superficial lymph glands, especially where the glands in the region of the throat are involved and cause difficult breathing, is very likely to be due to tuberculosis.

An exact diagnosis is possible only by the aid of special methods employed to detect the disease, among which is microscopical examination of some of the diseased material and secretion if such is available, inoculation of animals to produce the disease, serum agglutination reaction, and the tuberculin test. The first three require too much laboratory technique to be practical, thus leaving the tuberculin test the most satisfactory and best diagnostic agent known in determining the presence or absence of tuberculosis.

The cause of tuberculosis is a germ discovered by a dis-

tinguished physician, Dr. Robert Koch, in the year 1882, who named it "Bacillus Tuberculosis." He proved by numerous experiments that the disease is produced by this organism and without it the disease cannot be produced. While experimenting with this germ, Koch considered that there should be a product of this bacillus which, if discovered, would have a curative effect upon the disease. With this object in view, he discovered a substance known as tuberculin, which was first used in treating tuberculosis in man. For a time it seemed to bring about the desired results, but after extensive experimenting it was considered a failure as far as curative properties were concerned.

Koch made known his discovery of tuberculin in the year 1890. About this time extensive experiments were conducted by Nocard, Gebhardt, Bang, Arloing and others to ascertain the relative merits of tuberculin as a curative agent. In the course of these experiments it was observed that following the injection of tuberculin patients affected with tuberculosis showed a rise of temperature. This led veterinarians to apply tuberculin to suspected animals to see if a similar reaction resulted. Numerous experiments showed that the same results were obtained in suspected cattle, and since 1891 the use of tuberculin as a diagnostic agent for tuberculosis has been almost universally adopted in all parts of the civilized world. Tuberculin is not absolutely infallible, but is more dependable than any method that has ever been used. The records of a large number of tests made by Government officials show that with certain precautions it is accurate in 98 per cent of the cases tested. The tuberculin test conducted by a competent and experienced man detects the disease practically without fail. However, we are unable to detect the presence of the disease by the test in a too recent infection; the disease must make some little progress before the animal will react. In the beginning of

each case there is a period between the entrance of the germ into the body and the time when they have multiplied sufficiently for the test to reveal their presence. This is called the period of incubation and lasts from ten days to two months.

We are also unable to detect tuberculosis in animals too extensively infected because of the slight effect of an ordinary-sized dose of tuberculin on an advanced case of the disease, where so much natural tuberculin is already in the system. There is produced daily, within the system of an animal which is tuberculous, a certain amount of tuberculin, the amount depending upon the extent of the infection and activity and virulence of the germ. Where the production of tuberculin is extensive, it can be readily understood why an ordinary amount of tuberculin injected for diagnostic purposes could fail to bring about a reaction.

The intensity of the reaction and the extent of the lesions bear no relation to each other, unless this is an inverse one in the sense that extensively tuberculous cows, hence emaciated, weak animals, usually react with less intensity than robust individuals in which the disease is in its first stages or localized.

Tuberculin is the sterilized and filtered glycerin extract of cultures of tubercle bacilli. It contains the products of the tubercle germ without the germs themselves. Great care is required in its preparation. A special fluid (or culture medium) a veal bouillon containing a small amount of glycerin is prepared and injected with tubercle bacilli. This fluid is then placed in an incubator and kept at the temperature of the animal body for a certain period from six to eight weeks. The germs grow and multiply and the fluid becomes filled with the growth and products of the germ. When the necessary growth has been produced, the fluid is heated sufficiently to kill the germs. The fluid is then placed in a clay filter where all germs

are removed. Consequently, tuberculin is unable to produce the disease and does not harm healthy cattle, even in large doses. However, if the animal is tuberculous a decided rise of temperature will follow the injection of tuberculin.

The method adopted and officially used by the Government in making tests for tuberculosis is known as Koch's Subcutaneous Method, the technique of which is as follows:

Stable animals in the usual manner. For safety and convenience it is necessary that they be tied. Make them as comfortable as possible. Give them a good bed of straw, if such is available, to induce them to lie down and be contented. Animals not accustomed to confinement should be gotten up the evening prior to the day beginning the test, so they may become acquainted with surroundings, thus avoiding high temperatures incidental to excitement. Animals accustomed to grain, feed in the usual manner. Animals not accustomed to grain, feed sparingly on hay only. Make provisions that all animals have an abundance of fresh water throughout the period of test. To avoid any possible error in identification, a number should be pasted on the hip of each animal to correspond with the number on chart. The temperature of each animal is taken at least three times the first day of the test, preferably at 2 P.M., 5 P.M., and 8 P.M. These are referred to as pre-injection temperatures. Make a careful physical examination of each animal in the herd prior to injection of tuberculin. Ascertain age and weight of each animal. All animals showing normal pre-injection temperatures and showing no evidences of other diseases are injected with a suitable dose of tuberculin immediately following the last pre-injection or 8 P.M. temperature. Cows that have calved within the past few days are excluded from the test. Any animal which shows a temperature over 103° F. is not injected with tuberculin.

The object is to inject only such animals as are absolutely normal as determined by physical examination and temperature.

The site of injection, preferably the side of the neck, should be disinfected with some suitable disinfectant, as a 5 per cent carbolic acid solution. The hypodermic syringe and needles should be sterilized by boiling in water before using on a herd. The tuberculin is injected hypodermically into the connective tissue just under the skin and not into the muscle. Great care should be taken to see that the allotted amount of tuberculin for each animal is placed where it is intended.

The dose of tuberculin given is determined by the age, weight of the animal and the findings revealed on physical examination. In cases where an animal on physical examination shows symptoms of tuberculosis and her usual dose, according to age and weight, would be 3 c. c., due to the suspicious symptoms such dose might be doubled or trebled. In cases where a number of the herd show symptoms, suspicious of the disease, which would suggest probable extensive exposure, the dosage might be increased for the entire herd. Dosage is determined after a careful summary of all information available.

The reaction to tuberculin is manifested by a feverish attack and consists in a gradual rise of temperature beginning from the 6th to the 12th hour and probably as late as the 18th hour after injection of tuberculin, reaching its maximum from the 12th to the 21st hour, thereafter falling with slight interruptions until the normal is reached at the 20th to the 40th hour after injection. In some cases a second rise of shorter duration may be observed. The difference between the maximum temperature after injection and the temperature before injection may be from 2° to 5° F. Accompanying the feverish attack, the pulse rate and the breathing may be markedly increased, but not infrequently they remain practically nor-

mal. Great depression, loss of appetite, staring coat, dry muzzle, diarrhea are equally frequent, and trembling of muscles may also be observed. Not infrequently, there may appear a local swelling (local reaction) at the seat of injection; however, this may not be present.

Post-injection temperatures are the temperatures following the injection of tuberculin. The temperature of each animal injected with tuberculin is taken eight hours after injection and every two hours thereafter, until the 20th hour after injection. If there is no tendency for the temperature to rise by the 20th hour after injection, the test may be discontinued. If any animal shows a rise of temperature at any period of the second day of the test, the temperature of such an animal should be taken hourly. A rise of temperature of any animal on the second day should not be recorded by the registering of only one thermometer. Verify the reading with at least three thermometers to avoid any possible error. At intervals between temperatures, observe the cattle closely, going from one to another, especially those whose temperatures show a tendency to rise. Watch for the general symptoms and constitutional disturbances that frequently accompany reactions to tuberculin, which will materially assist in determining the results of the test.

The following instructions are issued and complied with by the U. S. Department of Agriculture, Bureau of Animal Industry, relative to what constitutes a reaction to the tuberculin test:

1. A rise of 2° F. or more above the maximum temperature observed prior to the injection of tuberculin, or a temperature above 103.8° F. should be regarded as an indication of tuberculosis, provided the temperature shows the characteristic rainbow curve.

2. Animals which after injection show a rise of temperature of 2° F. with a maximum between 103° and 103.8° F., as well as those which show a rise of less than

2° F. with a maximum temperature of 103.8° F. are regarded as suspicious. The presence of a general systemic reaction should be considered in determining the classification between suspicious and reacted.

3. Cattle which are regarded as suspicious should be submitted to a retest after the expiration of sixty days. This class of cattle and those which show possible physical evidences of tuberculosis, emaciation, old age, or which have been repeatedly tested, should receive double or treble the dose of tuberculin indicated by weight.

During experimental work conducted at this station, where cattle were slaughtered following the test, we observed that not infrequently an animal, which on the day following injection showed a rise of temperature of only 1° F. with the characteristic rainbow curve, would show tuberculous lesions on postmortem examination.

In some instances when an animal following an injection with tuberculin shows a rise of temperature of only 1° F. with the characteristic rainbow curve, such animal when subjected to a subsequent test in which an increased dose of tuberculin is injected will sometimes give a positive reaction.

These observations point to the great importance attached to the characteristic rise of temperature, referred to as the arch or the rainbow curve.

For all practical purposes any animal that reacts must be considered tuberculous. It is never safe to keep in a herd a cow that has once reacted to the tuberculin test, regardless of what her appearance and condition may be. Although infected with tuberculosis, even to a slight degree, she must be considered as dangerous not only to other animals in the herd, but also to the consumer of her products.

There are also two other methods of using tuberculin as a diagnostic agent for tuberculosis. These are known as the ophthalmic tuberculin test and the intradermal tu-

berculin test. Experiments have been and are at the present time being conducted with both these tests to ascertain their relative accuracy and merits in detecting tuberculosis. Some very gratifying results have been obtained by their use. It is hoped that these tests may prove to be as reliable as the subcutaneous method, which will materially simplify the technique and reduce the time and work in connection with the method now used. Thus far, these tests cannot be recommended for general practice as methods for diagnosing tuberculosis. The experiments have been too limited to warrant them to pass from the experimental stage, until further work and experimenting is done, before they can be adopted in the place of the present reliable subcutaneous test. These two tests are therefore not officially recognized at present for use in Federal testing.

In conclusion, to quote Dr. James Law, one of the leading veterinarians:

"Much has been said and written against the tuberculin test by those that have never used it and are therefore utterly incompetent either to endorse or condemn it, but for those who aim at a prompt and thorough eradication of tuberculosis from their herds, no resort, as regards efficacy, can compare with the tuberculin test."

DISCUSSION

DR. HARDING: There is some doubt in the minds of some whether the 98 per cent referred to relates to the whole proposition or whether it refers to those cases after mistakes are eliminated.

DR. LINTNER: Of those animals apparently reacting to the tuberculin test, the Government has on postmortem examination found positive lesions of disease in 98 per cent of the cases.

DR. ABBOTT: Many years ago in Texas we tuberculin tested several herds. About one per cent reacted, except

in the vicinity of Fort Worth, where about 75 per cent reacted. Every animal showed lesions of the disease on postmortem examination.

DR. HARDING: After a herd has been tuberculin tested for years, and on retest, you get reactors occasionally that are extremely puzzling.

DR. LINTNER: We have killed reacting animals having lesions that would ordinarily be overlooked, but on laboratory examination the suspicious parts are found to be tuberculous. It is a fact that an animal may have tuberculous lesions so protected that an animal will not react; but let something lower the vitality of the animal for a time, and on retesting it may react. A run-down condition will give the disease a better chance to develop. When people better understand these things, prejudice will disappear.

"Tuberculosis should be eradicated because it is a preventable disease. We tolerate it only because it is a habit some of us have acquired."

REPORT OF COMMITTEE ON LEGISLATION AFFECTING MILK AND MILK PRODUCTS

PROF. JAMES O. JORDAN, *Chairman*

In view of present conditions it seems inadvisable to your committee to discuss the subject entrusted to its care either at great length or statistically. Rather it appears to be the part of wisdom to attempt to conserve the interests of humanity, as well as that of the milk industry, by submitting a few essential recommendations for consideration. Your committee is aware that some of these topics have been considered previously, but by reason of this fact they are none the less vital. One is of such importance that it should be so emphasized that the sooner it becomes a condition, rather than a proposal, the better it will be for milk consumers, producers and dealers.

These recommendations concerning milk legislation follow:

1st. That milk and cream be subjected to proper pasteurization, except milk and cream which has been produced from animals free from disease, and handled by persons who have had medical examinations, and kept and transported with such safeguards as to prevent contamination with pathogenic organisms.

It is the desire of your committee not to exclude from the above high grades of raw milk, but this step has been taken, despite this view, in the belief that the proposition as thus advanced will meet with more general approval than otherwise.

2d. That there be renewed attempts to adopt uniform requirements for milk production.

The necessity for such agreement is manifest under all circumstances, but is especially emphasized where several communities are dependent upon the same milk shed. Progress has already been made in this direction in the establishment of reciprocal relations for the handling of some

of the dairy problems dealing with the supplies of New York City, Boston, and some New Jersey cities.

3d. That State legislatures be urged to so control the sale of milk that careless producers, after the exclusion of their product from cities or towns, be prohibited from present outlets, where it is condensed or powdered, or converted into butter or cheese.

Frequently under these last named conditions, the slovenly dairyman realizes as much profit as does his more careful competitor, to the discouragement of the latter over the unfair discrimination. Furthermore, with the incentives for better quality and prices lacking, the difficulty of raising production conditions is increased.

4th. The framing and changing of milk regulations dealing with production so as to place emphasis upon the important features, namely, healthy cows, the man, careful milking, washing and sterilization of utensils, and cooling of product.

The welfare of the industry will be enhanced and producers encouraged if less attention is given to non-essentials. The basis of such rules should be common sense; unnecessary features should be eliminated.

5th. Now that the so-called standardization of milk is an engrossing subject, the committee submits for consideration the proposition:

That such efforts meet with opposition unless the proposed laws or rules dealing with this topic call specifically for the labelling of such mixtures, so that the percentages of the products used in their manufacture are clearly stated.

Otherwise it appears that the consumer would not receive the protection and information to which he is entitled. Commercial interests should not outweigh the rights of the final purchaser. If the consumer knows what he is buying, he has the protection which is his due, but he is entitled to all the facts, and it should be the duty of officials dealing with the milk problem to see that he receives them.

6th. That the sale of products made from dried whole milk powder, or from dried skimmed milk powder and sweet butter, or from dried skimmed milk powder and cream, when done under sanitary conditions, and when labelled so that the percentages of the substances used in their manufacture are clearly stated, be permitted. These products, however, should be sold under distinctive names and not as milk or cream.

It is the opinion of the committee, based on statements by eminent authorities, that such products have all the nutritional qualities of fluid milk and cream, as ordinarily sold, and can be produced and handled in the same manner as the natural substances, to the great benefit of both consumer and producer. The consumer is benefited in that the use of such products will largely remove the seasonal variations in the price of milk, and will thus tend to a lower price level and to a more general use, particularly in the more southern regions of the United States. The producer is benefited in that the price of his output is stabilized, and is not as now subject to more or less arbitrary regulations by distributers; that it will enable him, if he so desires to produce practically all his milk during the cheapest seasons of production, and thereby sell the same without complications from the question of a "surplus;" and that it will tend to make a wider market by promoting consumption. The committee further believes that a more general manufacture and use of these products will tend to promote the dairy industry in general, will allow the introduction of supplies that by reason of geographic location are not in position to ship to points where demand for fluid milk exists, and will be substantial elements in the rebuilding of the dairy herds of the United States and of the world.

DISCUSSION

PROFESSOR STOCKING: Is there any objection to calling powdered milk "reconstructed milk"?

PROFESSOR JORDAN: I do not object to the word "milk" provided there is some distinguishing label showing that it is not the fresh product.

DR. REDFIELD, U. S. BUREAU OF CHEMISTRY: The name "milk" may be allowed, provided that some specific name be attached, such as "remade milk."

Do we have any laboratory methods of distinguishing between remade milk and fresh milk?

PROFESSOR JORDAN: It is difficult to detect differences, but it has in many cases been done. The consumers should know the nature of the product.

DR. STATES: I do not believe the powdered milk should be permitted. Producers of powdered milk are not subject to regulations of a sanitary nature.

MR. ARMSTRONG: Some of our powdered milk plants are subject to the same inspection as market milk plants.

Is remade milk as good as fresh milk?

PROFESSOR JORDAN: I think the consensus of opinion is that it is a good product, but hardly the equal of fresh milk.

"You will not correct all of the evils of your generation, but your reasonable, definite, consistent campaign will surely bring some things to pass."

THE MARKET MILK SITUATION IN MINNESOTA

M. J. SMISEK, *State Milk and Dairy Inspector*
St. Paul, Minn.

The inspection of milk and dairies has its friends and its enemies. Its friends are those who see the necessity for good, clean milk, fit to be consumed by a baby or a sick person; those who oppose it are men who are doing now as their forefathers did and are too stubborn to make such changes as are necessary to produce a high-grade product. In certain instances enemies are made by an inefficient inspector who knows less than the dairyman concerning the milk business. The only explanation such an inspector can give to questions asked is, "That's the law."

We have tried the enforcement of laws and we have tried publicity, but the results were so slight that we have centered our efforts on education. The educational side is the one which must not be overlooked. Laws cannot be carried out by persons who do not know what they mean. In fact, the greatest part of the inspector's work should be educational. As our Commissioner, James Sorenson, has often said, "Through education and cooperation great accomplishments can be made." He it was who, through education and cooperation, put Minnesota ahead of all the States in buttermaking. He was the one who called a conference of the Health Departments, and offered to cooperate with any health department in Minnesota to obtain a good, clean milk supply.

The result of this cooperation in our State has been great. Our State Department, in cooperation with the city health departments, established the annual milk contest and the milk exhibition, which have proved very helpful in procuring a clean milk supply.

The first exhibition of milk and cream and contest for prizes was held in connection with the State Fair of 1916, under the direction of the State Dairy and Food Department and in cooperation with the Twin City Health Departments. Since then these contests have been held at the State Fair annually. The first year the Department sent our application blanks to dairies supplying the public with milk and cream, inviting them to prepare four pint bottles of milk and cream and deliver them to the Department for analysis, and we had about forty entries. The milk and cream was scored by experts, who used the Government milk and cream score card and scored on the following points:

Bacteria	35
Flavor and odor	25
Visible dirt	10
Butterfat	10
Solids not fat	10
Acidity	5
Bottle and cap	5
Total	100

The Department sent out prizes and commented on each sample, giving the good and bad points of each. The milk was exhibited for a week during the State Fair, with the name and address of each dairyman who entered the contest.

In the second contest we adopted the same method of prepared samples, but at the same time some of the inspectors took samples off the wagons of the same dairymen who had sent in the prepared samples, so we might compare the milk which was prepared for the contest and that which was sold to the public by the same man.

We found there was a difference, and this year we had a milk and cream contest on two different lines. One

was an "off the wagon" contest in the Twin Cities, and the other was prepared milk and cream from different sections of the State. We like the plan which provides for the milk dealers to compete with milk and cream they deliver to the public.

These contests have proved of great value to the dairymen and milk dealers throughout the State, and much interest is being manifested. This was shown by the large number of entries at our last exhibition, there being more than a hundred.

The educational value of these contests cannot be overestimated. They have proved that milk and cream, produced and handled under sanitary conditions and kept at a low temperature, can be shipped many miles and remain sweet many days.

The contests have also helped to point out to dairymen and dealers the common defects in milk and cream, and we have suggested remedies to overcome the difficulties.

The experience of our Department shows that milk and cream can be scored with reasonable accuracy for flavor and odor, bacteria, chemical composition and keeping quality. A score card has been perfected which is in all respects as fair and accurate as the one used in scoring butter and cheese, for which Minnesota is well known.

"Men are born with two eyes, but with one tongue, in order that they should see twice as much as they say."

CONTROL OF MILK SUPPLIES IN SEVEN SOUTHERN EXTRA-CANTONMENT ZONES

DR. WILLIAM H. PRICE, United States Public Health Service

The advent of this country into the world war found a determination on the part of the authorities at Washington to concentrate on material issues in preparing for it. No country ever entered a war with less of flag waving and sentimentalism.

No issue could be more material than that of protecting the health of troops. Of only slightly less urgency was protection of the health of the civilian population.

Protecting the health of troops, from the administrative standpoint, naturally divided itself into two aspects, i. e., inside and outside camp.

The Army controlled its personnel and their environment inside camp.

It is not humanly possible to restrict soldiers to the limits of camps for more than brief intervals. Leaves and hikes frequently take them into the regions surrounding the camps. The sanitary regulations prevailing inside camps would have been negatived to some extent, and often to great extent, had troops on leave or on hike come in contact with infected persons or things, such as contaminated water or food, or had insanitary conditions outside camps, such as mosquito breeding, been permitted to provide the means for disease transmission inside camps. In all the Southern States Medical Officers in Charge, of the United States Public Health Service, were appointed Deputy State, County and City Health Officers in the areas surrounding cantonments, thus uniting under one responsible head all the public health activities in the area affected. The limits of these areas varied and were often broad; a Medical Officer in Charge at a cantonment might be Deputy Health Officer of two or three States and any number of

counties, cities and villages. Briefly stated, Sanitary Districts without regard to civil boundaries were established about the cantonments.

Control of milk and ice cream supplies was early recognized as one of the important problems of extra-cantonment sanitation, not only because these foods are readily available for troops at restaurants and drug stores in the extra-cantonment area, but because milk and ice cream supplies for Base Hospitals, and Officers' and Nurses' messes, with a few exceptions, are produced and handled in the extra-cantonment areas. Further, it is suspected that troops, though inoculated, are not immune to typhoid fever when the infection is milk-borne. The efficacy of anti-typhoid inoculation is questionable in the presence of a heavy charge of infection; milk, being a good culture medium, once infected is apt to contain a heavy charge. The danger of an outbreak of other milk-borne diseases among troops is, of course, readily apparent in the presence of uncontrolled milk and ice cream supplies.

In attempting control of milk supplies in extra-cantonment areas the Public Health Service requested and received the active cooperation of the well trained and experienced men of the Market Milk Section of the United States Department of Agriculture.

It was my privilege to more or less supervise milk control in seven Southern extra-cantonment areas, and the following remarks refer to attempts at control in those areas.

In attempting milk control it was necessary to see to it that every reasonable possibility of milk becoming the source of an epidemic of communicable disease among troops be removed, that the prohibitions employed should not be such as would eliminate milk from the diet of the civilian population, especially children, and that the dairy industry, which is essential to promotion of the public health, should be assisted and not destroyed. The follow-

ing three paragraphs were adopted as a brief statement of the principles involved and the problem to be solved.

1. Because of the importance of milk as a food, particularly as a necessity for which there is no substitute for the proper nutrition of children, and as a preventive and curative agent for certain diseases of unbalanced diet, maintenance of an adequate milk supply is an imperative consideration for every community.

2. Because of danger of communicable disease transmission incident to uncontrolled milk supplies, adequate safeguards against milk becoming such a transmitting agent are essential to maintenance of milk supplies.

3. Increase in price of milk in common with other necessities is a matter of public concern and leads to consideration of ways by which this increase may be restrained by the introduction of scientific methods of production, handling, safeguarding and distribution. However, maintenance of sufficient supplies, adequately protected against becoming the transmitting agent of communicable diseases takes precedence over price; food values contained considered, the present price of milk is still below prices of other animal product foods, which are no substitutes for milk.

The task, then, was taken to be, to preclude any reasonable possibility of milk or ice cream becoming the source of an epidemic among troops, and to accomplish the same end with that portion of the milk supply intended for civilian consumption in so far as it was possible to accomplish it without inhibiting the greatest production and consumption of which the area was capable. This meant proper pasteurization for supplies intended for troops (in addition to other measures) and proper pasteurization in addition to other measures, in so far as pasteuri-

zation was consistent with maintenance of present and stimulating greater production, for that portion of the supply intended for consumption by civilians.

It may seem that this is a modest program, easy of accomplishment. It will not seem so to you inspectors who are familiar with the difficulties under which the dairy industry has labored during the past two years, with the high prices of feed and labor, and the great difficulty in securing good labor at all. In addition, dairymen had recently been offered high prices for their cattle for slaughter, and for what feed they had in storage. Because of the tendency for producers to become discouraged, to sell their cattle and go out of the milk-producing business, utmost care must be exercised, even in normal times, in inaugurating attempts at milk control. As a result, such attempts have been most successfully undertaken as an evolutionary proposition. In this instance the difficulties were increased, not only because of increased strain on the economic situation, but also because the control for that portion of the supply intended for troops at least, must be arrived at instantly, and by revolution from the methods of milk control heretofore existing at the seven places visited.

The South is not a dairy section, though there is no insurmountable reason why it should not be; in fact there are several reasons why it should equal many of our great dairy States in milk production. At none of the places visited did milk consumption, previous to the arrival of troops, exceed .25 pints per person per day. Low consumption was due to various economic conditions, presence of the cattle tick which seemed to prohibit introduction of large milk producers from the North, and lack of understanding of the food value of milk and of modern methods of dairy farm and city milk plant management. In this situation it was primarily necessary to protect troops against milk-borne infection; it was only slightly less

necessary not to deprive the civilian population of their just requirements in the matter of market milk, nor to interfere with the prospects of increasing that supply both for present consumption, for preventing and curing pellagra and upbuilding agriculture in the South during the reconstruction period after the war.

With a few notable exceptions, very little control was found to have been exercised over the milk supply in the places visited. At most places efforts at control had been limited to attempts to eradicate bovine tuberculosis, in which marked progress has been made. In other respects the equipment and methods of milk production, handling, and pasteurizing were largely left to the personal inclination of the producers and dealers involved. Methods of cooling, sterilizing and pasteurizing especially left much to be desired. At practically no place was a time and temperature recorder found to be in operation on the arrival of Public Health Service Officers. Typhoid fever prevalence was found to be high in all milk producing areas.

The arrival of troops promptly aggravated the situation so far as quantity of milk supply was concerned. Base Hospitals, Officers' and Nurses' messes, restaurants, drug stores and ice cream factories practically swept family retail milk off the market, and the supplying of sufficient milk to meet the imperative necessities of the civilian population became an integral part of the program for milk control.

The use of the Department of Agriculture score card for dairy farms was given consideration as a means for improving conditions surrounding milk production and of the quality of the final product. It is agreed by those having most experience with the problem of improving quality of market milk, especially if that experience has been gained in several localities, that the official score card, as it stands, is of great importance in improving milk quality and in providing a basis of understanding between

producers and the authorities when the system can be extended over a period of years. This statement is made in full knowledge of theories adverse to the use of the score card either in part or as a whole. In this instance the necessity for speed precluded the logical use of the card, and efforts to improve quality in production were centered largely on methods, small-top pails, clean udders, sterilized utensils, cooling and speed in handling. As an encouragement to greater production no opportunity was overlooked to advocate use of pure bred sire, weighing each cow's milk, balancing rations, raising feed and utilizing manure. These latter considerations may seem to be foreign to a program for milk control, but actual experience may be depended on to dispel such a view. The old system of milk control has passed and will never return. Milk inspection in the present and future will consist in a reorganization of this fundamental industry on a basis of economy and efficiency wherein the interests of the producer will be given equal and definite place with those of the consumer. It is not difficult, in almost any locality, to demonstrate the existence of readily correctable errors in the economics and efficiency of milk production that are of benefit to no one and add increased cost to the final product. It is no prophecy to say that the successful milk inspector of the future will be he who can demonstrate methods of economy for the benefit of producers and dealers, and not he whose equipment consists almost exclusively of theoretic considerations and laboratory technique from which the viewpoint of the producer and dealer are excluded.

None but pasteurized milk and ice cream was permitted to enter into the diet of troops and means were found or developed to pasteurize that portion of the supply at all places visited. Also, a program was laid out for either a gradual trend toward or summary transference to 100% pasteurization for that portion of the supply consumed by

civilians as soon as equipment for that purpose becomes available. Time and temperature recorders, to insure heating to 145° F. and holding for 30 minutes, were required to be installed on all these pasteurizers, and these recorders were checked with a test thermometer furnished by the Hygienic Laboratory at Washington. Some of the recorders were found to require from 5 to 20 degree adjustments. Numerous opportunities were found to institute reforms with respect to time of heating, use of ice in cooling, and speed of handling through the plant and in delivery which were of direct benefit to the dealer, or ultimate benefit to the consumer, and therefore of assistance to the inspector by securing more enthusiastic cooperation of both those parties.

It is impossible in the brief space of this talk to report details of methods employed at all these camps; they naturally varied at each place visited. At Raleigh, N. C., Dr. Koonce, the City Meat and Milk Inspector, and Mr. Reed, of the Extension Division of the United States Department of Agriculture, were able to secure the use of an abandoned pasteurizing equipment at the State Agricultural College, thereby opening the possibility of providing pasteurized milk, which previously was not available in Raleigh, for troops and of securing shipped-in milk to supplement the local supply which was rapidly being exhausted. At Little Rock, Ark., Dr. Punteney, of the United States Public Health Service, was able to greatly increase the amount of milk production at several of his shipping stations by the introduction of large milk producers from the North following the eradication of the cattle tick in that section, and to secure the installation of a dairy at Camp Pike which is supplying milk of a quality equal to certified to the Base Hospital at costs so low as to provide a valuable demonstration to that State with respect to advantages of modern dairy farm management.

At Anniston, Ala., the dairymen raised $32,000 to con-

struct, equip and operate a single central pasteurizing and ice cream manufacturing plant that will not only safeguard the present available supply but should also stimulate increased production and consumption in that vicinity by providing marketing facilities for both producers and consumers. This plant is of interest because it eliminates the middleman, or merges his functions with those of the producer; in other words it brings the producer and consumer face to face without the interposition of a third party in the form of a dealer. Pending the completion of this new plant the local ice cream establishment gave precedence to the milk supply intended for troops through their pasteurizer. Their own product was pasteurized thereafter.

Laboratory control was, of course, attempted at all places visited. While laboratory assistance is fundamental to any modern program for milk control, certain practical considerations prevented chief dependence being placed upon it in this effort for a quick transition from an uncontrolled to a controlled milk supply.

In so far as I know no ulterior effects were traced to the milk supply in any of these Southern camps after the system outlined above had been installed. Previous to its installation very serious results in the form of an outbreak of typhoid fever had occurred at one of the camps. Also, so far as I know, the milk supply available in these areas has increased as a result of the activities of the United States Public Health Service rather than diminished. The price of milk has increased, but not out of proportion to increased costs for feed and labor nor to increase in milk prices elsewhere.

DISCUSSION

DR. PUNTENEY. When the United States took control, there was but little milk, and that was excluded from the camp. Dr. Price made a survey. The average bacteria count was 8,000,000 per c. c. We arranged for two

deliveries daily, and for two trucks that took the place of nine teams. We installed sanitary privies. Vaccinated employees against typhoid. Cows were tuberculin tested. Used damp cloth for cleaning udders. The average bacteria count was reduced to 400,000. All milk is now pasteurized except that produced by the camp hospital dairy, where the counts run from about 3,000 to 12,000. Employees examined every two weeks for pathogenic disease organisms.

The bacterial counts in ice cream used to be about 180,000,000 per c. c. The number of organisms has now been reduced to about 1,200,000.

We found most of the high counts due to contaminated utensils. Milk now supplied to Camp Pike or Little Rock does not contain over about 12,000 bacteria per c. c. In one instance three cases of typhoid resulted from a carrier who packed ice cream in shipping cans.

We have always urged better cows. The average production used to be about seven pounds daily per cow. The average production has now increased to about 1 1-3 gallons daily per cow.

"We accomplish more by prudence than by force."

EXTRACTS FROM THE ADDRESS OF DR. W. A. EVANS

Health Editor, Chicago *Tribune,* Chicago, Ill.

I do not believe introductions are necessary. I have been with you before. I am glad you are here with the A. P. H. A. I hope for a congress of hygiene, each society having to do with their own problem, but meeting jointly for the consideration of all public health problems, thereby ending a multiplicity of organizations and too many meetings.

Ten years ago the Chicago City Council passed the first compulsory pasteurization ordinance of which I have any knowledge. It was hard work to get it and hard to keep. Far be it from me to say anything against the tuberculin testing of cattle, but the time has come to advance a step, and that is compelling pasteurization of milk. No epidemics of milk-borne scarlet fever have been reported since 1907.

Pasteurization preserves milk, but does not fully meet all conditions in milk marketing. The improvement of keeping quality is a minor factor as compared with the prevention of disease.

I do not believe the developments of the past year have warranted the prediction made by Dr. Neff and myself at your meeting of one year ago. Wages increased rapidly in those groups who most need milk.

We judge milk by increase in death rate, by poor nutrition, rickets, and so forth. Milk consumption has fluctuated, and there has been a lack of uniformity in the demand which makes it hard to judge. The number of cows and amount of milk is seemingly increasing as fast as the population. There is a shortage at times, due to demand for export milk for Belgium, Northern France, Great Britain and even Denmark and Holland. Due to higher priced feed, European demand will increase during the year and will probably continue for several years. The French people have a new appetite for cheese, and the

other products—cheese, curd, powder, butter—will increase for several years.

We need more milk here. Dr. McCollum's research work has not been disproven. He says milk is a necessity. If his argument holds good, then milk is a necessary food for children. The child and the community must have milk, and adults as well must under certain conditions have milk.

The producers of milk for Chicago in 1907 asked about $1.12 per cwt., or about 3.28 cents per quart. The milk producers for Chicago asked for milk in 1918, $3.77 per cwt., or about 8.1 cents per quart. Most of this increase has been asked for during the past eighteen months. Consumers pay 14 cents per quart now. The distributer obtains from 5 to 6 cents per quart for his share of the retail price. There has been no decrease in the number of cows in the last eighteen months.

We would be benefited by a larger milk consumption. The use of milk would increase if the price was lower. The farmers have applied the principle of unionism in the milk business. Having tasted, and liked the taste, he will probably stay in the game. The farmer probably will not decrease his price. What chance have we to keep the farmer satisfied? The only hope is for the adoption of some method of marketing milk that will lessen the cost. The farmers can keep better cows and produce more cheaply. Dried and condensed milk are to be seriously considered in this connection. If Henry Ford's type of mind could be applied for the getting of results, we could at a lesser price go far to solve the problem. The man who delivers milk on one side of the street should deliver it on the other side, to avoid duplication and crossing of routes.

Condensed milk is not best for a child, or the economical food for a child. From the standpoint of infant welfare there is no better product than fresh liquid milk.

SUPPLY OF MILK FOR ARMY CANTONMENTS

J. H. Sasseen, Columbus, Ohio

At the organization of Camp Sherman, Chillicothe, Ohio, September 1, 1917, the military officials began looking for a source of milk for its 60,000 athletes in training.

Owing to lack of laboratory facilities no examinations for the purity of the milk were made until February 1, 1918. At this time about nine dairies, or milk dealers, were selling milk in the Camp. The results were startling. One dealer's milk showed a bacterial count under 500,000 per c. c. The highest bacterial count was 4,700,000 per c. c.

An immediate general inspection took place within twenty-four hours, and the following orders were issued: That no milk be delivered or sold in the Camp except from one designated milk dealer with proper credentials allowing him to make sales inside the Camp. The reasons for cutting to one source of supply were:

1. One inspection for the day's supply.
2. Responsibility for purity with one firm.
3. Sources of contamination lessened.
4. Able to survey and control conditions with efficiency.

The contract was given to a Columbus, Ohio, firm, making necessary the transportation of milk a distance of fifty miles. While the firm's facilities for handling such a supply were not adequate, they were ready to make such changes as were required by the Division Surgeon of the Camp.

The following daily record was made out and mailed to the Division Surgeon's headquarters:

Temperature of milk received.
Acidity of milk received.
Bacteria in milk received.
Temperature pasteurized.
Time held.
Temperature cooled.

Bacteria.
Butterfat.
Storage.
Time of shipment.

There were five inspections of the milk supply:

1. The milk company's field man.
2. Efficient laboratories.
3. City official inspection of producers with official permits.
4. City official inspection of milk plant.
5. Military inspection with the aid of efficient laboratories.

With this chain of inspection in existence, any discrepancy was noticed at once. On or about March 10, 1918, an epidemic of streptococcic sore throat broke out in the cantonment. An immediate triple inspection was made of the milk supply, but the conclusions reached were that the milk supply could not be responsible for the epidemic.

The Medical Staff congratulated the Major in charge on his recent action confining the source of milk supply to one firm, and no doubt it is the proper policy for cities to pursue to have fewer but more competent and efficient milk plants under better control. If it worked for a Government cantonment, it would be proper and efficient for city governments or authorities to adopt such measures for the benefit of the consuming multitudes in our cities.

The bacterial analysis was published daily in the Camp Bulletin for the attention of officers in charge of mess halls. This bacterial analysis was the reliable indication of quality. In fact the bacterial standards required were lower than those of our cities, namely, 10,000 per c. c. Butterfat was a secondary consideration, although they demanded not less than 3.5 per cent

While there were no requirements for the soldiers to use fresh milk, the officials believed in providing and

recommended liberal use of it, and officers in charge did not hesitate to advise the use of more fresh milk in preference to the condensed product. Of course, fresh milk is practically impossible in the trenches, but at training camps where the health and sturdiness of the soldiers are always paramount factors, mess sergeants were requested to use fresh milk *freely*.

The milk was shipped to the Camp in iced cars and taken in charge by a lieutenant who saw that every can was properly sealed, the samples for laboratory analysis being taken at the various mess halls, and no mess sergeant was allowed to receive a can of milk with a broken seal. The mess halls were arranged on a self-serve basis; therefore a khaki-clad soldier filled his comrade's cup with milk as he passed by for his eats. Some mess sergeants issued fresh milk daily, and some would change to ice cream and buttermilk, of which a vast amount was consumed.

As a conclusion of my work with the military officials, I am convinced that a higher plane of efficiency can be reached and maintained in the milk business.

Now that the military inspection has demonstrated that they can get immediate action without any parleys, we should have more uniform and efficient regulations and enforce them on a prompt educational but rigid basis.

"Peace hath her victories no less renowned than war."

MARKET MILK CONDITIONS IN IOWA

DR. O. P. THOMPSON, *State Dairy Inspector*
Waterloo, Iowa

The family cow supplies the major part of the milk in the towns and villages of Iowa, as the inhabitants of these are made up largely of retired farmers who bring with them from their farms their favorite cow, which supplies themselves, as well as several of their neighbors, with milk.

In towns of three to five thousand inhabitants this milk supply is supplemented by dealers who are producers as well, buying but little milk, if any.

In the larger towns of 10,000 or more we have, in addition to these large commercial plants. This milk is purchased from farmers who are grain and stock raisers as well, and to whom the production of milk is but one branch of their farming operations. They raise grain and sell it as such or feed it to steers or hogs, or to the dairy cow, whichever one appears to them most profitable at the particular time. In other words, they follow diversified farming and the production of milk is merely a side line with the majority of them.

Under our laws we have no control over the family cow or milk sold from her, provided it is not sold from a store or vehicle.

The dealer who is also the producer of the milk he sells, having complete control over the cow, her feed and care, as well as the care of the milk in all its stages, if a man of intelligence and naturally cleanly, can and does produce the best grade of milk.

The larger commercial plants practiced pasteurization originally to prevent the souring of their product, but are now coming to appreciate the fact that merely heating milk, regardless of temperature and time, is not pasteuri-

zation and that efficient pasteurization not only retards the souring of milk but makes it a safe food.

The market milk situation during the past two years has presented many new problems which were given very little consideration during the pre-war years. Common with all articles of food, food for man and feed for domestic animals, the market price of milk has climbed steadily upward.

This increase in price, however, has not stimulated increased production owing to the fact that the price of a cow's feed has advanced more than has the price of her products, and farm labor is scarce and demands higher wages. Cows are also selling for such a high price for beef that many farmer-dairymen are of the opinion that they can make more money selling their surplus cows for beef and selling their grains, hay and roughage on the open market than they can by feeding these products to the cow and selling her output. In the language of another: "Acres of dairy cows continue to pursue their pathetic paths towards the shambles." The State Dairy and Food Commissioner's report, now in the printer's hands, will show that for the year ending July 1, 1918, Iowa produced 10,920,376 lbs. less creamery butter than the previous year, and 12,086,393 lbs. less than average make of the preceding ten years, and the Minnesota report shows a like shortage.

Practically all Iowa cities have experienced a shortage of milk during the past two years; and while these shortages have in most cases been temporary, the distributers have been compelled to purchase milk in a new territory or buy it in competition with those willing to pay a high price. This situation has not only increased the original cost of milk to the distributer, but there has been added an increased buying expense and greater transportation charges to bring the milk from newer and more remote districts.

In 1916 we inaugurated a change in our Market Milk Contest at the Dairy Cattle Congress at Waterloo, and continued the same in 1917. This differed materially from former contests in that the dealers were not asked to submit samples, but samples of milk were secured from wagons by our local inspectors in their respective cities, and forwarded to the State laboratory at Des Moines for official scoring and exhibition at that show, thus securing a representative sample of the milk offered for sale.

It is gratifying to us to note that the average score of all these samples for 1917 was about 3.65 points higher than were the averages for the year 1916. It is also a noticeable fact that the higher average scores by cities and the highest increased scores over previous years were found in those cities having milk inspectors who devote their entire time to inspection and are paid adequate salaries. We were obliged to discontinue this contest this year owing to the poor services rendered by the express companies at this time.

The department this year has not found any dairy situation needing correction that it could not handle under the present Dairy and Sanitary Laws. The Iowa Dairy Law has been enforced by the Dairy and Food Commissioner since 1892 and in its present amended condition seems to meet the emergencies as they arise. The basic principle of our law is that the State rather than the municipal authorities should set standards for the purity of market milk. This feature of the law is proving itself more valuable each year.

The milk supply of our cities has been showing a gradual improvement, particularly the product of the larger city milk plant. Several modern city plants have been put in operation this year and there has been the normal amount of improvement of older plants. There has not been a single outbreak of any disease in any of our cities which has been attributed to the milk supply. The loca-

tion of one of the largest army cantonments at Des Moines has been a tax on the already short supply of milk in the vicinity. The Department is cooperating with the Federal Public Health officials in the inspection of the cantonment supply and the dairies supplying it, and the supply now seems ample.

DISCUSSION

DR. MALONEY: Let us encourage the production and use of a lot of milk, and especially encourage the return to the dairy industry of those feeds that for the time being have been diverted to other purposes.

DR. THOMPSON: The real trouble is with the labor situation. There are many farms where the help prospects have prevented production.

"The dairy inspector will come into his fullest usefulness when he teaches the farmers in his community to produce better milk and at less cost."

OBSERVATIONS ON THE PASTEURIZATION AND SUBSEQUENT HANDLING OF MILK IN CITY MILK PLANTS

RUSSELL S. SMITH, *Milk Specialist,* United States Department of Agriculture

The business of handling and distributing milk in cities has reached a point of considerable importance. It is a business which must be considered as an "essential business" and of equal or greater concern to the general welfare of the community than the questions of other food, clothing, housing, water supply and waste disposal.

Importance is placed upon this business because of the fact that milk is an essential food. It is a cheap source of animal protein and fat in a form which is practically 100 per cent digestible. The health of the community may become vitally concerned if the proper attention is not given to the question of safe production and handling of milk.

From the point of view of many health officials who are apparently well informed on the subject, the pasteurization of all milk has been advocated as a solution of the many dangers that are liable to come from using raw milk.

It has been found, however, that the requirement of pasteurization alone does not solve the problem, but that inspection developed to its highest practical degree, followed by proper pasteurization, brings the best results.

In other words, the pasteurization process was never intended to be used or advocated as a remedy for unclean or slack production under unsanitary conditions, but rather to eliminate certain risks which cannot be eliminated in any other way, after the supply has been brought to a point of reasonable safety by inspection and education.

Within the last few years a large proportion of the

milk supply in American cities has been sold as pasteurized milk, and it seems reasonable to assume that the sale of this milk will continually increase.

"The greatest feature of the process of pasteurization, *properly performed,* is that while no valid objections can be raised against the process, it causes an additional degree of safety in milk produced and handled even under the most effective system of inspection."*

Doubtless it is the desire of every owner of a pasteurizing device to secure as high a degree of efficiency from the process as is possible, and this paper has been prepared for the purpose of reviewing some of the observations that have been made on attempts to perform the process and the subsequent handling of milk.

It must be understood that mere presence of the pasteurizing apparatus in the milk plant and the running of the milk through such apparatus without special attention to temperature and time and without proper cooling and storage under direct supervision by the manager or some other properly informed person does not secure desired results. The process will not perform itself, nor can it be left to inexperienced help who lack interest and knowledge of the functions of the process. Pasteurization calls for supervision and control. In most of our cities there is a great lack of this proper control and supervision by inspectors and health officers. It may be that inspectors and health officers need to be enlightened as to how to carry on the proper supervision and control in order that they might in turn enlighten some milk plant owner who wishes to do what is proper. There seems to be a growing tendency on the part of health officials to leave the supervision and control to the pasteurizing plant itself and to measure its efficiency by the bacteria count of the milk when delivered to the public.

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*United States Department of Agriculture Bulletin 342.

The failure of some plants to come within the city requirements for bacteria count is no reason for condemning the process of pasteurization. It is in just such cases where the inspector should step in and help rather than criticize. A little education will often produce marked improvement, and the dealer would be able to meet the city regulations.

This supervision and control of pasteurizing in milk plants can best be accomplished by trained men who have authority to carry on bacteriological control of the process. This control should be based only on accurate data which is current with the existing process. Because health departments have not interested themselves more deeply in this subject of control and assistance, we find quite a few milk plants depending on private laboratories established for this purpose at some expense. Samples to these laboratories sometimes come from some distance and accurate tests are usually not possible. Such results usually tell of the difference between the raw milk entering the plant and the pasteurized milk after it is bottled, and the number of samples tested for this information is usually limited.

It seems to be the custom to expect a bacterial reduction of 99 per cent during pasteurization. This may be accomplished in some instances, but the efficiency of the process cannot be based on the per cent of bacteria destroyed. The condition of the product when it is actually used is essential.

"Often 99 per cent of the bacteria may be destroyed and yet the milk may still contain hundreds of thousands, while in other cases in which it contains only tens of thousands the per cent of reduction may have been only 80 to 90."*

Because of the fact that not all the bacteria are

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*United States Department of Agriculture Bulletin 342.

destroyed by pasteurization, the milk is therefore not sterile. It is still a perishable product and it must be handled or stored and used with the same precautions as raw milk. This point is too often lost sight of by all who have to do with pasteurized milk, and for the protection of all concerned the proper labeling of the container with the date of pasteurization has proved to be best in increasing trade and satisfying consumers.

Pasteurization adds expense, and from a strictly business point of view it is difficult to understand why after the process has been properly performed any manager will allow the results to become void because of some subsequent operation which causes inoculation of the milk.

It is likewise difficult to understand just why the milk is allowed to pass through the pasteurizing apparatus under no supervision or control, expecting the apparatus to do the work by itself.

Cases which illustrate these points are not difficult to find. It is not because there is anything at fault with the process of pasteurization as it should be done, but rather that the process has merely been attempted and in reality no favorable results were obtained.

To illustrate an instance where inoculation has occurred after the process has been performed and where the milk has not been properly cooled, the following table is given showing actual tests at a large milk plant:

TABLE I

Pasteurization Tests

Raw				Heated			Held			Cooler			Bottled	
Date	Place Received	Temp.	Count	Place	Temp.	Count	Time	Temp.	Count	Place	Temp.	Count	Temp.	Count
June 6	Vat	71°	682,000	Holder	143°	83,000	30 min.	145°	2,000	Bottler	60°	1,000	63°	13,600
June 8	Vat	72	942,000	Holder	143	105,000	30 min.	144	4,600	Bottler	60	3,850	66	11,400
June 8	Vat	72	975,000	Holder	143	86,000	30 min.	144	6,000	Bottler	60	2,400	64	9,600
June 13	Vat	72	145,000	Holder	142	30,000	30 min.	144	1,070	Bottler	48	1,040	60	2,000
June 13	Vat	72	265,000	Holder	142	30,000	30 min.	144	2,600	Bottler	48	1,540	56	3,000
June 15	Vat	70	572,000	Holder	142	71,000	30 min.	143	4,200	Bottler	50	3,500	58	2,800
								143	3,700	Bottler	50	4,400	58	2,300
June 18	Vat	68	381,000	Holder	142	39,100	30 min.	144	500	Bottler	59	300	54	800
June 18	Vat	68	278,000	Holder	142	41,400	30 min.	144	500	Bottler	59	300	54	800
		Av. 70.6°	Av. 530,000		Av. 142.4°	Av. 60,700		Av. 144°	Av. 3,146		Av. 56°	Av. 2,038	Av. 59°	Av. 5,744
											Reduction 99.6%		Reduction 99%	

It will be noted that the reduction in bacteria count after the milk is cooled is 99.6 per cent, and that it is 99 per cent after it is bottled. Without further comment such a reduction would seem to indicate that the pasteurizing was being done very efficiently, but let us study the facts closer.

Having gained a reduction of 99.6 per cent, it would seem to have been the best policy to have maintained that degree, but this was not done. The loss of .6 per cent does not seem to be significant, but in reality it means that the average bacteria count was increased from 2,038 to 5,144, or 152 per cent during the bottling process.

The temperature of the milk increased from 56 per cent to 59 per cent during this process, which shows that there was but little if any attempt to maintain the degree of reduction gained by the process itself.

An examination of the empty cans and bottles at this milk plant showed them to be practically sterile, and the conclusion was drawn that the bottling machine constituted the source of inoculation after the cooling and prior to bottling. This was confirmed when sterile water was run through the valves in a bottling machine and bacteria counts made on the water thus collected, with the following results:

Bacteria Count of Water.

Valve 1	336,000,000
Valve 2	126,000,000
Valve 3	216,000,000
Valve 4	165,000,000
Average	210,750,000

The estimate inoculation per 1 c. c. of milk when 10 gallons are in the bottling machine would be:

Valve 1	8,400
Valve 2	3,150
Valve 3	5,400
Valve 4	4,125
Average	5,269

With these facts known it is not difficult to understand why there occurred an increase in bacteria count after milk passed through the bottling machine.

To illustrate another instance when the milk was allowed to pass through unsterilized apparatus after the heating and holding for 30 minutes at temperatures varying from 136° F., to 148°, or an average of 140° F. This instance shows what usually happens when there is an absence of temperature record control.

The table shows that while a reduction of 97.8 per cent has been secured by the heating process, there is an increase in bacteria count of 6 per cent after the milk has passed over the cooler; of 30 per cent more from cooler to bottler; of 33.5 per cent more from bottler to the bottle; and of 335.7 per cent more after the milk has been stored for 24 hours before delivery.

From after the heating process until the milk is bottled there was increase in bacteria count of 84.6 per cent. The increase in bacteria count from after the heating process until the milk was delivered was 704.2 per cent.

After the milk had been cooled the temperature was allowed to rise 8° F. Assuming that 300 gallons of milk passed over the cooler and afterwards the temperature increased 8 degrees, the loss in terms of ice at 15 cents per cwt. would be 120 pounds, or 18 cents for the entire amount, or 2-5 of a pound per gallon. This represents actual loss, and when multiplied by the repetition of the same process for the 14 days under observation the loss becomes $2.52. This would be further increased with the frequency of the process.

TABLE II

Days	Averages of Samples	—Raw Milk—		——— Held ———		
		Temp.	Count	Time	Temp.	Count
14	210	73°	970,000	30 min.	140°	20,475
						Reduction 97.8%

——— Cooled ———			
—Off cooler—		—Into bottler—	
Temp.	Count	Temp.	Count
44°	21,750	47°	28,305
	Reduction 97.7%		Reduction 97%

—— Bottled ——		—Stored 24 hrs.—	
Temp.	Count	Temp.	Count
52°	37,800	52°	164,710
	Reduction 96.1%		Reduction 83.2%

	Temp.	Bacteria Count	Per Cent Bacteria Increase
Average increase off cooler.....	....	1,275	6.0
Increase cooler to bottler	3°	6,555	30.0
Increase bottler to bottle.....	5°	9.495	33.5
Increased bottled to 24 hrs. old	..	126,910	335.7
Total increase pasteurizer to bottle....	8°	17,325	84.6
Total increase pasteurizer to delivery...	8°	144,235	704.2

At another milk plant observations were made on the holding of milk after it had been heated, the holding temperature varying from 85° to 130° for 30 minutes, according to the temperature of water in the water jacket surrounding the holding compartments.

The tests were made while the milk was being run through the pasteurizing apparatus by inexperienced men, and it clearly shows the necessity of supervision and control of the process. The milk was cooled in the usual way, but no attention was given to the temperature at which the milk was held for 30 minutes.

TABLE III

Special tests showing heating and holding milk at different temperatures and cooling in the usual way under actual commercial conditions.

Raw Milk

Before clarifying — Temp.	Count	After clarifying — Temp.	Count
42°	33,000	90°	35,300
42°	42,000	90°	32,000
40°	24,000	110°	29,600
40°	.....	110°	29,400
Av.	Av.	Av.	Av.
41.6°	33,000	100°	31,575

Heated — Temp.	Time	Count	Cooled — Temp.	Count First over
85°	30 min.	33,400	40°	142,000
...	.....	.....	40°	140,000
		5.7% increase		346% increase
100°	30 min.	33,700	40°	31,300
100°	30 min.	54,400	40°	31,300
		39.4% increase		.8% reduction
110°	30 min.	19,400	40°	24,600
110°	30 min.	17,000	40°	.....
		42.2% reduction		22.1% reduction
115°	30 min.	13,100	38°	17,200
115°	30 min.	12,600	..	.....
		59% reduction		45.5% reduction
130°	30 min.	9,400	38°	12,000
130°	30 min.	9,400	..	.....
		70.2% reduction		62% reduction

Bottle or Can — Place	Temp.	Count	Stored 24 hrs. — Place	Temp.	Count
....	..	.....	....	..	.....
....	..	.....	....	..	.....
Pint	48°	32,500	Pint	44°	265,000
Pint	48°	36,200	Pint	44°	297,000
					789% increase
Pint	48°	32,200	Pint	44°	162,000
Pint	49°	43,200	Pint	44°	314,000
		19.4% increase			654% increase

Bottle or Can			Stored 24 hrs.		
Pint	48°	31,200	Pint	44°	175,000
....	..	.....	....	..	.....
		1.2% reduction			454% increase
Pint	50°	38,200	Pint	44°	198,000
....	..	.....	....	..	.....
		21% increase			527% increase

The table shows that after heating raw milk having a bacteria count of 31,575 and holding it for 30 minutes at 85°, there was an increase of 5.7 per cent in the bacteria count. This milk was passed over a cooler, it being the first milk over, and the bacteria count was increased 346 per cent over what the raw milk had been.

Heating the raw milk and holding it at 100° F. for 30 minutes resulted in an increase in bacteria count of 39.4 per cent, and after it was stored at 44° for 24 hours the increase in bacteria count over the raw milk was 789 per cent.

Heating the raw milk and holding it at 110° for 30 minutes resulted in a 42.2 per cent reduction in bacteria count, but when stored for 24 hours at 44° F. there was an increase of 654 per cent over the original count of the raw milk.

Heating the raw milk and holding it at 115° for 30 minutes resulted in a 59 per cent reduction in bacteria count, but after storing at 44° for 24 hours there was an increase of 454 per cent over the original count of the raw milk.

Heating the raw milk and holding it at 130° F. for 30 minutes resulted in a 70.2 per cent reduction, but after storing for 24 hours at 44 degrees there was an increase of 527 per cent over the bacteria count of the raw milk.

The conclusions that can be drawn from these tests are convincing and they prove that the process of pasteurization must not be left to novices but rather to experienced operators who have knowledge of the objects of the process and the correct way to secure and maintain results.

At this same plant a series of tests were made when the heating process was under control, but inoculation from some source occurred after the heating.

TABLE IV

Days	Averages of Samples	Raw Milk — Before clarifying Temp.	Count	After clarifying Temp.	Count
5	128	45.7°	54,074	84°	152,375

Heated Temp.	Time	Count	Cooled Temp.	Count
145°	30 min.	6,240	45.2°	8,452
	96% reduction		94.4% reduction	

—Bottle or Can— Temp.	Count	—Stored 24 hrs.— Temp.	Count
51°	15,592	42.2°	24,386
89.7% reduction		83% reduction	

	Temp.	Bacteria Count	Per Cent Bacteria Increase
Increase off cooler	....	2,212	35.4
Increase cooler to bottler.....	5.8°	7,140	83.4
Bottled to 24 hours old.....	8.8° (dec.)	8,894	57.0
Total increase pasteurizer to bottler..	5.8°	9,352	149.8
Total increase pasteurizer to delivery.	3.0° (dc.)	18,146	290.8

Inoculation of milk after it has been pasteurized is one of the most important problems of the present day milk problem. It has been pointed out that the failure to properly wash and sterilize milk cans causes them to become a serious source of contamination.*

CONTAMINATION OF MILK CANS

Supplementing these studies the writer has conducted similar tests at 21 milk plants located in different sections of the country. Those studies, however, were concerned

*Observations on the Washing of Milk Cans. R. O. Webster and R. S. Smith. Int. Assn. of Dairy & Milk Inspectors, Report 1917, pp. 54-56.

with freshly washed cans which were to be filled with pasteurized milk for the trade. To determine the initial inoculation which would be given to milk placed in the cans the same technic was employed, namely, rinsing the can with 300 to 500 c. c. of sterile water, drawing off some of the rinse water from each can and making a bacteriological examination of it. By running high dilutions on the sample of rinse water the total bacteria count of the can may be computed. The result is then divided by the capacity of the can in cubic centimeters, the final result being the estimated initial inoculation given by the can to 1 c. c. of milk. This will be the initial inoculation of bacteria which will develop under favorable conditions either in the milk or in the can itself.

It is therefore important to reduce this initial inoculation to the minimum. In the examination of 236 milk cans under all conditions of washing and steaming, the initial inoculation when ready for filling was found to vary between zero and 7,920,000 bacteria. The following table shows to some extent why can washing in different pasteurizing plants plays an important role in the condition of the milk after it has been pasteurized, it being understood that initial inoculation is noted and not the growth in the milk as a result of the initial inoculation of bacteria.

TYPICAL RESULTS OF EXAMINATION OF FRESHLY WASHED MILK CANS

Initial	inoculation	of	30	cans	varied	from	30	to	162	Average 82
Initial	inoculation	of	4	cans	varied	from	23	to	945	Average 264
Initial	inoculation	of	10	cans	varied	from	2	to	120	Average 42.6
Initial	inoculation	of	3	cans	varied	from	1	to	48	Average 17.6
Initial	inoculation	of	39	cans	varied	from	37	to	2250	Average 684
Initial	inoculation	of	10	cans	varied	from	2.7	to	100	Average 38.2
Initial	inoculation	of	10	cans	varied	from	18	to	16	Average 5.2
Initial	inoculation	of	24	cans	varied	from	1.1	to	75	Average 41
Initial	inoculation	of	25	cans	varied	from	.2	to	562	Average 52.8
Initial	inoculation	of	6	cans	varied	from	60	to	360	Average 168.3
Initial	inoculation	of	19	cans	varied	from	12	to	840	Average 207

Cans placed over steam jet.....	10 cans varied from	52	to 675..	Average 206 6
After new can steamer was installed	9 cans varied from	1.5	to 441..	Average 97.3

Difference of 53%.

Clean water and steam jet	5 cans varied from	80	to 2,750..	Average 1,010
Two other days	13 cans varied from	500,000	to 7,920,000	
Dirty water and steam jet; no drainage	6 cans varied from	1,200,000	to 5,490,000	2,277,900

It is interesting to note that gas formers were found to be present in the drain water from all of the 13 cans examined at one plant on one day, and in 3 of the 6 cans examined on the other day, and that the presence of gas formers in the milk was in part attributed to this source.

Too much emphasis cannot be given to the fact that only thorough washing, steaming and drying produces a sterile container for milk, and that milk should not be allowed in any other than a sterile container at any time, and particularly if the milk has been pasteurized or otherwise heated. Voiding of the process of pasteurization by introducing inoculation factors is poor policy. Not only is the object of the process defeated and the time and cost of apparatus lost, but the condition of the milk may become an actual menace to the health of the community.

EXAMINATION OF MILK BOTTLES

The washing and sterilizing of returned empty milk bottles to a city milk plant constitutes a big problem. Bottles are received in varying conditions of cleanliness and from the many and varied sources of collection, and it becomes somewhat of an accomplishment to make them sterile containers for milk.

Under varying conditions of washing and steaming at different milk plants the initial inoculation which would be given to the milk by the empty bottle was found to vary from zero to 1,636 bacteria per cubic centimeter. A total of 268 empty bottles have been examined by rinsing with 20 to 30 c. c. of sterile water and then making a bacteriologi-

cal determination of the rinse water and dividing the result by the capacity of the bottle in cubic centimeters.

TYPICAL RESULTS OF EXAMINATION OF EMPTY MILK BOTTLES

(Bottles were ready to be filled with milk)

Initial inoculation of	16	pint bottles	varied from	.3	to	1,008	Average	23.5
Initial inoculation of	5	pint bottles	varied from	4.1	to	126	Average	52.1
Initial inoculation of	4	pint bottles	varied from	32.0	to	57	Average	44.4
Initial inoculation of	45	pint bottles	varied from	0.0	to	900	Average	72.3
Initial inoculation of	6	pint bottles	varied from	2.0	to	36	Average	13.6
Initial inoculation of	10	pint bottles	varied from	61.0	to	1,408	Average	392.2
Initial inoculation of	10	pint bottles	varied from	33.0	to	1,130	Average	236.0
Tests at same plant,	12	quarts	varied from	26.0	to	1,636	Average	482.2
Tests at same plant,	22	pints	varied from	28.0	to	245	Average	89.5
Tests at same plant,	12	pints	varied from	55.0	to	228	Average	141.0
Tests at same plant,	10	quarts	varied from	25.0	to	143	Average	82.0

While the inoculation may be deemed small in some instances, it must be emphasized that the tests show the initial inoculation which would be present and this would develop rapidly under favorable conditions in the milk.

It is interesting to note the difference in the result of the different milk plants and the difference in results on pint and quart bottles in the same plants. The amount of drain water in 22 bottles in one plant taken at random from bottles stored without inverting in cases showed a range of from 1 c. c. to 6.2 c. c., with an average of 2.8 c. c. Such bottles stored in a warm room and having drainage present to act as an inoculating agent are hardly suitable final containers for milk, especially if the milk has been pasteurized.

The inoculation from the empty bottle can be reduced to a minimum by thorough washing, steaming and draining, and as this is possible and highly important from a health point of view no other method should be tolerated.

Placing pasteurized milk in a bottle which has not been sterilized just previously lessens the efficiency of the pasteurizing process and helps to defeat its purpose.

EXAMINATION OF MILK BOTTLE CAPS

In the examination of 2,166 milk bottle caps in batches of from 28 to 68 taken from the caps in use at different pasteurizing plants, the initial inoculation per c. c. of milk from the cap was found to range from zero to 453. The surface in contact with the milk is limited to the under side of the cap.

The bacteriological examination of batches of caps washed with sterile water in the laboratory showed a high total count present in some instances, but when divided by the number of caps and by one-half the cap surface, the inoculation to 1 c. c. of milk becomes small.

TYPICAL RESULTS IN THE EXAMINATION OF MILK BOTTLE CAPS

Initial inoculation of—

206 bottle caps varied from .01 to 4. ....Average 1.2
33 bottle caps showed no inoculation.
28 bottle caps showed no inoculation.
41 bottle caps showed no inoculation.
45 bottle caps showed no inoculation.
68 bottle caps showed no inoculation.
33 bottle caps showed no inoculation.
35 bottle caps showed no inoculation.
207 bottle caps varied from 2.3 to 12.8....Average 3.8
84 bottle caps varied from 20.0 to 453.0....Average 5.6

A special study was made at one pasteurizing plant on different days to see if any difference existed between the use of loose advertising bottle caps and the caps used in tubes as they are received.

ADVERTISING CAPS

(Furnished by a local shoe repairing company and used on bottles of pasteurized milk)

Initial inoculation of	50	bottle caps averaged	3.3
Initial inoculation of	70	bottle caps averaged	6.4
Initial inoculation of	80	bottle caps averaged	1.2
Initial inoculation of	56	bottle caps averaged	2.2
Initial inoculation of	52	bottle caps averaged	1.7
Initial inoculation of	34	bottle caps averaged	1.9
Initial inoculation of	52	bottle caps averaged	3.5
Initial inoculation of	394	bottle caps averaged	3.6

BOTTLE CAPS IN CLOSED TUBES

Initial inoculation of	52	bottle caps averaged	.9
Initial inoculation of	62	bottle caps averaged	.08
Initial inoculation of	48	bottle caps averaged	.2
Initial inoculation of	40	bottle caps averaged	.1
Initial inoculation of	40	bottle caps averaged	.1
Initial inoculation of	58	bottle caps averaged	.1
Initial inoculation of	40	bottle caps averaged	.8
Initial inoculation of	340	bottle caps averaged	.4

These tests show that the advertising caps furnished by the shoe repairing company in bulk in open boxes had an initial inoculation of 88.8 per cent greater than the caps in sealed tubes. The fact that the bulk caps had to be nested for use in the capping machine caused a handling that is avoided when tubed caps are used.

While the initial inoculation from milk bottle caps may be small, the importance of handling and storage of the caps, especially in bulk lots, should not be overlooked. Often we find the caps being inserted by hand, a practice that should not be tolerated. While it may not be possible

to measure the result by bacteriological examination, the danger from possible typhoid carriers should serve as a warning against the practice and emphasize the necessity for the utmost precautions.

CONCLUSIONS

The process of pasteurization of milk as it is carried on in many city milk plants should receive more detailed attention.

In many instances only an attempt at the process is being made. This being due to either lack of attention or to the absence of understanding on the part of the operators as to the functions and reasons for the process.

Although the process causes a reduction of bacteria, the per cent of the reduction is not a measure of the efficiency of the process.

If the milk becomes reinfected after the heating and holding process the intent of the process becomes void. Time and temperature control of the process, together with bacteriological tests at different stages and afterwards is necessary if a safe product is to result.

City health officials should not rest assured of a safe product because of the mere presence of a pasteurizing plant in their city. Special attention must be given to the operation of such a plant in view of the fact that it is a chance source of infection to the entire community.

The operation of pasteurizing plants where the indiscriminate heating and handling is carried on as a remedy for poor milk conditions under the guise of pasteurizing should be checked.

Permits for the sale of "pasteurized milk" issued by the Health Department only to such plants as have complete pasteurizing equipment with recording devices and where subsequent handling methods insure a safe product to the consumer will be a step in advance toward solving the problem.

Bacteriological control of the process and of the condition of the subsequent containers and contact surfaces is essential. This examination should not be left to the pasteurizing plant, but should be made frequently by competent officials under the direction of the health officials responsible for the health of the community.

Employees whose duties bring them into contact with the milk after it has been pasteurized either directly or indirectly by contact with surfaces likely to be reached by the milk should be medically examined frequently. All such persons should be given the prophylactic preventive treatment now given by the Army and Navy.

The inoculation of pasteurized milk from improperly washed cans constitutes a problem that has been neglected. Only when a can is properly washed, steamed and dried should it be considered as a sterile and proper container for pasteurized milk.

The inoculation of pasteurized milk from improperly washed bottles makes it possible for the milk plant to become a disseminator of infection from many sources under the protection of the term "pasteurized milk."

Only when bottles are properly washed, steamed and stored should they be considered as containers for pasteurized milk.

The inoculation of pasteurized milk from milk bottle caps is necessarily small because of the limited contact surface, but nevertheless hand capping and the use of caps in bulk lots, especially those bearing advertising not related to the milk business and which are carelessly stored and handled should not be tolerated.

The utmost precaution in the process of pasteurization of milk at proper temperature for the proper time and the elimination of the chances of reinfection or inoculation of the milk from persons and surfaces after the process has been properly performed constitute a vital and ever increasing problem.

It is hoped that some facts have been brought to the attention of owners and operators of pasteurizing plants that will cause them to realize their responsibility. It is also hoped that health officials and milk inspectors may also realize the extent of this current and future problem and that control and enlightenment are essential.

"The call for dairy products is one of the most insistent, universal, and exacting of all the demands of trade."

REPORT OF COMMITTEE ON METHODS OF BACTERIAL ANALYSES OF MILK AND MILK PRODUCTS AND THE INTERPRETATION OF RESULTS

GEORGE B. TAYLOR, *Chairman*

The determination of the bacterial content of milk is the foundation upon which modern sanitary control of the milk supply is built. This foundation must be strong or the whole structure will be weak.

A report giving the bacterial content of samples of milk is important only so far as confidence is held in the methods used or in the person making them.

Quantitative bacteriology is not yet an exact science and the results obtained are of no consequence unless they are comparable. For the results to be comparable it is essential that the methods for routine analysis be identical. It is not only necessary that the methods be identical, but the results of the analyses must be interpreted by means of uniform rules. On account of the increased interest in laboratory work in connection with the control of the milk supply, it is thought that this report can be opportunely devoted to emphasizing the importance of uniform methods of analysis and the interpretation of bacterial results.

In this connection it might be interesting to review the manner by which the Association of Official Agricultural Chemists obtains the official methods for the chemical analysis of agricultural and food products. That association is made up of State and Federal officials who have to do with food, feed and fertilizer control. Practically all the work of the association relates to the study of the analyses of these products. The executive committee is elective with rotation in office. This committee appoints a referee for each class of subjects under investigation. Every member of the Association is expected to do his

share in trying out proposed methods of analysis. For instance, printed forms are sent out to every member. The member indicates the lines along which he prefers to work for the coming year. Each referee then has assigned to him the voluntary workers along the chemical line he represents. Once a year the referee reports to the Association the results of the collaborative work for the preceding year and makes recommendations for adoption, rejection or further study. In case of a favorable report a method becomes "provisional." Another year's study may make this "provisional" method "official," provided no objection has been made. Each official method represents at least two years of careful study. On account of the thoroughness with which chemical methods are tried out and proved before adoption, the work of that society has obtained universal recognition in this country and its methods are in use in foreign countries. Many State fertilizer, feed and food laws contain provisions making the methods of the A. O. A. C. mandatory in those States; and in legal cases along the above lines, the point is usually made that the official methods of analyses were used.

Reverting to bacteriological methods of milk control, the so-called standard methods heretofore put forward have been made by a committee of the laboratory section of the American Public Health Association. The members of that committee are appointive and their number is small. It is believed that the committee is not representative of the bacteriological profession in this country, especially as relates to the bacteriology of milk and milk products.

The reports of the committee have been published as standard bacteriological methods, although the bacteriological profession as a whole has not cooperated in trying out these methods. Further, the average worker along routine bacteriological lines has taken no special interest in these reports and does not feel it incumbent upon him to drop old methods for new ones.

As a result the "standard methods" are not universally used. It is of extreme importance that we have uniformity in methods. These statements are made solely with a view of pointing out conditions generally known. Something should be done. It is possible to use the present standard committee as a nucleus for broader and more general work.

In order, however, to focus the attention of this Association on what we think are needed reforms, we bring forward the following recommendations:

1. That some action be taken for an interchange of views among all organizations dealing with the bacteriological control of the country's milk supply along lines expressed in this report.

2. That in consideration of some action being taken among such organizations, committees be appointed to formulate plans for the working out of standard uniform methods for the bacteriological analysis of milk.

3. That the main idea of such an organization shall be the adoption of standard bacteriological methods for milk analysis, thoroughly and universally tried out, so that all laboratories making official analyses will work along identical lines.

"Science teaches us to seek the truth without prejudice."

REPORT ON QUESTIONNAIRE TO HEALTH OFFICERS CONCERNING CONTROL OF THE MILK SUPPLY

GEORGE B. TAYLOR, *Market Milk Specialist*

Dairy Division, U. S. Department of Agriculture

In this country it is estimated that there are nearly 1,400 cities of over 5,000 population. How many of these cities have no health departments is difficult to say. In the Report of the Committee on Statistics of Milk and Cream Regulations of the Official Dairy Instructors' Association, October, 1916, the following statement is made: "Complete regulations were obtained from 409 of the 694 cities represented in our study; from 62, partially complete regulations were obtained; and 223 cities reported they had no regulations pertaining to the sale of milk and cream. An exceedingly large proportion, or 218 of the cities having no regulations governing the sale of milk and cream were in the group containing from 5,000 to 25,000 population. These cities were located in 45 States, so may be considered representative of the whole country." This report shows also that 511 cities between 5,000 and 25,000 population reported, hence nearly 50 per cent of these cities had no regulations pertaining to the sale of milk and cream.

As one of the most important features of health work is the control of the milk supply, a city which reports no laws governing this may be regarded as showing no real activity along health lines.

In the United States Public Health Reports, volume 32, number 31, there is a "Directory of City Health Officers containing the names and official titles of health officers of cities having a population of 10,000 and over in 1910." In this list are 443 names. Since there were 600 cities

of over 10,000 population in 1910, it may be presumed that 150 of them or 25 per cent had no health departments.

From information at hand it may be roughly estimated that there are 500 cities in this country which have no health departments. Of course a very large percentage of these is in the group of cities between 5,000 and 25,000 population.

In order to obtain information regarding laboratory control of the milk supply and the extent of dairy inspection, a questionnaire, known as Health Officer Letter No. 12 (Appendix A) was sent in April, 1918, to all cities of over 5,000 population.

Five hundred and five replies were received from 481 cities in 46 States, District of Columbia, Hawaii and Porto Rico, including 23 State departments; and the Hawaii Territorial Board of Health. In 6 States all the cities of over 5,000 population reported. In 16 States over 50 per cent of these cities reported; 36 per cent of all cities over 5,000 population reported.

In order to make the information thus received readily available, the replies were all tabulated. In abstracting these reports, special care was taken to avoid mistakes in facts and misinterpretation of opinions expressed.

In tabulating, three general divisions were made:

Health Departments having Laboratories for the Analysis of Milk (Appendix B).

Health Departments having no Laboratories for the Analysis of Milk (Appendix C).

Dairy Inspections, Bacteria Counts, and Opinions of Health Officers or Inspectors, April-May, 1918 (Appendix D).

Relative to health departments possessing laboratories, information was received on cost of equipment, number of laboratory workers, number of samples per year, chemical and bacteriological determinations, age of milk

samples and manner of collection, and dairy inspection and use of the score card. Other interesting data were added under remarks. In this table the analysis of 400,000 samples of milk per year is indicated. Under the heading "Chemical," the following determinations were made: specific gravity, fat, total solids and solids not fat (usually by calculation) and usually preservatives; the refractive index was made in many instances and sometimes other determinations such as sediment, temperature, acidity, protein, refractive index of separated butter fat, ash, ash of serum, freezing point, blood, leucocytes and microscopical examination.

In the report under bacteriological determinations, counts were made usually after an inoculation period of 48 hours at around 37° C., though several laboratories reported a 24-hour period at the above temperature. The temperature varied in only a few instances with such answers as "room temperature," "20" and "25"° for a 48-hour inoculation period. One laboratory reported a 72-hour period at 20° as well as a 48-hour period at 37½°.

Where it comes to the question of colon determination, wide variation exists. A great many laboratories do not make this determination; several did not answer this question, and those which did reported in favor of various methods, using Endo media, lactose bile, lactose broth, dextrose broth, litmus lactose agar, neutral red, eosin, and "standard methods."

Just what is meant by "Standard Methods" for colon determination in milk is not understood as the latest methods of the American Public Health Association for the routine bacteriological analysis of milk do not mention the determination of B. Coli.

Dairy inspection is followed by most of the cities with the exception of the smaller and some of the largest. Some form of score card is in general use.

There are several special features in these reports. It seems that the full time health officer is on the increase and that some towns combine the health activities with a single laboratory, pro-rating the expense on a per capita basis. A great deal of emphasis is placed on the value of milk contests for bettering the milk supply and the publication locally of dairy scores and bacteria counts. One city states that 90 per cent of the milk supply is pasteurized and the rest from tuberculosis-free cattle. A few report compulsory pasteurization. One city states that 60 per cent of the milk supply runs below 10,000 bacteria, but it may also be interesting to note that the average age of the milk when plated is two hours. The Delaware State Board of Health reports a portable kit for bacteriological examination, and the Louisiana State Board of Health has a laboratory car for the analysis of milk and water. A few laboratories report that counts are made by microscope. The United States Public Health Service is equipping laboratories in many of the cantonment zones. One laboratory reports "Laboratory closed temporarily; workers at war." In a great many instances special stress is laid on sediment tests, and cotton discs are sometimes returned to the producer with the report of his product. One method of reporting to the producer the result of the examination is that of the city of Scranton, Pa. One of these reports is herewith given.

"Mr. John Smith:

Dear Sir:

Below you will find the result of a Chemical Analysis of a Sample of Milk sent by you to the Up to Date Dairy of this city.

Temperature	60	too high
Specific Gravity	1.031	
Butter Fat	3.0%	too low
Total Solids	11.60%	too low

Solids Not Fat	8.60%
Water	88.40% too much
Bacteria Per Cubic Centimeter	
Number Leucocytes	
Sediment Test	Very bad.

This sample was obtained on Wednesday, April 5, 1918. Your attention is called to above analysis of your milk. Kindly compare same with legal standards as printed below and comply with them.

The above attached cotton disc shows the amount of dirt contained in one pint of your milk. Some dirt? You can eliminate most of it by using a small top milking pail, and by keeping your cows' flanks and udders clean, especially before milking time. Try it and be convinced. Give us clean milk to drink.

Yours truly,
FOOD AND MILK INSPECTOR.

MINIMUM LEGAL STANDARDS

Temperature, Minimum	50
Specific Gravity	1.029
Butter Fat	3.25 %
Total Solids	12.00 %
Solids Not Fat	8.00 %
Water, Maximum	88.00 %"

Another table (Appendix C) giving cities of over 5,000 population possessing no laboratories is given. Differentiation is made between those cities in which no laboratory work is done and those cities where the work is done by other departments such as State departments, or by institutional or private laboratories which have no direct connection with the health department. In some instances the tone of the replies to the questionnaire would seem to indicate that very little milk inspection or analytical work is done even where it is claimed that this work is done by

outside agencies. In others, it is believed that good work is accomplished. For example, it seems that there is close cooperation between the officials of cities in Connecticut which have no laboratories and the State department. Most of the cities collect samples regularly and forward to the State laboratory, one reporting an average of 300 samples of milk a year sent to the State laboratory. Terre Haute, Ind., reported that 500 samples of milk a year were sent to the State laboratory.

In New Jersey the State inspectors visit small cities, collect samples and make dairy inspections. As dairy inspection as well as analytical work are both important functions in the control of the milk supply, the questionnaire also asked for information regarding dairy inspection. The inspection of dairies is found to be almost universal. Some form of score card is also in general use. In order to obtain the opinions of health departments relative to dairy inspection and bacteria counts, these questions were asked:

"Do you consider farm inspection important enough to be continued?"

"Do you consider bacteria counts important enough to be continued?" (Appendix D)

To the first question, 309 answered "Yes," 14 answered "No," and 182 expressed no opinion. To the second question, 268 answered "Yes," 14 answered "No," and 223 expressed no opinion. From this we may infer that the opinion of dairy and milk control officials is overwhelmingly in favor of both dairy inspection and bacteria counts. More officials expressed opinions in favor of farm inspections probably because farm inspection is more generally in use than bacterial analysis. Some of the points in favor of dairy inspection are here brought out.

"Scoring causes rivalry between firms."

"General cleanliness of farms improved with consequent improvement of milk supply."

"Inspection necessary if dairies supply raw milk."

"Sediment tests show marked improvement."

"Important when used as follow-up work after laboratory analysis."

"Cleaner cottons and decrease in bacteria noticeable just after farm inspection."

"Good milk supply due to dairy farm score."

"A means of finding the cause of high counts and applying the remedy."

"General education of farmer due to inspection."

"Inspections often repeated with special attention to methods most effective means of obtaining milk of good quality."

"Personality of inspector very important."

"Combination laboratory and inspection best."

"Important when made by competent inspectors."

"Important for its prophylactic effect."

"Important in smaller cities in absence of compulsory pasteurization."

"Personal acquaintance with producer obtains good results."

On the other hand objection to dairy inspection is raised because:

"Watching city milk distributers is a police function."

"Not important on a large scale for small city."

"Not important judging from results locally."

"Can be stopped if bacterial work is done properly."

"Not important except where trouble is manifested."

"Not important. Inspection is to be cut down very materially."

"Only as to cleanliness of cattle and barnyard. Score cards not advisable."

"Better control of milk supply through dealers than by routine farm inspection."

"Farm inspection gave practically no results."

"Too much emphasis has been placed on equipment and too little on character of product."

Some opinions in favor of bacteria counts are herewith given:

"Marked improvement in supply since laboratory counts instituted."

"Market milk contest of great assistance."

"Important when milk comes from sanitary dairies."

"Dairymen are interested in their bacteria counts and make an effort to keep them down."

"Examination points out defects which are eliminated by farm inspection."

"Fewer bacteria and less infant mortality."

"Counts reduced from 6,000,000 in 1913 to 89,000 in 1917."

"Laboratory control is point from which to direct inspection."

"Milk handling should be controlled by bacteria count and sediment test."

"Larger dairies anxious to get low bacteria counts."

"Important as a check on dairy inspection and methods for determining the true quality of the product of various sources."

"Milk can be controlled in no other way."

"All important as a clue to careful or careless production."

"Better milk supplies by publishing tests."

"Less sour and dirty milk."

"Improvement here is due to holding periodical contests giving each dairyman and dealer a rating and publishing same."

"Important provided all data relative to collection of samples and conditions of dairies and employees are available."

"Bacteria counts are only half as large since farm

inspection and laboratory control were instituted and results published."

A few officials did not regard bacterial counts as important, for example:

"Bacteria counts are useless unless a prohibitive number of samples are taken."

"They are important possibly in summer but hardly think so in winter." (Extreme Northern State.)

"Not important where pasteurization of milk and sterilization of all utensils are required."

Another interesting point brought out is the increased importance of sediment tests as shown by such statements as these:

"Sediment test is as good a system for obtaining clean milk as bacteria count unless confronted with an epidemic of contagious disease."

"Splendid analytical record is due to constant use of sediment tests, which is mailed to producers with report of complete tests."

The microscope is also used considerably:

"Microscopic examinations of sediment made."

"Microscopical examination of milk is more valuable to a person understanding the importance of the varieties of bacteria than the incubation of quantity only."

It is an important fact that most of the men engaged in milk control work favor strongly both inspection of the source of supply and bacterial examination of the product, regarding these two methods as proper functions of the health department since they both aid and correlate each other.

Of course in answers such as are given here, it is necessary to consider local conditions such as size of city, proximity of producer, climatic influence, and other conditions which have a bearing in the relative importance of specific sanitary methods.

In order to show the extent of work being done in the control of the milk supply according to groups of population, the following table was prepared.

	5,000—25,000			50,000—100,000			100,000—500,000			Over 500,000			25,000—50,000					
	Number	Per cent of whole	Per cent of No. reporting	Number	Per cent of whole	Per cent of No. reporting	Number	Per cent of whole	Per cent of No. reporting	Number	Per cent of whole	Per cent of No. reporting	Number	Per cent of whole	Per cent of No. reporting	Total number	Per cent of whole	Per cent of No. reporting
Cities—Population according to 1916 (except 5-10 thousand) (10-25,000—1916; 5-10,000—1910 combined)	1060	....	....	139	....	....	62	....	....	56	....	....	10	....	....	1327	....	....
Cities reporting	335	31.6	....	72	51.8	....	32	51.6	....	34	60.7	....	8	80	....	481	36.2	....
Cities reporting laboratories for the analysis of milk........	63	5.9	18.8	53	38.1	73.6	26	41.9	81.3	33	58.9	97.1	8	80	100	183	13.8	38.0
Cities reporting no laboratories for the analysis of milk.....	272	25.7	81.2	19	13.7	26.4	6	9.7	18.7	1	1.8	2.9	0	0	0	298	22.4	62.0
Cities reporting chemical analysis of milk being done but not bacteriological	6	0.6	1.8	4	2.8	5.6	1	1.6	3.1	5	8.9	14.7	0	0	0	16	1.2	3.3
Cities reporting bacteriological analysis of milk being done but not chemical	8	0.8	2.4	2	1.4	2.8	2	3.2	6.3	1	1.8	2.9	0	0	0	13	0.9	2.7
Cities reporting both chemical and bacteriological analyses being made	41	3.8	12.3	43	30.9	59.7	20	32.3	62.5	32	57.1	94.1	7	70	88	143	10.8	29.7
Cities reporting no laboratories but stating analytical work being done by some institution	82	7.7	24.4	10	7.2	13.9	2	3.2	6.2	0	.0	.0	0	0	0	94	7.1	19.5
Cities reporting fairly complete analytical work and dairy inspection	39	3.7	11.6	37	26.6	51.4	19	30.6	59.4	29	51.8	85.3	7	70	88	131	9.9	27.2
Cities reporting dairy inspection	150	14.2	44.8	52	37.4	72.2	26	41.9	81.3	29	51.8	85.3	8	80	100	265	19.9	55.1
Cities reporting dairy inspection and use of score cards......	90	8.5	26.8	37	26.7	51.4	25	40.3	78.1	28	50.0	82.4	7	70	88	187	14.1	38.9

This table shows reports from 31.6 per cent of cities between 5,000 and 25,000; 51.8 per cent of cities between 25,000 and 50,000; 51.6 per cent of those between 50,000 and 100,000; 60.7 per cent of those between 100,000 and 500,000; and 80 per cent of cities over 500,000. From the number of cities and States covered there is no doubt that the figures are representative.

The main feature here shown is the lack of control of the milk supply in the small cities. Eighty-one per cent of the cities reporting between 5,000 and 25,000 have no laboratory facilities for the analysis of milk. Although 45 per cent claim to inspect dairies, the score card is not generally used. The above conditions are gradually changed in the cities of larger population. As the population increases, the control of the milk supply is extended, until in the larger groups of cities, especially those above 100,000, laboratory control and dairy inspection with the use of the score card is almost universal. For example, in the group 100,000 to 500,000, ninety-seven per cent of the cities possess laboratories for the analysis of milk; eighty-five per cent carry on dairy inspection with the almost universal use of the score card.

Another classification was made of "cities reporting fairly complete analytical work and dairy inspection." While this classification is to a certain extent a matter of opinion, it is thought that determinations of butterfat, specific gravity, calculation of total solids and one other chemical examination such as ash, preservatives, or refractive index, together with counts on plain agar at 37 degrees for 48 hours constitute an examination which may be termed "fairly complete."

It will be noted that in the groups from:

5,000-25,000, complete analysis and dairy inspection occurred in 11.6% of cities.

25,000-50,000, complete analysis and dairy inspection occurred in 51.4% of cities.
50,000-100,000, complete analysis and dairy inspection occurred in 59.4% of cities.
100,000-500,000, complete analysis and dairy inspection occurred in 85.3% of cities.
500,000-and over, complete analysis and dairy inspection occurred in 88.0% of cities.

Conclusions:

A careful study of these reports covering every section of the country shows that the outstanding feature is the lack of proper control of the milk supply of the smaller cities. Of course this is a generally known fact; but the emphasis which actual figures give should be an incentive for greater efforts to correct such conditions. At least three causes underlie this condition of affairs in the smaller cities:

1. Lack of interest on the part of the people.
2. Lack of intelligent leadership for health matters.
3. Lack of appropriations from the city authorities.

There must be some means of combatting these things so that in the course of time the health conditions of the smaller cities may be on a par with those of the larger cities so far as relates to the control of the milk supply. In the table given five population groups have been made. For the purpose of making recommendations a redivision consisting of three groups is made:

1. Those cities whose condition is such that no outside assistance is needed.
2. Those cities which need some aid from outside sources.
3. Those cities in which the foundation for control of the milk supply must be laid by means of pioneer work.

The study of the reports indicates that this division can be made at the 50,000 and the 100,000 marks—that is, the great majority of cities of over 100,000 population are handling the milk problem in a relatively satisfactory way, many of the cities, between 50,000 and 100,000 have laid the foundation for proper control, while the vast majority of cities with a population below 50,000 are not equipped to handle the local milk question.

Of course there are some exceptions to these divisions and some of the smaller towns are doing excellent work while a few of the large cities are not accomplishing much.

The question arises as to the best means of handling the milk control situation in the smaller cities. The vital point is to arouse public sentiment in favor of milk supply regulation. The initiative must be taken by the people themselves. There certainly exists in every city some organization which is able to influence public opinion to some extent in that city. Each city contains one or more of such societies as these—medical society, civic league, chamber of commerce, housewives' league, and child's welfare association.

The activities of any one of these should help to mold public opinion. Only after such effort is made can outside influence be used. In every small city there exists a nucleus which it may be advisable to recognize as the basis for real health control. This nucleus may be nothing but a name such as city physician or health officer or agent with little or no appropriation or authority. As the city fathers usually have some reason for filling such an office and as the city officials are the final arbiters, nothing really practicable can be done without their full cooperation. This cooperation can usually be obtained provided there is enough public sentiment behind the proposition; but it may be advisable to use existing organization if possible.

Of course every city should have as the prime requisite a full time health officer. If this is not practicable, perhaps

there can be appointed a full time county health officer with full authority to force action by all the towns or cities in the county. Some small cities have combined in so far as health work is concerned and have one health executive, one laboratory and one set of inspectors for all. Such combinations doing splendid work now exist in New Jersey and Massachusetts. Every health department, whether individual city, county or combination of cities, should have a good laboratory with competent analysts and inspectors. A few neighboring cities working together can fully equip a laboratory and pay good salaries without burdening each city with heavy expense.

In the States in which the State board of health or the State dairy department is active, the smaller cities can obtain much help from these.

In this connection a word may be in order against any State department interfering with the health work of its large cities. The large cities are usually well equipped in both working force and laboratories; and they sometimes resent what they regard as outside interference. The State department will find plenty of work to do in its smaller cities and rural districts.

The State departments may have an inspection force large enough to cover the State with its central laboratory so situated that samples comparatively fresh can reach it in a short time. In this way the State will bear all the expense, or the State may persuade the small city to appoint a competent inspector who may be paid by the city or by the State and the city but who must be trained and put under the authority of the State organization. It would seem from the report that Connecticut has a system of working cooperation between the State department and the smaller towns. North Dakota, a much larger State, has four laboratories in different parts of the State to handle food and pathogenic samples. The laboratory car may be very useful but it has its limitations.

Other outside agencies are the United States Public Health Service and the United States Department of Agriculture. The Public Health Service is doing splendid health work in the extra-cantonment zones, but in most instances they have taken over completely all local health activities. This may be necessary in time of war, but it is hardly feasible in peace times.

The United States Department of Agriculture has men trained especially to go to the aid of the smaller cities in their efforts to carry on the control of the milk supply. A city has only to apply for this assistance and it will be furnished as promptly as circumstances permit. Of course, as stated before, a city contemplating asking for assistance should have made the necessary initial steps.

It is believed that State and Government authorities should emphasize the importance of the control of the milk supply of the smaller cities, and that these cities should be made to realize the necessity of such control and means of obtaining it.

Reverting again to laboratory control and methods of analysis, every one realizes the necessity of uniform methods both from a chemical and a bacteriological standpoint. The Official Association of Agricultural Chemists is clearly recognized when it comes to the adoption of chemical methods. The laboratory section of the American Public Health Association is usually recognized when it comes to routine bacteriological work. It is believed that for the sake of uniformity, methods put out by these two associations should be strictly followed. On the other hand, it is absolutely necessary that the committees on methods exhaust every effort to prove the correctness of their work before recommendation is made for adoption as official.

With full laboratory equipment, uniform methods of analysis, competent workers and officials and a forceful propaganda to bring the smaller cities to a realization of

proper milk control, sanitarians interested in safe, clean, pure milk supplies can look forward more optimistically to a solution of the milk problem.

APPENDIX A

Health Officer Letter No. 12. April, 1918.

UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF ANIMAL INDUSTRY, DAIRY DIVISION

Health Officers: Washington, D. C.

Will you kindly help us to obtain very important information by carefully filling out the blanks below and returning as soon as possible in the inclosed addressed envelope, no stamps needed?

Name of Health Department .....
City .....State .....
Name of executive officer .....Title.....
Have you a laboratory for the analysis of milk.....
water .....other foods? .....
How long has it been established? .....
Name of chief of laboratories .....
How many laboratory assistants? .....
What is the approximate value of laboratory equipment .....fixtures? .....
What is your average number of samples per year of milk .....water.....other foods?.....
Indicate the determinations made on:
MILK—Chemical: specific gravity .....
fat .....total solids .....
solids not fat .....preservatives .....
refractive index of milk serum .....
other determinations .....
Bacteriological: count plain agar .....
incubation period .....temperature.....
colon determination .....

how made .....sporogenes test or other determinations .....
WATER—Chemical: total solids .....
hardness .....turbidity .....
chlorine .....nitrogen as nitrites .....
nitrogen as nitrates.....nitrogen as free ammonia .....nitrogen as albuminoid ammonia .....
Bacteriological: count plain agar .....
incubation period .....
temperature ..... colon determination .....how made .....
other determinations .....
How many inspectors do you use for the collection of samples for analysis? .....
Where are samples of milk for bacteriological analysis taken? (On street, at farm) .....
What is the average age, when examined, of milk samples for bacteriological analysis? .....
How are samples for bacteriological analysis taken? (Original bottles or transferred to sterile containers) .....Are samples iced immediately? .....Do you make dairy farm inspections? .....How long have you been making them? .....
Do you use a dairy barn score card? .....
Inclose copy of score card used. Can you give us any data showing improvement of milk supply due to farm inspection and laboratory control? .....
.....
.....
Do you consider farm inspection important enough to be continued?.....
.....
Do you consider bacteria counts important enough to be

continued?.....

.....

Remarks:

.....

.....

.....

.....

Date..... Signature.....

APPENDIX B

HEALTH DEPARTMENTS HAVING LABORATORY FOR THE ANALYSIS OF MILK

ABBREVIATIONS—
*—Yes.
o—No or none.
S—Sediment.
ac—Acidity.
pr—Protein.
sr—Serum.
L or l—Lactose.
t—Temperature.
bl—Blood.
fr.pt.—Freezing point.
r.i.b.f.—Refractive index butter fat.
micro.—Microscopical.
leu—Leucocytes.
l.br.—Lactose broth.
g-l'a—Gas; lactose litmus agar.
g-en—Gas; endo.
d.br.—Dextrose broth.
st.pl.—Staining and plating.
lla—Lactose litmus agar.
aer—Aerobically.
g-nr—Gas; neutral red.
eos—Eosin.
bi.sr.—Bile serum.
o.b.—Original bottle.
s.c.—Sterile container.
r.t.—Room temperature.

BIRMINGHAM, Ala.

Population estimated 1916 181,762
Laboratory—
How long established .....13 years
Value of equipment..... $1,200
Laboratory workers 1
Number milk samples..... 1,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Average age of milk samples... 12 hours
Samples, how taken.....o.b. & s.c.
Dairy inspection .....Yes, 18 years
Score card used..... Yes
Remarks—Laboratory established 1906. Water samples 300.

HUNTSVILLE, Ala.

Population estimated 1916..... 7,611 (10)
Laboratory—
How long established ..... 6 months
Value of equipment $500
Laboratory workers 1
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made..... o
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 3 months
Score card used..... Yes
Remarks—Full time health officer for city and county.

FORT SMITH, Ark.

Population estimated 1916..... 28,638
Laboratory—
How long established.....10 years
Value of equipment..... $3,000
Laboratory workers 2
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made..... *
Average age of milk samples..4 to 6 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes
Score card used..... Yes
Remarks—City contracts with industrial laboratory.

HELENA, Ark.

Population estimated 1916 10,796
Laboratory—
How long established .....6 months
Value of equipment $500
Laboratory workers 1
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37½
Colon determination, how made..... o
Average age of milk samples....12 hours
Samples, how taken..... o.b.
Dairy inspection .....Yes, 1 year
Score card used.....No

TEXARKANA (Ark. and Texas)

Population estimated 1916 18,760
Laboratory—
How long established.....6 years
Value of equipment..... $400
Laboratory workers 1
Number milk samples 648
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples 1 to 2 hrs.
Samples, how taken.....o.b. & s.c.
Dairy inspection .....Yes, 6 years
Score card used..... Yes
Remarks—Joint laboratory for both cities.

BERKELEY, Cal.

Population estimated 1916 57,653
Laboratory—
How long established .....6 years
Value of equipment $1,200
Laboratory workers 2
Number milk samples 900
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other deteminations ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ... 1.br.
Average age of milk samples..2 to 8 hrs.
Samples, how taken.....o.b. & s.c.
Dairy inspection .....Yes, 7 years
Score card used..... Yes
Remarks—Quarterly scores of dairies and milk plants published.

LOS ANGELES, Cal.

Population estimated 1916 503,812
Laboratory—
How long established .....20 years
Value of equipment $4,000
Laboratory workers 6
Number milk samples 14,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples..12-18 hours
Samples, how taken.....o.b. & s.c.
Dairy inspection .....Yes, 12 years
Score card used..... Yes
Remarks—Market milk contests held periodically. Scores published.

LONG BEACH, Cal.

Population estimated 1916 27,587
Laboratory—
How long established .....8 years
Value of equipment $700
Laboratory workers 1
Number milk samples 700
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples.....8 hours
Samples, how taken.....o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used..... Yes

PALO ALTO, Cal.

Laboratory—
How long established.....8 years
Value of equipment..... $1,000
Laboratory workers 1
Number milk samples 350
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations made..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples ....5 hours
Samples, how taken..... o.b.
Dairy inspection .....Yes, 8 years
Score card used..... Yes

RICHMOND, Cal.

Population estimated 1916 6,802
Laboratory—
How long established .....8 years
Value of equipment $100
Laboratory workers 1
Number milk samples 250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations made ..... S
Bacteriological—
Count plain agar..... o
Incubation period ..... o
Temperature ..... o
Colon determination, how made ..... o
Dairy inspection .....None
Remarks—Pasteurization of all milk required.

SAN FRANCISCO, Cal.

Population estimated 1916 463,516
Laboratory—
How long established .....18 years
Laboratory workers 11
Number milk samples..... 3,600
Determinations made—
Chemical—
Specific gravity ..... o
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made.....Gas
Samples, how taken ..... s.c.
Dairy inspection .....Yes, 10 years
Score card used..... Yes
Remarks—General laboratory for water and foods.

SANTA BARBARA, Cal.

Population estimated 1916 14,846
Laboratory—
How long established .....3 years
Value of equipment.....$1,000
Laboratory workers 1
Number milk samples 100
Determinations made—
Chemical—
Specific gravity ..... o
Fat ..... *
Solids not fat..... o
Total solids ..... o
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made .... g-lla
Average age of milk samples..4 to 6 hrs.
Samples, how taken..... o.b.
Dairy inspection .....Yes, 10 years
Score card used..... Yes

COLORADO SPRINGS, Colo.

Population estimated 1916 32,971
Laboratory—
How long established .....15 years
Value of equipment $2,000
Laboratory workers 1
Number milk samples 750
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made.....g-en
Average age of milk samples ....15 hours
Samples, how taken..... o.b.
Dairy inspection .....Yes, 12 years
Score card used..... Yes
Remarks—General laboratory for water and food.

DENVER, Colo.

Population estimated 1916 260,800
Laboratory—
How long established.....14 years
Value of equipment..... $1,050
Laboratory workers 3
Number milk samples..... 1,300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ... 1.bi.
Average age of milk samples 12 to 24 hrs.
Samples, how taken.....o.b. & s.c.
Dairy inspection .....Yes, 10 years
Score card used..... Yes

PUEBLO, Colo.

Population estimated 1916..... 54,462
Laboratory—
How long established .....4 years
Value of equipment..... $600
Laboratory workers 1
Number milk samples 450
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples..3 to 15 hrs.
Samples, how taken..... o.b.
Dairy inspection .....Yes, 6 years
Score card used.....No

DAIRY AND FOOD DEPARTMENT
Hartford, Conn.

Laboratory—
Laboratory workers 5
Dairy inspection.....Yes, 10 years
Score card used..... Yes
Remarks—Chemical analyses by Agr. Exp. Sta. Bacteriological analyses by State B. of H. F. & D. Dept. collects samples.

STATE HEALTH DEPARTMENT
New Haven, Conn.

Laboratory—
- How long established ..... 13 years
- Laboratory workers 5
- Number milk samples 3,000

Determinations made—
- Chemical—
  - Specific gravity ..... o
  - Fat ..... *
  - Solids not fat ..... o
  - Total solids ..... o
  - Preservatives ..... o
  - Refractive index ..... *
  - Other determinations ..... S
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37
  - Colon determination, how made ..... o
  - Average age of milk samples. 24 to 48 hrs.
  - Samples, how taken ..... s.c.

Dairy inspection ..... None
Remarks—Health officers send in samples of milk and water. See above.

BRIDGEPORT, Conn.

Population estimated 1916 121,579
Laboratory—
- How long established .... 1 year, 6 months
- Laboratory workers 3
- Number milk samples 2,500

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... o
  - Other determinations ..... S
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37½
  - Average age of milk sample .... 24 hours
  - Samples, how taken ..... o.b. & s.c.

Dairy inspection ..... Yes, 1½ years
Score card used ..... Yes
Remarks—Ninety per cent pasteurized. Rest from t.b. free cattle.

HARTFORD, Conn.

Population estimated 1916 110,900
Laboratory—
- How long established ..... 8 years
- Value of equipment $3,000
- Laboratory workers 4
- Number milk samples 1,600

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *

Score card used ..... No
Remarks—Dairy inspection by State D. & F. Dept.

NEW HAVEN, Conn.

Population estimated 1916 149,685
Laboratory—
- How long established ..... 20 years
- Value of equipment $1,500
- Laboratory workers 2
- Number milk samples 3,600

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *

Dairy inspection ..... Yes, 12 years
Score card used ..... Yes
Remarks—Bacteria counts not made regularly.

STATE BOARD OF HEALTH
Wilmington, Del.

Laboratory—
- How long established ..... 19 years
- Value of equipment $2,800
- Laboratory workers 2
- Number milk samples 100

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... o
  - Other determinations ..... S
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period 24-48
  - Temperature 37
  - Samples, how taken ..... o.b. & s.c.

Dairy inspection ..... None
Remarks—Portable kit used for bacteriological examinations.

HEALTH DEPARTMENT
District of Columbia

Population estimated 1916 363,980
Laboratory—
- How long established ..... 26 years
- Value of equipment $19,000
- Laboratory workers 6
- Number milk samples 8,700
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... *
  - Other determinations ..... Ash
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 25
  - Colon determination, how made .. 1.bi-en
  - Samples, how taken ..... o.b. & s.c.

Dairy inspection ..... Yes, 23 years
Score card used ..... Yes

JACKSONVILLE, Fla.

Population estimated 1916 76,101
Laboratory—
How long established .....8 years
Laboratory workers 2
Number milk samples 6,000
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Count plain agar..... *
Average age of milk samples 2
Samples, how taken .....o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used..... Yes
Remarks—60% milk runs below 10,000 bacteria.

STATE BOARD OF HEALTH
Atlanta, Ga.

Remarks—Agricultural Department examines milk.

AGRICULTURAL DEPARTMENT
Atlanta, Ga.

Laboratory—
How long established .....4 years
Value of equipment $2,000
Laboratory workers 4
Number milk samples 2,000
Determinations made—
Chemical—
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples ..18 hours
Samples, how taken .....o.b. & s.c.
Dairy inspection .....Yes
Score card used..... Yes
Remarks—State veterinarian inspects dairies.

STATE BOARD OF HEALTH
Boise, Idaho

Laboratory—
How long established .....9 years
Value of equipment $10,000
Laboratory workers 3
Number milk samples 100
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made .. g-en
Average age of milk samples ..16 hours
Samples, how taken .....s.c.
Dairy Inspection .....Yes, 8 years
Score card used..... Yes
Remarks—Laboratory use for other foods and water.

AURORA, Ill.

Population estimated 1916 34,204
Laboratory—
How long established .....5 years
Value of equipment $2,000
Laboratory workers 2
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index 0
Bacteriological—
Count plain agar..... *
Incubation period ..... 24 hours
Temperature 37
Colon determination, how made ..... *
Average age of milk samples 12 to 24 hrs.
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 2 years
Score card used .....No

CAIRO, Ill.

Population estimated 1916 15,794
Laboratory—
How long established .....6 years
Value of equipment $1,000
Laboratory workers 2
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Preservatives 0
Bacteriological—
Count plain agar ..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made .... l.bl.
Average age of milk samples ..1 to 6 hrs.
Samples, how taken ..... s.c.
Dairy inspection .....Yes, 4 years
Score card used .....No
Remarks—Milk iced at farms, delivered iced.

CHICAGO, Ill.

Population estimated 1916 2,497,722
Laboratory—
How long established .....24 years
Value of equipment $4,000
Laboratory workers 12
Number milk samples 35,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ... g-en
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 10 years
Score card used..... Yes
Remarks—Laboratory analyses 6,000 other foods and water.

DECATUR, Ill.

Population estimated 1916 39,631
Laboratory—
How long established .....1 year
Value of equipment $400
Laboratory workers 1
Number milk samples 250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made .... 1.br.
Average age of milk samples 6 to 18 hrs.
Samples, how taken ..... o.b.
Dairy inspection .....Yes
Score card used .....No

ELGIN, Ill.

Population estimated 1916 28,203
Laboratory—
How long established .....4 years
Value of equipment $300
Laboratory workers 1
Number milk samples 50
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made .. d.br.
Average age of milk samples 18 to 24 hrs.
Samples, how taken .....o.b.
Dairy inspection .....None

EVANSTON, Ill.

Population estimated 1916 28,591
Laboratory—
How long established .....7 years
Value of equipment $5,000
Laboratory workers 2
Number milk samples 450
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 4 years
Remarks—Laboratory analyses over 400 other foods and water.

LA SALLE, Ill.

Population estimated 1916 12,221
Laboratory—
How long established .....4 years
Value of equipment $2,000
Laboratory workers 2
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples ..24 hours
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 3 years
Score card used..... Yes

MOLINE, Ill.

Population estimated 1916 27,451
Laboratory—
How long established .....8 years
Laboratory workers 1
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Bacteriological—
Count plain agar..... *
Colon determination, how made ..... *
Average age of milk samples 12 to 16 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 6 years
Score card used..... Yes
Remarks—Report filled by milk inspector, incomplete.

OAK PARK, Ill.

Population estimated 1916 26,654
Laboratory—
How long established .....5 years
Value of equipment $300
Laboratory workers 2
Number milk samples 12
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Preservatives ..... *
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .... gas
Samples, how taken .....o.b.
Dairy inspection .....None
Remarks—Laboratory analyzes water principally.

ROCKFORD, Ill.

Population estimated 1916 55,185
Laboratory—
Laboratory workers 1
Number milk samples 550
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Refractive index..... 0
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 38
Colon determination, how made 0
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....None
Remarks—Inspection discontinued.

ROCK ISLAND, Ill.

Population estimated 1916 28,926
Laboratory—
Value of equipment $165
Laboratory workers 1
Number milk samples 250
Determinations made—
Chemical—
Specific gravity 0
Fat ..... *
Other determinations ..... S
Score card used..... Yes
Remarks—Fat and sediment test only.

STATE BOARD OF HEALTH
Indianapolis, Ind.

Laboratory—
How long established .....13 years
Laboratory workers 5
Number milk samples 500
Determinations made—
Chemical—
Specific gravity 0
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations 0
Bacteriological—
Count plain agar 0
Dairy inspection .....Yes, 12 years
Score card used..... Yes
Remarks—Laboratory analyzes foods, drugs and waters.

EAST CHICAGO, Ind.

Population estimated 1916 28,743
Laboratory—
How long established .....2½ years
Value of equipment $2,000
Laboratory workers 2
Number milk samples 200
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made 0
Average age of milk samples 18 to 48 hrs.
Samples, how taken ..... o.b.
Dairy Inspection .....None

EVANSVILLE, Ind.

Population estimated 1916 76,070
Laboratory—
How long established .....20 years
Value of equipment $150
Laboratory workers 1
Number milk samples 800
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives 0
Refractive index 0
Other determinations 0
Dairy inspection .....Yes, 20 years
Score card used..... Yes
Remarks—Bacteriological department to be installed shortly. April 18th.

GARY, Ind.

Population estimated 1916 16,208
Laboratory—
How long established .....6 years
Value of equipment $3,500
Laboratory workers 1
Number milk samples 800
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples 24 to 48 hrs.
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 4 years
Score card used .....No
Remarks—Dairy inspection discontinued

HAMMOND, Ind.

Population estimated 1916 26,171
Laboratory—
How long established .....3 years
Value of equipment $300
Laboratory workers 1
Number milk samples 200
Determinations made—
Average age of milk samples 10 to 12 hrs.
Score card used .....No
Remarks—Laboratory just started.

LAFAYETTE, Ind.

Population estimated 1916 21,286
Laboratory—
How long established .....16 years
Value of equipment $50
Laboratory workers 1
Number milk samples 250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Dairy inspection .....Yes, 6 months
Score card used..... Yes
Remarks—No bacteriological work done.

SOUTH BEND, Ind.

Population estimated 1916 68,946
Laboratory—
Laboratory workers 2
Number milk samples 650
Determinations made—
Chemical—
Fat ..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Average age of milk samples 12 to 24 hrs.
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 1 year
Score card used..... Yes
Remarks—Laboratory analyzes 700 waters and 400 other foods.

STATE BOARD OF HEALTH
Des Moines, Iowa

Laboratory—
How long established .....10 years
Value of equipment $10,000
Laboratory workers 5
Number milk samples 100
Remarks—Pathological laboratory. All laboratory and inspection work done by the State food and dairy department.

CEDAR RAPIDS, Iowa

Population estimated 1916 37,308
Laboratory—
How long established .....10 years
Laboratory workers 2
Number milk samples 2,000
Determinations made—
Chemical—
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives 0
Average age of milk samples ..15 hours
Samples, how taken ..... s.c.
Dairy inspection .....Yes, 4 years
Score card used..... Yes
Remarks—Bacteriological analyses made by city chemist.

GRINNELL, Iowa

Population estimated 1916 ..... 5,061(15)
Laboratory—
How long established .....10 years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 20
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Preservatives ..... *
Determinations made—
Bacteriological—
Count plain agar..... *
Average age of milk samples .. 12 hours
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 3 years
Score card used..... Yes
Remarks—College and creamery analyze samples.

SIOUX CITY, Iowa

Population estimated 1916 57,078
Laboratory—
How long established .....few months
Value of equipment $2,500
Laboratory workers 1
Number milk samples ..... (8 mo.) 125
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made IIbi & IIa
Average age of milk samples .....24 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 7 years
Score card used..... Yes
Remarks—Laboratory just being completed.

FORT SCOTT, Kan.

Population estimated 1916 10,550
Laboratory—
How long established .....2 years
Value of equipment $500
Laboratory workers 2
Number milk samples 150
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made .. g-st.pl.
Average age of milk samples 12 to 15 hrs.
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 15 months
Score card used .....No
Remarks—Sale of milk in bottles only.

KANSAS CITY, Kan.

Population estimated 1916 99,437
Laboratory—
How long established .....7 years
Value of equipment $3,000
Laboratory workers 5
Number milk samples 2,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations .....ac.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .. l.br.
Average age of milk samples ....15 hours
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 4 years
Score card used..... Yes
Remarks—Department analyzes 3,000 waters and 500 other foods.

TOPEKA, Kan.

Population estimated 1916 48,726
Laboratory—
How long established .....4 years
Value of equipment $600
Laboratory workers 1
Number milk samples 1,300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations .....ac.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples 7 to 8 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 9 years
Score card used .....No
Remarks—Department analyzes water and other foods.

LEXINGTON, Ky.

Population estimated 1916 41,097
Laboratory—
How long established .....6 years
Value of equipment $2,000
Laboratory workers 2
Number milk samples 850
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .. lb-en
Average age of milk samples ....14 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 8 years
Score card used..... Yes
Remarks—Counts published in local papers.

LOUISVILLE, Ky.

Population estimated 1916 238,910
Laboratory—
How long established .....20 years
Value of equipment $3,000
Laboratory workers 3
Number milk samples 2,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ... s.m.
Average age of milk samples 6 to 12 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 6 years
Score card used..... Yes
Remarks—Laboratory analyzes 650 waters and 1000 other foods.

STATE BOARD OF HEALTH
New Orleans, La.

Laboratory—
How long established .....11 years
Value of equipment $15,500
Laboratory workers 5
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37½
Colon determination, how made .. 1-br-en
Average age of milk samples 4 to 48 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used..... Yes
Remarks—Department analyzes 2200 waters and 800 other foods.
Incubation period .....72 hours
Temperature 20
Remarks—Has traveling laboratory car.

ALEXANDRIA, La.

Population estimated 1916 15,333
Laboratory—
How long established .....6 months
Value of equipment $1,500
Laboratory workers 2
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ... s.m.
Average age of milk samples ... 4 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 4 months
Score card used .....Yes
Rmearks—Cantonment zone. U. S. P. H. S. has charge.

NEW ORLEANS, La.

Population estimated 1916 371,747
Laboratory—
How long established .....20 years
Laboratory workers 2
Number milk samples 5,573
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... S
Dairy inspection .....Yes, 6 years
Score card used..... Yes
Remarks—No bacteria tests. Chemical analyses in private laboratory.

SHREVEPORT, La.

Laboratory—
Population estimated 1916 35,230
How long established .....10 years
Value of equipment $500
Laboratory workers 3
Number milk samples 180
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period ..... 24 and 48
Temperature .....20 and 37
Colon determination, how made .. lbr-lla
Samples, how taken ..... s.c.
Dairy inspection .....Yes
Score card used..... Yes
Remarks—Laboratory analyzes waters and other foods.

STATE HEALTH DEPARTMENT
Baltimore, Md.

Laboratory—
How long established .....8 years
Value of equipment $11,000
Laboratory workers 8
Number milk samples 422
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 4 years
Score card used..... Yes
Remarks—Laboratory makes large numbers of water and food analyses.

BALTIMORE, Md.

Population estimated 589,621
Laboratory—
How long established .....22 years
Value of equipment $20,000
Laboratory workers 11
Number milk samples 18,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 5 years
Score card used .....Yes

BELMONT, Mass.

Population estimated 1916 ..... 8,081(15)
Laboratory—
How long established .....5 years
Value of equipment $1,800
Laboratory workers 2
Number milk samples 220
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples ....24 hours
Samples, how taken ..... o.b.
Dairy inspection .....Yes, 5 years
Score card used..... Yes
Remarks—Bacteriological reports published locally.

CUMBERLAND, Md.

Population estimated 26,074
Laboratory—
How long established .....8 years
Value of equipment $2,500
Laboratory workers 3
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ... s.m.
Average age of milk samples 12 to 24 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 2 years
Score card used..... Yes

BROOKLINE, Mass.

Population estimated 32,730
Laboratory—
How long established .....25 years
Value of equipment $3,500
Laboratory workers 4
Number milk samples 1,250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... *
Average age of milk samples 10 to 60 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 15 years
Score card used..... Yes
Remarks—Bacteriological and chemical reports published locally.

STATE HEALTH DEPARTMENT
Boston, Mass.

Laboratory—
How long established .....36 years
Laboratory workers 5
Number milk samples 8,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations .....Pr.,S. Ash
Dairy inspection .....Yes, 12 years
Score card used..... Yes
Remarks—This does not include report from water laboratory.
Other determinations .....Pr.S.
Remarks—Local Boards of Health do bacteriological work and inspect dairies.

CAMBRIDGE, Mass.

Population estimated 1916 112,981
Laboratory—
How long established .....40 years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 4,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 24 hours
Samples, how taken .....s.c.
Dairy inspection .....None

CHELSEA, Mass.

Population estimated 1916 46,192
Laboratory—
How long established .....5 years
Value of equipment $250
Laboratory workers 1
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 12 hours
Samples, how taken .....s.c.
Dairy inspection .....None

CONCORD, Mass.

Population estimated 1916 ..... 6,681(15)
Laboratory—
How long established .....4 years
Value of equipment $300
Laboratory workers 1
Number milk samples 150
Determinations made—
Average age of milk samples .. 24 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 10 years
Score card used..... Yes
Remarks—Details of work not enclosed in report as stated.

EVERETT, Mass.

Population estimated 39,484
Laboratory—
How long established .....12 years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 950
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Refractive index ..... *
Other determinations ..... o
Average age of milk samples .. 48 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 4 years
Score card used .....None
Remarks—Bacterial counts made in private laboratory.

FRAMINGHAM, Mass.

Population estimated 1916 13,982
Laboratory—
How long established .....2 years
Value of equipment $800
Laboratory workers 1
Number milk samples 250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples .. 24 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 5 years
Score card used..... Yes
Remarks—Bacterial counts published monthly in local papers.

HAVERHILL, Mass.

Population estimated 1916 48,477
Laboratory—
How long established .....10 years
Value of equipment $1,500
Laboratory workers 1
Number milk samples 2,400
Determinations made—
Bacteriological—
Count plain agar..... *
Incubation period .....20 hours
Temperature 39
Average age of milk samples .. 12 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes, 7 years
Score card used..... Yes
Remarks—No report on chemical analyses.

LAWRENCE, Mass.

Population estimated 1916 100,560
Laboratory—
How long established .....10 years
Value of equipment $1,000
Laboratory workers 2
Number milk samples 480
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 36
Colon determination, how made ..... o
Average age of milk samples 6 to 24 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 6 years
Score card used..... Yes

LEOMINSTER, Mass.

Population estimated 1916 20,839
Laboratory—
Value of equipment $300
Laboratory workers 1
Determinations made—
Average age of milk samples .. 12 hours
Dairy inspection .....Yes, 6 months
Score card used .....No
Remarks—Report would indicate laboratory just started.

NEW BEDFORD, Mass.

Population estimated 1916 118,158
Laboratory—
How long established .....18 years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives 0
Bacteriological—
Average age of milk samples .. 24 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes, 11 years
Score card used..... Yes
Remarks—Bacteria count by microscope.

LYNN, Mass.

Laboratory—
Population estimated 102,425
How long established .....17 years
Value of equipment $1,500
Laboratory workers 1
Number milk samples 2,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Average age of milk samples 4 to 6 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes
Score card used .....No

NORTH ADAMS, Mass.

Population estimated 1916 22,019
Laboratory—
How long established .....10 years
Value of equipment $500
Laboratory workers 1
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index 0
Other determinations 0
Dairy inspection .....Yes, 8 years
Score card used..... Yes
Remarks—Bacteria counts not made.

MALDEN, Mass.

Laboratory—
Population estimated 1916 51,155
How long established .....8 years
Value of equipment $800
Laboratory workers 1
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples 6 to 12 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 10 years
Score card used .....No
Remarks—Analyses published locally.

PLYMOUTH, Mass.

Population estimated 1916 19,100
Laboratory—
How long established .....9 months
Value of equipment $500
Laboratory workers 1
Number milk samples 100
Determinations made—
Chemical—
Fat ..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples ... 5 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 2 years
Score card used .....Yes

READING, Mass.

Laboratory—
Population estimated 1916 ..... 6,805(15)
How long established .....2 years
Value of equipment $100
Laboratory workers 1
Number milk samples 100
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Other determinations 0
Dairy inspection .....Yes, 2 years
Score card used..... Yes
Remarks—Bacteria counts not made.

SPRINGFIELD, Mass.

Population estimated 1916 105,942
Laboratory—
How long established .....14 years
Laboratory workers 1
Number milk samples 2,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made 0
Average age of milk samples 2 to 12 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 13 years
Score card used..... Yes
Remarks—Another laboratory for water analyses.

SALEM, Mass.

Population estimated 1916 48,562
Laboratory—
How long established .....4 years
Value of equipment $2,000
Laboratory workers 1
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations .....pr.sr.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made 0
Average age of milk samples .. 24 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used..... Yes

WAKEFIELD, Mass.

Population estimated 1916 12,733
Laboratory—
How long established .....3 years
Value of equipment $100
Laboratory workers 1
Number milk samples 100
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Dairy inspection .....Yes, 3 years
Score card used..... Yes
Remarks—No report on bacterial analysis.

SOMERVILLE, Mass.

Population estimated 1916 87,039
Laboratory—
How long established .....20 years
Value of equipment $1,500
Laboratory workers 3
Number milk samples 5,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations .....l.pr.S.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made 0
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 4 years
Score card used..... Yes
Remarks—Microscope counts also.

WALTHAM, Mass.

Population estimated 1916 30,570
Laboratory—
How long established .....8 years
Value of equipment $450
Laboratory workers 2
Number milk samples 2,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37½
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used..... Yes
Remarks—Counts also by microscope.

WELLESLEY, Mass.

Population estimated 1916 6,439
Laboratory—
How long established .....6 years
Value of equipment $1,800
Laboratory workers 2
Number milk samples 4,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Other determinations 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made 0
Average age of milk .... 18 to 24 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 6 years
Score card used..... Yes
Remarks—This laboratory does work for several cooperating Boards of Health; 85% samples under 50,000.

WESTFIELD, Mass.

Population estimated 1916 18,391
Laboratory—
How long established .....1 year
Value of equipment $300
Laboratory workers 1
Number milk samples 150
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made 0
Average age of milk samples 1 to 6 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 1 year
Score card used..... Yes

WINCHENDON, Mass.

Population estimated 1916 ..... 5,678(10)
Laboratory—
How long established .....3 years
Value of equipment $500
Laboratory workers 1
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat 0
Total solids..... *
Preservatives 0
Refractive index..... 0
Other determinations 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made 0
Average age of milk samples .. 10 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 3 years
Score card used..... Yes

FOOD AND DRUG DEPARTMENT
Lansing, Mich.

Laboratory—
How long established .....23 years
Value of equipment $10,000
Laboratory workers 8
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations .....fr.pt.
Dairy inspection .....Yes
Score card used..... Yes
Remarks—Chemical laboratory analyzes 1,800 other foods. No bacteriological reports.

ALBION, Mich.

Population estimated 1916 ..... 5,833(10)
Laboratory—
How long established .....4 years
Value of equipment $150
Laboratory workers 1
Number milk samples 10
Determinations made—
Chemical—
Fat ..... *
Preservatives ..... *
Other determinations ..... S
Dairy inspection .....Yes, 4 years
Score card used .....No
Remarks—No bacteriological work done.

ANN ARBOR, Mich.

Population estimated 1916 15,010
Laboratory—
How long established .....10 years
Value of equipment $1,000
Laboratory workers 3
Number milk samples 400
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .... 11a.

DETROIT, Mich.

Population estimated 1916 571,784
Laboratory—
How long established .....10 years
Value of equipment $4,000
Laboratory workers 6
Number milk samples 15,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... ac.S.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .... g-en
Average age of milk samples 12 to 18 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 9 years
Score card used..... Yes
Remarks—Laboratory analyzes waters, 2800, and other foods.

ESCANABA, Mich.

Population estimated 1916 15,485
Laboratory—
How long established .....9 years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... o
Total solids ..... o
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples .. 4 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 3 years
Score card used .....No

GRAND RAPIDS, Mich.

Population estimated 1916 128,291
Laboratory—
How long established .....6 years
Value of equipment $3,500
Laboratory workers 3
Number milk samples 1,750
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples .. 24 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 18 years
Score card used..... Yes

JACKSON, Mich.

Population estimated 1916 35,363
Laboratory—
How long established .....3 years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 1,300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Temperature ..... rt. 37½
Average age of milk samples 12 to 24 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 3 years
Score card used..... Yes

LUDINGTON, Mich.

Population estimated 1916 10,367
Laboratory—
How long established .....18 months
Value of equipment $1,200
Laboratory workers 3
Number milk samples 432
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .... gas
Average age of milk samples .. 6 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 1 year
Score card used .....Yes

MARQUETTE, Mich.

Population estimated 1916 12,409
Laboratory—
How long established .....4 years
Value of equipment $200
Laboratory workers 1
Number milk samples 150
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Other determinations .....St
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .... gas
Average age of milk samples 1 to 48 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 4 years

PONTIAC, Mich.

Population estimated 1916 17,524
Laboratory—
How long established .....2 years
Laboratory workers 2
Number milk samples 250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples 12 to 18 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 2 years
Score card used..... Yes

DULUTH, Minn.

Population estimated 1916 94,495
Laboratory—
Value of equipment $500
Laboratory workers 2
Number milk samples 700
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 38
Colon determination, how made ..... o
Average age of milk samples .. 6 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 5 years
Score card used..... Yes
Remarks—City laboratory now being installed. Have used State branch.

MINNEAPOLIS, Minn.

Population estimated 1916 363,454
Laboratory—
How long established .....20 years
Value of equipment $3,000
Laboratory workers 4
Number milk samples 3,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period .....48 hours
Temperature 37
Colon determination, how made .. s.m.
Average age of milk samples .. 24 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 7 years
Score card used..... Yes

ST. PAUL, Minn.

Population estimated 1916 274,232
Laboratory—
How long established .....17 years
Value of equipment $3,500
Laboratory workers 2
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples 7 to 36 hrs.
Samples, how taken .....o.b.
Dairy inspecoitn .....Yes, 5 years
Score card used .....Yes

HATTIESBURG, Miss.

Population estimated 1916 16,482
Laboratory—
How long established .....5 months
Value of equipment $1,200
Laboratory workers 3
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... o
Solids not fat ..... o
Total solids ..... o
Preservatives ..... o
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Temperature 37
Colon determination, how made ..... o
Average age of milk samples 8 to 15 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 4 months
Score card used .....Yes
Remarks—Cantonment zone. U. S. P. H. S. in charge.

JOPLIN, Mo.

Population estimated 1916 33,216
Laboratory—
Value of equipment $200
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... o
Fat ..... *
Solids not fat ..... o
Total solids ..... o
Preservatives ..... o
Refractive index..... o
Other determinations ..... *
Dairy inspection .....Yes, 4 years
Score card used .....No

SPRINGFIELD, Mo.

Population estimated 1916 40,341
Laboratory—
How long established .....4 years
Value of equipment $2,000
Laboratory workers 4
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Temperature 37
Colon determination, how made ... d-br
Average age of milk samples 6 to 18 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 4 years
Score card used..... Yes

ST. JOSEPH, Mo.

Population estimated 1916 85,236
Laboratory—
How long established .....6 years
Value of equipment $2,000
Laboratory workers 1
Number milk samples 2,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Refractive index..... o
Other determinations .....Pr.L.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made . l.br.-en
Average age of milk samples 12 to 18 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 6 years
Score card used..... Yes

ST. LOUIS, Mo.

Population estimated 1916 757,309
Laboratory—
How long established .....25 years
Value of equipment $8,000
Laboratory workers 4
Number milk samples 10,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... S.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ... s.m.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 4 years
Score card used..... Yes
Remarks—Laboratory analyzes other foods and drugs.

BILLINGS, Mont.

Population estimated 1916 14,422
Laboratory—
How long established .....4 months
Value of equipment $700
Laboratory workers 1
Number milk samples 400
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 12 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 6 years
Score card used..... Yes
Remarks—Full time health officer employed January 1, 1918.

BUTTE, Mont.

Population estimated 1916 43,425
Laboratory—
How long established .....7 years
Value of equipment $3,000
Laboratory workers 5
Number milk samples 1,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... bl
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Temperature 37
Colon determination, how made ... aer.
Average age of milk samples .. 2 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 1 year
Score card used .....Yes

LINCOLN, Neb.

Population estimated 1916 46,515
Laboratory—
How long established .....4 years
Value of equipment $1,000
Laboratory workers 2
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations .....S.ac.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples .. 8 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 3 years
Score card used..... Yes

STATE LABORATORY OF HYGIENE
Concord, N. H.

Laboratory—
- How long established ..... 16 years
- Laboratory workers 3
- Number milk samples 500

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Preservatives ..... *
  - Refractive index ..... *
  - Other determinations ..... ash
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37½
  - Colon determination, how made ..... o
  - Samples, how taken ..... o.b. & s.c.

Dairy inspection ..... Yes
Score card used ..... Yes
Remarks—Dairy inspection by local health officers.

STATE HEALTH DEPARTMENT
Trenton, N. J.

Laboratory—
- How long established ..... 24 years
- Value of equipment $5,000
- Number milk samples 3,000

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... *
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 24 hours
  - Temperature 35
  - Colon determination, how made ..... o
  - Samples, how taken ..... s.c.

Dairy inspection ..... Yes, 10 years
Score card used ..... Yes
Remarks—Laboratory analyzes over 3,000 waters and foods.

DOVER, N. J.

Population estimated 1916 ..... 8,971(15)
Laboratory—
- How long established ..... 3 years
- Value of equipment $350
- Laboratory workers 2
- Number milk samples 120

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... o
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37
  - Colon determination, how made ..... o
  - Average age of milk samples .. 24 hours
  - Samples, how taken ..... o.b.

Dairy inspection ..... Yes, 10 years
Score card used ..... Yes

ELIZABETH, N. J.

Population estimated 1916 86,690
Laboratory—
- How long established ..... 6 years
- Value of equipment $575
- Laboratory workers 2
- Number milk samples 1,800

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... o
  - Other determinations ..... o
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37
  - Colon determination, how made ..... o
  - Average age of milk samples .. 16 hours
  - Samples, how taken ..... s.c.

Dairy inspection ..... Yes, 6 years
Score card used ..... Yes

KEARNY, N. J.

Population estimated 1916 22,531
Laboratory—
- How long established ..... 4 years
- Value of equipment $400
- Laboratory workers 1
- Number milk samples 700

Determinations made—
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37½
  - Average age of milk samples .. 24 hours
  - Samples, how taken ..... s.c.

Dairy inspection ..... Yes, 10 years
Score card used ..... Yes

LONG BRANCH, N. J.

Population estimated 1916 13,395
Laboratory—
- How long established ..... 4 years
- Value of equipment $600
- Laboratory workers 2
- Number milk samples 170

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Other determinations ..... S
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37½
  - Average age of milk samples 14 to 28 hrs.
  - Samples, how taken ..... o.b. & s.c.

Dairy inspection ..... Yes, 4 years
Score card used ..... Yes

MONTCLAIR, N. J.

Population estimated 1916 26,318
Laboratory—
How long established .....20 years
Value of equipment $1,000
Laboratory workers 2
Number milk samples 400
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made 0
Average age of milk samples 24 to 36 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 15 years
Score card used..... Yes

NEWARK, N. J.

Population estimated 1916 408,894
Laboratory—
How long established .....30 years
Value of equipment $3,700
Laboratory workers 6
Number milk samples 5,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ... g-en
Average age of milk samples .. 6 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 6 years
Score card used..... Yes
Remarks—Waters and other foods analyzed.

M. I. ASSN. OF THE ORANGES, N. J.

Laboratory—
How long established .....7 years
Value of equipment $450
Laboratory workers 2
Number milk samples 1,200
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Average age of milk samples 24 to 36 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 10 years
Score card used .....Yes
Remarks—Assn. consists of Orange, E. Orange, W. Orange, South Orange and South Orange Township. Appropriations per capita basis.

PRINCETON, N. J.

Population estimated 1916 ..... 5,678(15)
Laboratory—
How long established .....5 years
Value of equipment $1,500
Laboratory workers 2
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made 0
Average age of milk samples .. 12 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 5 years
Score card used..... Yes

SUMMIT, N. J.

Population estimated 1916 ..... 9,136(15)
Laboratory—
How long established .....4 years
Value of equipment $300
Laboratory workers 1
Number milk samples 30
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives 0
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period .....12 hours
Temperature 37½
Colon determination, how made 0
Average age of milk samples .. 12 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 4 years
Score card used..... Yes
Remarks—Laboratory closed temporarily; workers at war.

TRENTON, N. J.

Population estimated 1916 111,593
Laboratory—
How long established .....4 years
Value of equipment $4,000
Laboratory workers 4
Number milk samples 900
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ... en
Average age of milk samples .. 3 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 7 years
Score card used..... Yes
Remarks—Water analyses 2,600

JERSEY CITY, N. J.

Population estimated 1916 306,345
Laboratory—
  Number milk samples 4,900
Determinations made—
  Chemical—
    Specific gravity ..... *
    Fat ..... *
    Solids not fat ..... *
    Total solids ..... *
    Preservatives ..... *
    Refractive index ..... o
  Bacteriological—
    Count plain agar ..... *
    Incubation period ..... 48 hours
    Temperature 37½
    Colon determination, how made ..... o
    Average age of milk samples .. 36 hours
    Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 2 years
Score card used ..... Yes
Remarks—City work divided among four laboratories.

ALBANY, N. Y.

Population estimated 1916 104,199
Laboratory—
  Number milk samples 1,200
Determinations made—
  Chemical—
    Specific gravity ..... *
    Fat ..... *
    Solids not fat ..... *
    Total solids ..... *
    Preservatives ..... *
  Bacteriological—
    Count plain agar ..... *
    Incubation period ..... 48 hours
    Temperature 37
    Average age of milk samples 4 to 36 hrs.
    Samples, how taken .....s.c.
Dairy inspection .....Yes, 4 years
Score card used ..... Yes
Remarks—Analyses by contract, Albany Hospital.

AMSTERDAM, N. Y.

Population estimated 1916 37,103
Laboratory—
  How long established .....10 years
  Value of equipment $2,000
  Laboratory workers 2
  Number milk samples 2,000
Determinations made—
  Chemical—
    Specific gravity ..... *
    Fat ..... *
    Solids not fat ..... *
    Total solids ..... *
  Bacteriological—
    Count plain agar ..... *
    Incubation period ..... 48 hours
    Temperature 32
    Average age of milk samples .. 24 hours
    Samples, how taken .....s.c.
Dairy inspection .....Yes, 8 years
Score card used ..... Yes

AUBURN, N. Y.

Population estimated 1916 37,385
Laboratory—
  How long established .....10 years
  Laboratory workers 1
  Number milk samples 200
Determinations made—
  Chemical—
    Specific gravity ..... *
    Fat ..... *
    Solids not fat ..... *
    Total solids ..... *
    Preservatives ..... *
    Refractive index ..... o
    Other determinations ..... o
  Bacteriological—
    Count plain agar ..... *
    Incubation period ..... 48 hours
    Temperature 37½
    Colon determination, how made ..... o
    Average age of milk samples 18 to 24 hrs.
    Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 15 years
Score card used ..... Yes

BATAVIA, N. Y.

Population estimated 1916 13,350
Laboratory—
  How long established .....7 years
  Value of equipment $1,500
  Laboratory workers 2
  Number milk samples 100
Determinations made—
  Chemical—
    Specific gravity ..... *
    Fat ..... *
    Solids not fat ..... *
    Total solids ..... *
    Preservatives ..... *
    Refractive index ..... *
  Bacteriological—
    Count plain agar ..... *
    Incubation period ..... 48 hours
    Temperature 37½
    Colon determination, how made ..... o
    Samples, how taken .....o.b.
Dairy inspection .....Yes
Score card used ..... Yes

BINGHAMTON, N. Y.

Population estimated 1916 53,973
Laboratory—
  How long established .....16 years
  Value of equipment $3,500
  Laboratory workers 2
  Number milk samples 1,200
Determinations made—
  Chemical—
    Specific gravity ..... *
    Fat ..... *
    Solids not fat ..... *
    Total solids ..... *
    Preservatives ..... *
    Refractive index ..... *
  Bacteriological—
    Count plain agar ..... *
    Incubation period ..... 48 hours
    Temperature 22
    Colon determination, how made .. g-nr.
    Average age of milk samples 12 to 24 hrs.
    Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 11 years
Score card used ..... Yes
Remarks—Waters and other foods analyzed.

BUFFALO, N. Y.

Population estimated 1916 468,558
Laboratory—
How long established .....26 years
Value of equipment $25,000
Laboratory workers 14
Number milk samples 12,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ... s.m.
Average age of milk samples 18 to 30 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used..... Yes

CANANDAIGUA, N. Y.

Population estimated 1916 ..... 7,501(15)
Laboratory—
How long established .....12 years
Value of equipment $1,500
Laboratory workers 2
Number milk samples 80
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat 0
Total solids 0
Preservatives 0
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made .... 1-bi.
Average age of milk samples .. 12 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes
Score card used..... Yes

GLOVERSVILLE, N. Y.

Population estimated 1916 22,082
Laboratory—
How long established .....12 years
Value of equipment $500
Laboratory workers 1
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat 0
Total solids 0
Preservatives ..... *
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... *
Average age of milk samples not over 40 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes
Score card used..... Yes

ITHACA, N. Y.

Population estimated 1916 15,848
Laboratory—
How long established .....10 years
Laboratory workers 2
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Other determinations 0
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made 0
Average age of milk samples 9 to 40 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 10 years
Score card used..... Yes
Remarks—Analyses made in college laboratories.

NIAGARA, N. Y.

Population estimated 1916 37,353
Laboratory—
How long established .....2 years
Value of equipment $700
Laboratory workers 2
Number milk samples 4,660
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Average age of milk samples .. 25 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 2 years
Score card used..... Yes
Remarks—Microscopic examinations made of all samples.

OLEAN, N. Y.

Population estimated 1916 16,624
Laboratory—
How long established .....8 years
Value of equipment $650
Laboratory workers 1
Number milk samples 900
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Total solids..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period .....24-48 hours
Temperature 35
Colon determination, how made ..... *
Average age of milk samples .. 4 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 5 years
Score card used..... Yes

POUGHKEEPSIE, N. Y.

Population estimated 1916 30,390
Laboratory—
How long established .....5 years
Value of equipment $1,000
Laboratory workers 2
Number milk samples 400
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .... gas
Average age of milk samples 24 to 36 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 5 years
Score card used..... Yes

WHITE PLAINS, N. Y.

Population estimated 1916 22,465
Laboratory—
How long established .....3 years
Value of equipment $1,000
Laboratory workers 3
Number milk samples 150
Determinations made—
Chemical—
Specific gravity ..... o
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples 15 to 24 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 5 years
Score card used..... Yes

ROME, N. Y.

Population estimated 1916 23,737
Laboratory—
How long established .....5 years
Value of equipment $800
Laboratory workers 1
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Temperature 37½
Colon determination, how made ... 1.br.
Average age of milk samples 4 to 14 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 25 years
Score card used..... Yes

YONKERS, N. Y.

Population estimated 1916 99,838
Laboratory—
How long established .....20 years
Value of equipment $1,500
Laboratory workers 1
Number milk samples 1,060
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .... 1.bi.
Average age of milk samples .. 30 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes, 20 years
Score card used..... Yes

SYRACUSE, N. Y.

Population estimated 1916 155,624
Laboratory—
Laboratory workers 3
Number milk samples 3,300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples 5 to 24 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 11 years
Score card used..... Yes

STATE LABORATORY OF HYGIENE
Raleigh, N. C.

Laboratory—
How long established .....10 years
Value of equipment $10,000
Laboratory workers 8
Remarks—This is a water laboratory analyzing 2,500 samples per year. Food work in charge of Dept. of Agriculture.

DURHAM, N. C.

Population estimated 1916 25,061
Laboratory—
How long established .....2½ years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations .....ac.t.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples 5 to 15 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 3 years
Score card used .....Yes

GOLDSBORO, N. C.

Population estimated 1916 ..... 6,107(10)
Laboratory—
How long established .....3 years
Value of equipment $500
Laboratory workers 2
Number milk samples 150
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24-48 hours
Temperature 37
Colon determination, how made .. l.br.-en
Samples, how taken .....o.b.
Dairy inspection .....Yes, 3 years
Score card used..... Yes

ROCKY MOUNT, N. C.

Population estimated 1916 ..... 8,051(10)
Laboratory—
How long established .....1 year
Value of equipment $400
Laboratory workers 1
Number milk samples 200
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made .. l.br.-en
Average age of milk samples 2 to 3 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 1 year
Score card used..... Yes

WILMINGTON, N. C.

Population estimated 1916 29,892
Laboratory—
Value of equipment $1,500
Laboratory workers 1
Number milk samples 800
Determinations made—
Chemical—
Specific gravity ..... o
Fat ..... *
Solids not fat ..... o
Total solids ..... o
Preservatives ..... o
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples 5 to 16 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 7 years
Score card used .....Yes

WINSTON-SALEM, N. C.

Population estimated 1916 31,155
How long established .....2 years
Value of equipment $500
Laboratory workers 2
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Average age of milk samples .. 9 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 1 year
Score card used .....Yes

WILSON, N. C.

Population estimated 1916 ..... 6,717(10)
Laboratory—
How long established .....5 months
Value of equipment $600
Laboratory workers 2
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... —
Fat ..... —
Total solids ..... —
Preservatives ..... o
Bacteriological—
Count plain agar ..... —
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples 2 to 4 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 5 months
Score card used .....Yes

STATE HEALTH LABORATORY
North Dakota

Laboratory—
How long established ..... 11 years
Value of equipment $3,500
Laboratory workers 7
Number milk samples 1,762
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... *
Total solids ..... *
Preservatives ..... *
Refractive index ..... o
Other determinations ..... o
Bacteriological—
Count plain agar ..... *
Incubation period ..... 24 hours
Temperature 37½
Colon determination, how made .. l.br.-en
Samples, how taken ..... o.b. & s.c.
Dairy inspection ..... Yes, 2 years
Score card used ..... Yes
Remarks—Combined report from State laboratories in four cities, Grand Forks, Minot, Fargo, Bismarck.

CHILLICOTHE, Ohio

Population estimated 1916 15,470
Laboratory—
How long established ..... 1 year
Laboratory workers 1
Number milk samples ..... (6 mo.) 104
Determinations made—
Bacteriological—
Count plain agar ..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 12 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection ..... Yes, 6 months
Score card used ..... Yes
Remarks—Laboratory just established; not yet fully equipped.

CINCINNATI, Ohio

Population estimated 1916 410,476
Laboratory—
How long established ..... 7 years
Value of equipment $2,000
Laboratory workers 4
Number milk samples 18,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... *
Total solids ..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... r.i.b.f.
Bacteriological—
Count plain agar ..... *
Incubation period ..... 48 hours
Temperature 37
Average age of milk samples .. 24 hours
Samples, how taken ..... o.b.
Dairy inspection ..... Yes, 7 years
Score card used ..... Yes
Remarks—Laboratory analyzes waters and other foods.

CLEVELAND, Ohio

Population estimated 1916 674,073
Laboratory—
How long established ..... 17 years
Value of equipment $4,000
Laboratory workers 15
Number milk samples 20,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... *
Total solids ..... *
Preservatives ..... *
Refractive index ..... o
Other determinations ..... S
Bacteriological—
Count plain agar ..... *
Incubation period ..... 24 hours
Temperature 37
Colon determination, how made .... s.m.
Average age of milk samples 3 to 30 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection ..... Yes, 13 years
Score card used ..... Yes
Remarks—Bacterial examination in 1917 of 1,700 samples.

COLUMBUS, Ohio

Population estimated 1916 214,878
Laboratory—
How long established ..... 15 years
Value of equipment $2,200
Laboratory workers 3
Number milk samples 4,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... *
Total solids ..... *
Preservatives ..... *
Refractive index ..... o
Other determinations ..... Pr.S.ac.
Bacteriological—
Count plain agar ..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 15 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection ..... Yes, 14 years
Score card used ..... Yes

DAYTON, Ohio

Population estimated 1916 127,224
Laboratory—
How long established ..... 10 years
Value of equipment $1,500
Laboratory workers 3
Number milk samples 852
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... *
Total solids ..... *
Preservatives ..... *
Other determinations ..... S.ac.
Bacteriological—
Count plain agar ..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples 24 to 36 hrs.
Samples, how taken ..... o.b.
Dairy inspection ..... Yes, 10 years
Score card used ..... Yes

HAMILTON, Ohio

Population estimated 1916 40,496
Laboratory—
How long established .....3 years
Value of equipment $800
Laboratory workers 2
Number milk samples 250
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made .... l.bi.
Average age of milk samples 12 to 36 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 3 years
Score card used .....Yes

NORWOOD, Ohio

Population estimated 1916 22,282
Laboratory—
How long established .....8 years
Value of equipment $300
Laboratory workers 2
Number milk samples 340
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Average age of milk samples .. 24 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 8 years
Score card used .....No

LORAIN, Ohio

Population estimated 1916 33,962
Laboratory—
How long established .....10 years
Laboratory workers 2
Number milk samples 700
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Dairy inspection .....Yes, 10 years
Score card used .....Yes
Remarks—Bacterial analyses not being made.

MARTINS FERRY, Ohio

Population estimated 1916 9,996
Laboratory—
Number milk samples 25
Determinations made—
Chemical—
Fat ..... *
Dairy inspection .....Yes, 4 years
Score card used .....Yes
Remarks—Laboratory record incomplete.

MANSFIELD, Ohio

Population estimated 1916 22,734
Laboratory—
How long established .....9 years
Laboratory workers 1
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24-48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples 6 to 40 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used .....Yes
Remarks—Work done by private laboratory.

SANDUSKY, Ohio

Population estimated 1916 20,193
Laboratory—
How long established .....2 years
Value of equipment $300
Laboratory workers 1
Number milk samples 900
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Dairy inspection .....Yes, 10 years
Score card used .....Yes
Remarks—Bacterial analyses not made.

SPRINGFIELD, Ohio

Population estimated 1916 51,550
Laboratory—
How long established .....2 years
Value of equipment $500
Laboratory workers 1
Number milk samples 100
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made ... l.l.a.
Average age of milk samples .. 24 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes, 3 years
Score card used .....Yes

ZANESVILLE, Ohio

Population estimated 1916 30,863
Laboratory—
Laboratory workers 1
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples 4 to 16 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....None

TOLEDO, Ohio

Population estimated 1916 191,554
Laboratory—
How long established .....6 years
Value of equipment $5,000
Laboratory workers 3
Number milk samples 1,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Other determinations ..... ash S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ... eos.
Average age of milk samples .. 12 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 11 years
Score card used .....Yes

OKLAHOMA CITY, Okla.

Population estimated 1916 92,943
Laboratory—
How long established .....12 years
Value of equipment $3,000
Laboratory workers 2
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... ash
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Temperature 37
Colon determination, how made .. l.bi.
Average age of milk samples 6 to 14 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 6 years
Score card used .....Yes

YOUNGSTOWN, Ohio

Population estimated 1916 108,385
Laboratory—
How long established .....19 years
Value of equipment $1,500
Laboratory workers 1
Number milk samples 2,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Other determinations ..... S
Dairy inspection .....Yes, 11 years
Score card used .....Yes
Remarks—Bacterial counts discontinued. Stress on sediment tests.

PORTLAND, Ore.

Population estimated 1916 295,463
Laboratory—
How long established .....8 years
Value of equipment $1,070
Laboratory workers 3
Number milk samples 6,300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 12 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 9 years
Score card used .....Yes
Remarks—City holds periodic milk contest with fine results.

STATE DAIRY AND FOOD BUREAU
Harrisburg, Pa.

Laboratory—
- How long established ..... 25 years
- Number milk samples 6,000

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... *
  - Other determinations ..... ash

Dairy inspection ..... None

Remarks—District laboratories, institutional or private, six. No general bacteriological work done. Dept. makes no dairy inspection.

BELLEVUE, Pa.
Population estimated 1916 ..... 6,323(10)

Laboratory—
- How long established ..... 5 years
- Laboratory workers 1
- Number milk samples 20

Determinations made—
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 24 hours
  - Temperature 20-37
  - Colon determination, how made ... l.bi.
  - Average age of milk samples 3 to 24 hrs.
  - Samples, how taken ..... o.b.

Dairy inspection ..... Yes, 5 years

Score card used ..... No

Remarks—State D. & F. Bur. makes chemical analyses of milk.

ALLENTOWN, Pa.
Population estimated 1916 63,505

Laboratory—
- How long established ..... 3 years
- Value of equipment $3,000
- Laboratory workers 1
- Number milk samples 1,600

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... *
  - Total solids ..... *
  - Preservatives ..... *
  - Refractive index ..... *
  - Other determinations ..... ac.
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37
  - Colon determination, how made .... gas
  - Average age of milk samples .. 10 hours
  - Samples, how taken ..... o.b. & s.c.

Dairy inspection ..... Yes, 2 years

Score card used ..... No

COATESVILLE, Pa.
Population estimated 1916 14,455

Laboratory—
- How long established ..... 2 years
- Samples, how taken ..... o.b. & s.c.

Dairy inspection ..... Yes

Remarks—Work done by hospital laboratory. Report incomplete.

ALTOONA, Pa.
Population estimated 1916 58,659

Laboratory—
- How long established ..... 1 year
- Value of equipment $3,500
- Laboratory workers 1
- Number milk samples 50

Determinations made—
- Chemical—
  - Specific gravity ..... *
  - Fat ..... *
  - Solids not fat ..... o
  - Total solids ..... o
  - Preservatives ..... o
  - Refractive index ..... o
- Bacteriological—
  - Count plain agar ..... *
  - Incubation period ..... 48 hours
  - Temperature 37
  - Colon determination, how made ... gas
  - Average age of milk samples .. 48 hours
  - Samples, how taken ..... o.b.

Dairy inspection ..... Yes, 5 years

Score card used ..... Yes

Remarks—Laboratory makes 500 water analyses.

CLEARFIELD, Pa.
Population estimated 1916 ..... 6,851(10)

Laboratory—
- How long established ..... 2 years
- Value of equipment $100
- Laboratory workers 1

Remarks—Work done by hospital laboratory. Report incomplete.

LANCASTER, Pa.

Population estimated 1916 50,853
Laboratory—
How long established .....11 years
Value of equipment $1,500
Laboratory workers 3
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Average age of milk samples .. 24 hours
Samples, how taken .....o.b.
Dairy inspection .....1.....Yes, 6 years
Score card used .....Yes
Remarks—Laboratory makes 600 water analyses.

SCRANTON, Pa.

Population estimated 1916 146,811
Laboratory—
How long established .....11 years
Value of equipment $2,000
Laboratory workers 1
Number milk samples 800
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Temperature 20-37½
Colon determination, how made ... bi.sr.
Average age of milk samples 10 to 30 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 11 years
Score card used .....Yes
Remarks—Sediment disk returned to producer with report.

PHILADELPHIA, Pa.

Population estimated 1916 1,709,518
Laboratory—
How long established .....14 years
Number milk samples 6,000
Determinations made—
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ... s.m.
Average age of milk samples .. 36 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes
Score card used .....No
Remarks—Chemical and bacteriological work in different laboratories. Report by bacteriologist; chemical report not received.

NEWPORT, R. I.

Population estimated 1916 30,108
Laboratory—
How long established .....13 years
Value of equipment $2,000
Laboratory workers 1
Number milk samples 1,600
Determinations made—
Chemical—
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ... gas
Average age of milk samples 3 to 36 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 20 years
Score card used .....Yes
Remarks—Ordinance requires all milk pasteurized or certified.

PITTSBURGH, Pa.

Population estimated 1916 579,090
Laboratory—
How long established .....9 years
Value of equipment $5,400
Laboratory workers 4
Number milk samples 30,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37½
Colon determination, how made ..... *
Average age of milk samples .. 18 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes, 8 years
Score card used .....Yes
Remarks—Fat and solids principal chemical determinations.

PROVIDENCE, R. I.

Population estimated 1916 254,960
Laboratory—
How long established .....40 years
Value of equipment $4,000
Laboratory workers 7
Number milk samples 7,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Samples, how taken .....s.c.
Dairy inspection .....None

ANDERSON, S. C.

Population estimated 1916 12,226
Laboratory—
How long established .....6 months
Value of equipment $600
Laboratory workers 1
Number milk samples 800
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 38
Average age of milk samples 5 to 7 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 1 year
Score card used .....No

GREENVILLE, S. C.

Population estimated 1916 18,181
Laboratory—
How long established .....9 years
Value of equipment $1,800
Laboratory workers 2
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... S.t.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 6 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 6 years
Score card used .....Yes
Remarks—Microscopical examinations made. Water analyses 400.

ABERDEEN, S. Dak.

Population estimated 1916 15,218
Laboratory—
How long established .....18 months
Value of equipment $2,000
Laboratory workers 2
Number milk samples 200
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... o
Total solids..... *
Preservatives ..... o
Refractive index..... o
Other determinations .....a.c.
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples 10 to 20 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes
Score card used .....Yes

LEAD, S. Dak.

Population estimated 1916 9,763
Laboratory—
How long established .....10 years
Value of equipment $100
Laboratory workers 1
Number milk samples 15
Dairy inspection .....Yes, 6 years
Score card used .....No
Remarks—Report incomplete. H. O. reports records lost.

CHATTANOOGA, Tenn.

Population estimated 1916 60,075
Laboratory—
How long established .....6 years
Laboratory workers 3
Number milk samples 5,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made .. 1.br.-en
Average age of milk samples .. 2 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 6 years
Score card used .....Yes
Remarks—Cantonment zone. Cooperative with U. S. P. H. S.

KNOXVILLE, Tenn.

Population estimated 1916 38,636
Laboratory—
How long established .....8 years
Value of equipment $1,000
Laboratory workers 1
Number milk samples 550
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Total solids..... *
Preservatives ..... *
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made ..... lla.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 8 years
Score card used .....Yes

MEMPHIS, Tenn.

Population estimated 1916 148,995
Laboratory—
How long established .....20 years
Value of equipment $3,500
Laboratory workers 2
Number milk samples 2,400
Determinations made—
Chemical—
Specific gravity ..... o
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... ash
Bacteriological—
Count plain agar..... *
Incubation period .....24 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples 5 to 18 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 12 years
Score card used .....Yes

NASHVILLE, Tenn.

Population estimated 1916 117,057
Laboratory—
How long established .....8 years
Value of equipment $1,100
Laboratory workers 2
Number milk samples 2,500
Determinations made—
Chemical—
Specific gravity ..... o
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 12 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 3 years
Score card used .....Yes

STATE BOARD OF HEALTH
Austin, Texas

Remarks—Laboratory for water analyses only. State Food Dept. analyzes milk and other foodstuffs.

CORPUS CHRISTI, Texas

Population estimated 1916 10,432
Laboratory—
How long established .....4 years
Value of equipment $50
Laboratory workers 1
Number milk samples 100
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat ..... o
Total solids ..... o
Preservatives ..... o
Refractive index..... o
Other determinations ..... o
Bacteriological—
Count plain agar ..... o
Dairy inspection .....Yes, 4 years
Score card used .....Yes
Remarks—Dairy scores published monthly.

DALLAS, Texas

Population estimated 1916 124,427
Laboratory—
How long established .....3 years
Value of equipment $1,200
Laboratory workers 2
Number milk samples 2,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations .....micro.
Bacteriological—
Count plain agar..... *
Incubation period .....24-48 hours
Temperature 37½
Colon determinations, how made .. lla.en

EL PASO, Texas

Population estimated 1916 63,705
Laboratory—
Value of equipment $2,000
Laboratory workers 2
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Colon determination, how made ..... o
Average age of milk samples 6 to 24 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 5 years
Score card used .....Yes
Remarks—Report incomplete.

GALVESTON, Texas

Population estimated 1916 41,863
Laboratory—
Value of equipment $1,000
Laboratory workers 2
Number milk samples 375
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made ... g-en
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 8 years
Score card used .....No

WACO, Texas

Population estimated 1916 33,385
Laboratory—
How long established .....6 months
Value of equipment $1,900
Laboratory workers 4
Number milk samples 1,800
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Average age of milk samples 4 to 30 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 6 months
Score card used .....Yes
Remarks—Cantonment zone. U. S. P. H. S. in charge.

STATE BOARD OF HEALTH
Burlington, Vt.

Laboratory—
How long established .....20 years
Value of equipment $15,000
Laboratory workers 4
Number milk samples 1,000
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Average age of milk samples .. 12 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 8 years
Score card used .....No

STATE DAIRY AND FOOD DEPT.
Richmond, Va.

Laboratory—
How long established .....10 years
Value of equipment $2,500
Laboratory workers 3
Number milk samples 150
Determinations made—
Chemical—
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period 24
Temperature 37
Colon determination, how made .. 1 br.-en
Average age of milk samples .. 12 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 9 years
Score card used .....No
Remarks—Many other foods analyzed.

DANVILLE, Va.

Population estimated 1916 20,021
Laboratory—
How long established .....4 years
Value of equipment $2,000
Laboratory workers 1
Number milk samples 250
Determinations made—
Bacteriological—
Average age of milk samples .. 24 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 2 years
Score card used .....Yes
Remarks—New ordinance. Systematic analyses just beginning.

LYNCHBURG, Va.

Population estimated 1916 32,920
Laboratory—
How long established .....7 years
Value of equipment $3,000
Laboratory workers 2
Number milk samples 1,500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Average age of milk samples .. 24 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 10 years
Score card used .....Yes
Remarks—1,000 water samples analyzed.

RICHMOND, Va.

Population estimated 1916 156,687
Laboratory—
How long established .....10 years
Laboratory workers 4
Number milk samples 2,200
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period 24-48
Average age of milk samples 3 to 24 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 11 years
Score card used .....Yes

NEWPORT NEWS, Va.

Population estimated 1916 20,562
Laboratory—
How long established .....7 months
Value of equipment $2,500
Laboratory workers 2
Number milk samples ..... (7 mo.) 54
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat 0
Total solids 0
Refractive index..... 0
Other determinations 0
Bacteriological—
Count plain agar..... *
Incubation period ..... 24' hours
Temperature 37½
Colon determination, how made 0
Average age of milk samples .. 5 hours
Samples, how taken .....o.b.
Dairy inspection .....None
Remarks—Most of the work done on water samples.

NORFOLK, Va.

Population estimated 1916 89,612
Laboratory—
How long established .....10 years
Value of equipment $3,000
Laboratory workers 2
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Bacteriological—
Count plain agar..... *
Average age of milk samples .. 4 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 10 years
Score card used .....Yes
Remarks—Analytical report. incomplete. Monthly reports published.

ROANOKE, Va.

Population estimated 1916 43,284
Laboratory—
How long established .....8 years
Value of equipment $1,500
Laboratory workers 1
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37½
Colon determination, how made ... l.v.en
Average age of milk samples 4 to 24 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 8 years
Score card used .....Yes

EVERETT, Wash.

Population estimated 1916 35,486
Laboratory—
How long established .....3 years
Value of equipment $80
Laboratory workers 1
Number milk samples 500
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Other determinations 0
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made 0
Average age of milk samples 4 to 6 hrs.
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 4 years
Score card used .....Yes

TACOMA, Wash.

Population estimated 1916 112,770
Laboratory—
How long established .....10 years
Value of equipment $2,000
Laboratory workers 2
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Refractive index..... 0
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 38
Colon determination, how made 0
Average age of milk samples .. 14 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 10 years
Score card used .....Yes

STATE HEALTH DEPARTMENT
Charleston, W. Va.

Laboratory—
How long established .....4 years
Value of equipment $3,000
Laboratory workers 2
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Average age of milk samples .. 12 hours
Samples, how taken .....o.b.
Dairy inspection .....Yes, 4 years
Score card used .....Yes
Remarks—Laboratory analyzes water principally, very few milk samples, not over 50.

WHEELING, W. Va.

Population estimated 1916 43,377
Laboratory—
How long established .....10 years
Laboratory workers 1
Number milk samples 1,800
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period .....24-36 hours
Temperature 37
Colon determination, how made ..... *
Average age of milk samples 12 to 24 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 8 years
Score card used .....Yes

EAU CLAIRE, Wis.

Population estimated 1916 18,807
Laboratory—
How long established .....4 years
Value of equipment $50
Laboratory workers 1
Number milk samples 600
Determinations made—
Chemical—
Specific gravity 0
Fat ..... *
Solids not fat 0
Total solids 0
Preservatives 0
Refractive index..... 0
Other determinations ..... S
Dairy inspection .....Yes, 7 years
Score card used .....No
Remarks—Bacteria counts and dairy scoring to start in 1918.

STATE LABORATORY OF HYGIENE
Madison, Wis.

Laboratory—
How long established .....17 years
Value of equipment $2,000
Laboratory workers 5
Remarks—Work confined to medical diagnosis. Milk and food examinations by Dairy and Food Department.

KENOSHA, Wis.

Population estimated 1916 31,576
Laboratory—
How long established .....2 years
Value of equipment $800
Laboratory workers 2
Number milk samples 100
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... 0
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made 0
Average age of milk samples .. 24 hours
Samples, how taken ..... o.b. & s.c.
Dairy inspection .....Yes, 1 year
Score card used .....No
Remarks—Laboratory reports published locally.

BELOIT, Wis.

Population estimated 1916 18,072
Laboratory—
How long established .....2 months
Value of equipment $200
Laboratory workers 1
Determinations made—
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made 0
Samples, how taken .....o.b.
Dairy inspection .....None
Remarks—Laboratory just started. Milk ordinance proposed.

MADISON, Wis.

Population estimated 1916 30,699
Laboratory—
How long established .....2 years
Value of equipment $800
Laboratory workers 2
Number milk samples 800
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Other determinations ..... S.t.
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37½
Colon determination, how made ... s.m.
Average age of milk samples 6 to 18 hrs.
Samples, how taken .....o.b.
Dairy inspection .....Yes, 2 years
Score card used .....No
Remarks—Reports on fat, sediment, bacteria published locally.

OSHKOSH, Wis.

Population estimated 1916 36,065
Laboratory—
How long established .....3 years
Value of equipment $500
Laboratory workers 2
Number milk samples 200
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index..... o
Other determinations ..... S
Bacteriological—
Count plain agar..... *
Incubation period ..... 48 hours
Temperature 37
Colon determination, how made ... gas
Average age of milk samples 12 to 24 hrs.
Samples, how taken .....o.b.
Dairy inspection .....None

RHINELANDER, Wis.

Population estimated 1916 ..... 5,637(10)
Laboratory—
How long established .....2 years
Value of equipment $2,500
Laboratory workers 1
Number milk samples 50
Determinations made—
Chemical—
Fat ..... *
Total solids..... *
Preservatives ..... *
Other determinations ..... S.leu
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... *
Average age of milk samples 2 to 3 hrs.
Samples, how taken .....s.c.
Dairy inspection .....Yes, 1 year
Score card used .....No
Remarks—State B. of H. Branch laboratory.

SUPERIOR, Wis.

Population estimated 1916 46,226
Laboratory—
How long established .....7 years
Value of equipment $2,000
Laboratory workers 2
Number milk samples 600
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Preservatives ..... *
Refractive index..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37½
Colon determination, how made ..... o
Average age of milk samples .. 8 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes
Score card used .....No

TERRITORIAL BOARD OF HEALTH
Honolulu, Hawaii

Laboratory—
How long established .....10 years
Value of equipment $1,500
Laboratory workers 5
Number milk samples 300
Determinations made—
Chemical—
Specific gravity ..... *
Fat ..... *
Solids not fat..... *
Total solids..... *
Preservatives ..... *
Refractive index ..... *
Other determinations ..... o
Bacteriological—
Count plain agar..... *
Incubation period..... 48 hours
Temperature 37
Colon determination, how made ..... o
Average age of milk samples .. 6 hours
Samples, how taken .....s.c.
Dairy inspection .....Yes, 10 years
Score card used .....No

HONOLULU, Hawaii

Population estimated 1916 ..... 52,183(10)
Remarks—Laboratory work done by Territorial Board of Health in Honolulu.

APPENDIX C

HEALTH DEPARTMENTS HAVING NO LABORATORIES FOR THE ANALYSIS OF MILK

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Alabama	Talladega	5,854 (10)	None	None		Full time health officer just installed April, 1918
Alaska	Juneau	....	None	None		
Arizona	Douglas	6,437 (10)	Fort Sam Houston (U. S.)	Yes	Yes	
Arkansas	Jonesboro	7,123 (10)	None	None		
	Paragould	5,248	None	.....	No	
California	Eureka	14,684	None	Yes, 6 years	No	
	Riverside	19,763	None	Yes	Yes	Scores by State Dairy Inspector
	San Rafael	5,934 (10)	San Francisco laboratory	Yes	Yes	Scores by State Inspector
	Santa Cruz	14,594	None	Yes	Yes	Scores by State Dairy Inspector
Colorado	Cripple Creek	6,206 (10)	None	None		
	Grand Junction	7,754 (10)	None	None		
	Trinidad	13,857	Private laboratory	.....		
Connecticut	Danielson	....	State laboratory	None		
	New London	20,985	State laboratory	Yes	No	300 milk samples per year
	Norwich	29,419	None	.....	.....	Milk Inspector not under Board of Health
	Plymouth	5,021	State laboratory	.....	.....	
	Ridgefield	....	State laboratory	.....	.....	Examination of milk made once a year
	Rockville	....	State laboratory	Yes, 4 years	No	
	Southington	6,516 (10)	State laboratory	.....	.....	
	Stamford	35,119	State laboratory	None		
	Winsted	7,754 (10)	State laboratory	Yes, 8 years	Yes	Samples taken each month from each peddler; records published locally

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Georgia	Dalton	5,324 (10)	None	.....	.....	"We have no Board of Health at present"
	Gainesville	5,925 (10)	None	.....	.....	"Gainesville has nothing of this kind"
	Griffin	7,478 (10)	None	.....	.....	
	Rome	15,120	State Bd. of Health	Yes, 2 years	Yes	Producers sterilizing utensils and cooling
Idaho	Pocatello	12,293	College or private laboratory	Yes	No	
Illinois	Belvidere	7,253 (10)	None	.....	No	
	Canton	13,262	None	.....	.....	
	Carbondale	5,411 (10)	None	None	.....	
	Champaign	14,508	None	None		Milk ordinance prepared, not yet passed, April, 1918
	Danville	32,261	None	.....	.....	
	De Kalb	9,482	None	.....	.....	
	Galesburg	24,276	State Univ. laboratory	None	No	
	Harrisburg	5,309 (10)	None	.....	.....	
	Harvey	7,227 (10)	None	None	No	
	Kankakee	14,230	None	.....	No	
	Lincoln	11,838	None	None	No	Milk samples taken by State Inspectors
	Maywood	10,529	Columbus and Oak-park laboratories	.....	.....	
	Monmouth	10,177	None	None	.....	Dairy farm inspection by State officials
	Mt. Vernon	9,760	None	None	No	
	Olney	5,011 (10)	None	None	No	
	Paris	7,664 (10)	State Univ.	None	No	Farm inspection by State officials
	Pana	6,056 (10)	None	None	No	Pasteurization and sterilization of utensils required
	Pekin	10,823	None	.....	.....	
	Rock Island	28,926	None	.....	Yes	Fat and sediment tests made on 250 samples per year
	Waukegan	20,244	None	.....	.....	
	Macomb	5,774 (10)	None	Yes, 2 years	No	Laboratory for water work
	Cicero	19,974	None	.....	.....	Health Dept. just reorganized

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Indiana	Bedford	10,349	None	None		State B. of H. has done some work here
	Crawfordsville	11,164	None	.....		
	Elwood	11,028	None	.....	No	
	Goshen	8,955	None	None	No	
	Hartford City	6,187 (10)	None	None		
	Huntington	10,880	None	.....	.....	
	Jeffersonville	10,412	None	.....	.....	
	Laporte	13,202	None	None	No	Ordinance but no money
	Mt. Vernon	5,563 (10)	None	None	No	
	Muncie	25,424	None	.....	.....	
	New Albany	23,629	None	Yes, 10 years	No	Some samples taken and sent to State laboratory
	Potaka	.....	None	Yes	.....	Farms inspected twice a year
	Portland	5,130 (10)	None	.....	.....	
	Richmond	24,697	State laboratory	Yes, 10 years	Yes	
	Terre Haute	66,083	State laboratory	Yes	Yes	500 samples collected per year
	Valparaiso	6,987 (10)	None	.....	No	Laboratory started but closed; lack of funds
	Seymour	6,305 (10)	None	Yes	No	Only partial inspection of dairy farm
	Washington	7,854 (10)	None	None	No	
	Whiting	6,587 (10)	Laboratory in E. Chicago	None	No	
	Kokomo	20,930	None	None		
Iowa	Burlington	25,030	State laboratory	Yes	Yes	
	Creston	7,572 (15)	None	.....	.....	
	Davenport	48,811	None	Yes, 8 years	No	
	Dubuque	39,873	State laboratory	.....	.....	Bacteria count twice a year. Fat examination made
	Iowa City	11,413	State laboratory	.....	.....	
	Mason City	14,457	None	Yes, 2 years	Yes	Fat test made
	Ottumwa	24,334	None	.....	.....	
	Webster City	5,834 (15)	None	None	No	Some inspections made by State
Kansas	Coffeyville	17,548	None	.....	No	
	Hutchinson	20,753	State laboratory	.....	.....	Samples collected by State Inspector

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Kansas	Independence	14,506	State laboratory	None		
	Iola	11,068	None	.....	.....	County Board of Health
	Wellington	5,642 (15)	None	Yes, 2 years	Yes	
	Winfield	6,138 (15)	None	None		
Kentucky	Henderson	12,192	State laboratory	Yes, 2 years	Yes	25 samples of milk a year
	Hopkinsville	10,762	None	Yes	No	Inspections once or twice a year
	Maysville	6,141 (10)	State laboratory	.....	.....	State inspectors
	Winchester	7,156 (10)	State laboratory	Yes, 7 years	No	
Louisiana	New Iberia	7,499 (10)	State laboratory	None	.....	Scored by State Inspector
Maine	Bangor	26,659	None	.....	.....	
	Bath	9,396	None	None	No	
	Caribou	5,377 (10)	None	.....	.....	
	Gardiner	5,311 (10)	State laboratory	None	No	Dairy inspection just started
	Rumford	6,777 (10)	State laboratory	Yes, 1 year	No	
Maryland	Cambridge	6,407 (10)	State laboratory	Yes, 3 years	No	20 samples of milk a year
	Frederick	11,112	State laboratory	None	.....	
Massachusetts ...	Andover	7,978 (15)	State laboratory	.....	No	
	Bridgewater	9,381 (15)	None	None	No	Samples collected by State Inspectors
	Chelmsford	5,182 (15)	None	Yes, 1 year	No	
	Danvers	9,949	Private laboratory	Yes, 3 years	No	
	Fairhaven	6,277 (15)	None	None	No	Dairy inspection by State officials
	Franklin	6,440 (15)	None	Yes, 1 year	No	
	Greenfield	11,998	None	Yes	Yes	Dairy inspection irregular
	Mansfield	5,772 (15)	None	.....	.....	
	Maynard	6,770 (15)	None	.....	.....	
	Middleboro	9,048	Brockton laboratory	Yes, 5 years	Yes	Board employs man from Brockton lab. to collect and analyze samples
	Milford	14,110	None	.....	.....	State Inspector inspects and collects samples
	N. Attleboro	11,014	None	Yes, 4 years	No	
	Norwood	9,605	None	.....	.....	
	Orange	5,379 (15)	None	Yes, 3 years	Yes	
	Palmer	9,119	None	Yes, 4 years	No	
	Sangus	9,910	None	Yes	.....	
	Southbridge	14,205	State laboratory	Yes, 5 years	Yes	

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Massachusetts ...	Stoneham	7,489 (15)	Somerville laboratory	Yes, 3 years	No	
	Stoughton	6,982 (15)	None	Yes, 5 years	Yes	
	Westboro	5,925 (15)	Boston laboratory	Yes, 15 years	No	100 samples for sediment test per year
	Weymouth	13,882	None	.....	Yes	
	Winchester	10,603	Somerville laboratory	Yes, 10 years	Yes	240 samples per year collected
	Winthrop	12,692	State laboratory	.....	.....	
Michigan	Boyne City	5,218 (10)	None	.....	.....	No milk laws
	Dowagiac	5,088 (10)	None	.....	.....	
	Iron Mountain	9,216	None	None		City has no milk ordinance
	Ironwood	14,779	None	Yes, 3 years		
	Ishpeming	12,448	None	Yes, 3 years	.....	
	Monroe	6,893 (10)	None	.....	.....	
	Niles	5,156 (10)	None	.....	.....	
	Three Rivers	5,072 (10)	None	None		
Minnesota	Austin	6,960 (10)	None	.....	.....	
	Albert Lea	6,192 (10)	None	.....	.....	
	Cloquet	7,031 (10)	None	.....	.....	
	Crookston	7,559 (10)	None	.....	.....	
	Rochester	7,844 (10)	Mayo Clinic	Yes, 6 mo.	Yes	Milk ordinance in effect January, 1918
	St. Cloud	11,817	None	Yes	No	
	Virginia City	15,193	None	.....	.....	
	Stillwater	10,198	None	.....	.....	
Mississippi	Biloxi	9,679	None	.....	.....	
	Greenville	10,846	None	Yes, 5 years	No	
	Laurel	11,779	None	Yes, 4 years	No	
	Vicksburg	22,816	State laboratory	.....	.....	
	Yazoo City	6,796 (10)	State laboratory	Yes, 5 years	Yes	
	Columbus	10,561	State laboratory	.....	.....	
Missouri	Brookfield	5,749 (10)	None	None		
	Cape Girardeau	10,775	None	.....	.....	
	Fulton	5,228 (10)	None	None		No health authority
	Mexico	5,939 (10)	None	.....		
	St. Charles	10,350	None	.....	No	
	Webster Grove	7,080	Private laboratory	Yes	No	
Montana	Anaconda	10,562	None	.....	.....	
	Bozeman	5,107	State laboratory	None	None	State B. of H. Laboratory situated at Bozeman

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
New Hampshire.	Portsmouth	11,666	State laboratory	.....	.....	Milk samples every three months
New Jersey.....	Rochester	9,119	State laboratory	None		
	Somersworth	6,704 (10)	State laboratory	Yes, 2 years	No	
	Atlantic City	57,660	None	None	No	State Department of Health inspects dairy and collects samples
	Bayonne	69,892	None	.....	.....	State collects samples and makes dairy inspection
	Bloomfield	18,466	None	.....	.....	
	Bridgeton	14,395	None	.....	.....	State collects samples and makes dairy inspection
	Asbury Park	14,007	State laboratory	Yes, 23 years	Yes	H. O. cooperates with State in milk work
	Camden	106,233	None	.....	.....	State collects samples and makes dairy inspection
	Gloucester	11,109	None	None		State collects samples and makes dairy inspection
	Hackensack	16,945	None	Yes	.....	State collects samples and makes dairy inspection
	Harrison	16,950	None	None	.....	State collects samples and makes dairy inspection
	Morristown	13,006	None	Yes	Yes	State collects samples and makes dairy inspection
	Mutley	6,009	Oranges laboratory	Yes, 7 mo.	Yes	Contracts with milk assn. of Oranges for laboratory work
	Passaic	71,744	None	Yes, 10 years	Yes	
	Ridgewood	5,416 (10)	Paterson Hospital	Yes, 8 years	No	
	Salem	6,953 (15)	None	.....	.....	State collects samples and makes dairy inspection
	Union	24,776	None	.....	.....	
	Hoboken	77,214	None	.....	.....	State collects samples
New Mexico.....	Albuquerque	14,025	State Univ. laboratory	Yes, 10 years	Yes	
	Roswell	6,172 (10)	None	Yes	No	
	State Board of Health (Las Vegas)		None	None	No	
New York.....	Akron and Newstead	.....	None	Yes, 2 years	Yes	One department for both towns
	Catskill	5,371 (15)	State laboratory	Yes	.....	

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
New York	Cheektowaga	.....	None	Yes	.....	Dairies are scored by Buffalo inspectors
	East Hamburg	.....	State laboratory	Yes	Yes	
	Franklinville	.....	None	Yes, 2 mo.	Yes	
	Fulton	11,908	None	Yes	Yes	
	Holland	.....	None	Yes, 4 years	Yes	
	Hunn Township	.....	None	Yes	Yes	
	Johnstown	10,646	None	Yes, 5 years	Yes	
	Little Falls	13,451	None	Yes, 10 years	Yes	
	Marilla	.....	Buffalo laboratories	None		Buffalo Health Dept. scores dairies and collects samples
	Medina	6,079 (15)	None	Yes, 3 years	Yes	
	North Tarrytown	.....	Dobb's Ferry laboratory	.....	.....	Several towns combine for milk work
	North Tonawanda	13,768	State laboratory	Yes, 6 years	Yes	
	Oneonta	10,962	None	Yes, 1 year	Yes	
	Plattsburg	12,837	None	Yes, 8 years	Yes	
	Rensselaer	11,177	State laboratory	Yes	Yes	
	Saratoga Springs	13,821	Warren Co. laboratory	Yes, 4 years	Yes	
	Seneca	6,588 (10)	Buffalo laboratory	Yes, 2 years	Yes	
	Williamsville and Amherst		State laboratory	Yes, 2 years	Yes	
	Cortland	13,069	None	Yes	Yes	
North Carolina..	Kinston	6,995 (10)	None	.....	.....	
North Dakota...	Devil's Lake	5,157 (10)	State laboratory	.....	.....	
Ohio	Ashland	6,795 (10)	None	.....	.....	
	Ashtabula	21,498	State laboratory	Yes, 3 years	Yes	Fat and sediment test made locally. 250 per year
	Athens	5,463 (10)	None	Yes, 5 years	No	State inspects dairy and takes milk samples
	Bellaire	14,348	None	.....	.....	
	Bellevue	5,209 (10)	None	Yes, 5 years		Dairy scoring to be started shortly
	Cambridge	13,483	None	.....	.....	State collects samples twice a year
	Canton	60,852	Private laboratory	Yes, 18 years	Yes	Analytical work done by contract
	Conneaut	9,064	None	None		

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Ohio	Defiance	7,327 (10)	State laboratory	Yes, 10 years	No	
	Delphos	5,038 (10)	None	.....	.....	
	Findlay	14,858	None	Yes, 15 years	Yes	Fat test made
	Galion	7,214 (10)	None	.....	.....	
	Greenville	6,237 (10)	State laboratory	.....	No	State makes inspections
	Kenton	7,185 (10)	State laboratory	None		
	Massillon	15,310	None	Occasionally	No	
	Nelsonville	6,082	None	None		
	Piqua	14,152	None	Yes, 4 years	Yes	State inspects and collects samples. 25 per year
	St. Bernard	5,002 (10)	None	.....	No	Inspections made by Cincinnati
	St. Marys	5,732 (10)	State laboratory	.....	.....	
	Salem	9,799	None	Yes, 2 years	No	
	Troy	6,122	State laboratory	.....	.....	
	Wapakoneta	5,349 (10)	None	None		
	Wellsville	7,769 (10)	State laboratory	Yes, 5 years	Yes	State inspects twice a year
	Xenia	8,712	None	.....	.....	Dairy inspection work not yet organized April, 1918
Oklahoma	El Reno	7,872 (10)	State laboratory	.....	.....	
Oregon	Ashland	5,020 (10)	None	.....	.....	
	Astoria	10,363	State laboratory	None		
	Baker	6,742 (10)	None	None		
	Medford	14,118	State laboratory	.....	.....	
Pennsylvania	Ashland	6,855 (10)	None	.....	.....	
	Butler	27,632	None	.....	.....	
	Beaver Falls	13,532	None	.....	.....	
	Berwick	5,357 (10)	None	None		
	Bradford	14,544	None	.....	.....	
	Carbondale	19,242	None	.....	.....	
	Catasaugua	5,250 (10)	None	.....	.....	
	Chambersburg	12,380	None	Yes, 3 years	No	
	Connellsville	15,455	None	.....	.....	
	Coraopolis	5,252 (10)	None	.....	.....	
	Dickson City	12,086	None	None		
	Denora	8,174 (10)	None	.....	.....	State assists in collecting samples
	Du Bois	14,665	None	.....	.....	
	East Pittsburgh	5,615	None	None		
	Fayette	.....	None	.....	.....	No health department

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Pennsylvania	Forest City	5,749 (10)	None	.....	.....	
	Glass Port	5,540 (10)	None	.....	.....	
	Greenville	5,909 (10)	None	Yes, 3 years	Yes	
	Hazleton	28,491	State Hospital	None	.....	
	Indiana	5,749 (10)	None	.....	.....	
	Juniata	5,285 (10)	Altoona laboratory	.....	.....	
	Kingston	6,449 (10)	Hospital laboratory	.....	.....	
	Lock Haven	7,772 (10)	None	None		
	Luzerne	5,426 (10)	None	None		
	Mahanoy City	17,463	None	Yes	Yes	
	Norristown	31,401	None	.....	No	
	Pittston	18,599	None	Yes, 4 years	.....	
	Punxsutawney	.....	None	.....	.....	
	St. Clair	6,455 (10)	None	.....	.....	
	St. Marys	6,346 (10)	None	None		
	Scottdale	5,456 (10)	None	.....	.....	
	Sharon	18,616	None	None		State collects samples
	Sharpsburg	29,201	None	.....	.....	
	Steelton	15,548	None	.....	.....	
	Sunbury	16,260	None	.....	.....	
	Taylor	12,077	None	.....	.....	
	Washington	21,618	State laboratory	.....	.....	State collects samples. 35 per year
Rhode Island...	Windber	8,013 (10)	None	.....	.....	
	Bristol	9,609	None	None	No	
	Central Falls	25,636	State laboratory	Yes	.....	
	E. Providence	18,113	None	.....	.....	
	Warren	7,241	None	.....	.....	
South Dakota...	Warwick	29,969	None	Yes, 1 year	No	Dept. just organized
	Huron	6,012 (15)	State laboratory	.....	.....	
	Mitchell	7,785 (15)	State laboratory	None		
	Sioux Falls	16,499	None	Yes, 10 years	No	Butter fat tests made on few samples
	Watertown	7,010 (10)	None	Yes	No	
Tennessee						
Texas	Columbia	5,754 (10)	None	.....	.....	
	Austin	34,814	State laboratory	Yes, 6 years	.....	
	Ennis	5,669 (10)	None	.....	.....	
	Gainesville	10,099	None	.....	.....	
	Palestine	11,854	None	.....	No	
	Weatherford	5,074 (10)	None	.....	No	

State	City	Population Estimated 1916	Analytical Work. Done by	Dairy Inspection	Score Card Used	Remarks
Texas	Hillsboro	6,115 (10)	None	.....	.....	
Utah	Ogden	31,404	State laboratory	Yes	Yes	Fat tests made
	Provo	10,645	State laboratory	.....	.....	
Vermont	Brattleboro	7,541 (10)	State laboratory	.....	.....	
	Burlington	21,617	State laboratory	Yes	Yes	360 samples per year sent to State laboratory
	St. Albans	6,381 (10)	State laboratory	Yes	Yes	50 samples per year sent to State laboratory
Virginia	Fredericksburg	5,874 (10)	State laboratory	None		
	Winchester	5,864 (10)	None	Yes, 6 years	Yes	
Washington	Aberdeen	20,334	None	None	.....	Dairies inspected by State
	Bellingham	32,985	State laboratory	.....	No	
	Centralia	7,311 (10)	State laboratory	None		Dairies inspected by State
West Virginia...	Morgantown	13,709	Univ. laboratory	None		
	Moundsville	11,153	None	Yes, 3 years	No	
Wisconsin	Baraboo	6,324 (10)	None	None		
	Beaver Dam	6,758 (10)	None	.....	.....	
	Chippewa Falls	9,395	None	None	.....	Milk ordinance just passed April, 1918. State inspects dairies
	Manitowoc	13,805	None	None	.....	
	Marinette	14,610	None	Yes	No	
	Marshfield	5,783 (10)	State laboratory	Yes, 3 years	No	
	Menomonie	5,036 (10)	None	.....	.....	
	Oconto	5,629 (10)	None	.....	.....	
	So. Milwaukee	7,000	None	Yes, 6 years	No	
Wyoming	Laramie	8,256	None	.....	.....	No city health dept.
Porto Rico.....	Mayaguez	16,562 (10)	P. R. State Health lab.	Yes	.....	200 samples per year sent. Bacterial and chemical examinations

APPENDIX D

DAIRY INSPECTION AND BACTERIA COUNTS
OPINIONS OF HEALTH OFFICERS OR INSPECTORS
April-May, 1918

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	ALABAMA	
Birmingham	Yes. Total score of dairies increased from 65% to 79.8% from 1910	Yes. Marked improvements in supply from bacterial standpoint. 75 to 85% below 500,000. Due to better dairy sanitation and more efficient and careful methods
Huntsville	Yes. No data given	Yes. No data given
Talladega	No inspection	No bacteria counts
	ALASKA	
Juneau	No inspection	No bacteria counts
	ARIZONA	
Douglas	Yes. Dairies very much improved	Yes. Standard under 1,000,000
	ARKANSAS	
Fort Smith	Yes. No data given	Yes. No data given
Helena	Yes	Yes. Considerable improvement in bacteria counts
Jonesboro	No inspection	No bacteria counts
Paragould	No inspection	No bacteria counts
Texarkana (Ark. & Tex.)	Yes. No data given	Yes. No data given

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	CALIFORNIA	
Berkeley	Yes, emphatically. Scores increased from 59.4% to 67.2% from 1911 to 1917. Scoring causes rivalry between firms. Scores published	Yes, emphatically; no data given
Eureka	Yes. Results clearly shown	Yes. No laboratory for bacteria counts
Long Beach	Yes. Interest of public and dairymen increased	Yes. Counts are lower. Complaints fewer
Los Angeles	Yes. No special data given	Yes. Marked improvement in supply since laboratory counts instituted. Market milk contest of great assistance
Palo Alto	Yes. Sanitary score raised. Dirty dairies eliminated	Yes. Bacteria counts reduced
Richmond	Yes. No farm inspection. Pasteurizing plants inspected	Yes. No bacteria counts. Pasteurization required. Infant mortality dropped from 45 to 50 per year to 13 last year
Riverside	No inspection except by State. Large dairies score from 79 to 83	No bacteria counts
San Francisco	Yes. Score increased from 52 to 68%	Yes; when milk comes from sanitary dairies
San Rafael	Yes. Cleaner barnyards, new milk houses with concrete floors and good ventilation	Yes. No data given. Special samples sent to S. F. Lab.
Santa Barbara	Yes. Very much improvement	Yes. Very much improved
Santa Cruz	Yes. No data given	No bacteria counts

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	COLORADO	
Colorado Springs	Yes. General cleanliness of farms improved with consequent improvement of milk supply	Yes. Dairymen are interested in their bacteria counts and make an effort to keep them down
Cripple Creek	No inspection	No bacteria counts
Denver	Yes. Marked increase in sanitary production.	Yes. No special data given
Grand Junction	No inspection	No bacteria counts
Pueblo	Yes. Dairies and products improved. Both inspection and bacteria counts are necessary	Yes. Examination points out defects that are eliminated by farm inspection
Trinidad	No inspection; no opinion expressed	No bacteria counts; no opinion expressed
	CONNECTICUT	
State Dept. of Health	No inspection; no opinion expressed	Yes, if milk is received within 24 hours after collection and is kept cold on journey
Dairy & Food Dept.	Yes. No data given	Yes. No data given
Bridgeport	Yes, if dairies supply raw milk	Yes; it affords a rough check on age of raw supply and pasteurization. 90% of supply pasteurized and rest from tuberculosis-free cattle
Danielson	Yes. No data given	Yes. No data given
Hartford	Yes. No data given	No opinion expressed
New Haven	Yes, most decidedly	No opinion expressed. Microscopic examinations of sediments made. Stated death rate among infants reduced over 50%

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	CONNECTICUT—*Continued*	
New London	Yes. If done regularly milk is cleaner	Yes. Fewer bacteria and less infant mortality. Important in keeping control of milking machines
Norwich	No inspection	No bacteria counts
Plymouth	No opinion expressed	No opinion expressed
Ridgefield	Yes. No data given	No opinion expressed
Rockville	Yes. No data given	Yes. No data given
Southington	No opinion expressed	No opinion expressed
Stamford	No opinion expressed	No opinion expressed
Winsted	Cleaner barns. More light	Yes. Counts low. Better cooling and sterilizing facilities.
	DELAWARE	
State Board of Health	Yes	Yes. Tests when reported to milkman help him to better product. Emphasis placed on sediment test
	DISTRICT OF COLUMBIA	
Washington	Yes. Reference made to annual report	Yes. Death rate of children under 1 year from 210 in 1901 to 70 in 1917. Reference made to annual report
	FLORIDA	
Jacksonville	Yes. 75% of dairies have concrete floors and milk rooms	Yes. 60% of milk running below 10,000
	GEORGIA	
State Board of Health	No opinion expressed. No dairy inspection.	No opinion expressed. No milk laboratory
State Dept. of Agriculture.	Yes. No data given. Inspection by State veterinarian	Yes. No data given
Dalton	No inspection	No bacteria counts

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	GEORGIA—*Continued*	
Gainesville	No inspection	No bacteria counts
Griffin	No inspection	No bacteria counts
Rome	Yes. Dairymen are sterilizing utensils and icing milk	Yes
	IDAHO	
State Board of Health	Yes. Marked improvement in methods of handling and dairy sanitation	Yes. Uniformly low bacteria counts
Pocatello	Yes. No data given	Yes. No data given
	ILLINOIS	
Aurora	Yes. Inspection has caused improvement in sanitary conditions	Yes. No data given
Belvidere	No inspection	No bacteria counts
Cairo	Yes. Clean milking, clean cans, steam sterilization, cow inspection, quick delivery and personal equation	No; not as practiced on bile and agar. Milk iced at farm and delivered iced
Canton	No inspection	No bacteria counts
Carbondale	Yes. No data given	Yes. No data given
Champaign	No inspection	No bacteria counts
Chicago	Yes. No data given	Yes. In 1910 27% of raw milk and 90% of pasteurized milk ran below 500,000; in 1916, 53% of raw milk and 96% of pasteurized milk ran below 500,000; average counts in 1917 ran higher than in 1916; results on 48,000 samples for 8 years indicate efficient cooling is necessary
Cicero	No opinion expressed	No opinion expressed

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	ILLINOIS—*Continued*	
Danville	No inspection	No bacteria counts
Decatur	Yes. No data given	Yes. No data given
DeKalb	No inspection	No bacteria counts
Elgin	Yes, emphatically	Yes. General improvement of standard due to fear of laboratory
Evanston	Yes. Cannot urge its need too strongly.	Yes. Important to check up conditions and efficiency of methods. Table given to show importance of bacteria counts
Galesburg	Yes. No data given	No opinion expressed
Harrisburg	No inspection	No bacteria counts
Harvey	No inspection	No bacteria counts
Kankakee	No inspection	No bacteria counts
LaSalle	No. Watching city milk distributers as a police function	Yes. No data given
Lincoln	Yes. No data given	Yes. No data given
Macomb	Yes. No data given	Yes. No data given
Maywood	No opinion expressed	No opinion expressed
Moline	Yes. Dairy farms more sanitary since inspection started	Yes. No data given
Monmouth	No inspection	No bacteria counts
Mt. Vernon	No inspection	No bacteria counts
Oak Park	Yes. No data given	Yes. No data given
Olney	No inspection	No bacteria counts
Paris	Yes; if State issues orders; producers indifferent to orders from local authorities	No opinion given
Pana	No. Not on a large scale for this small city	No. Pasteurization of milk and sterilization of all utensils required
Pekin	Yes. No data given	Yes. No data given

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	ILLINOIS—*Continued*	
Rockford	Yes. No data given	Yes. No data given
Rock Island	Yes. Methods have improved	Yes. No data given
Waukegan	No opinion expressed	No opinion expressed
	INDIANA	
Bedford	No opinion expressed	No opinion expressed
Crawfordville	No opinion expressed	No opinion expressed
East Chicago	Yes. No data given	Yes. No data given
Elwood	Yes. No data given	Yes. No data given
Evansville	Yes. No data given	No bacteria counts
Gary	No inspection. No opinion expressed	Yes. No data given
Goshen	No inspection	No bacteria counts
Hammond	Yes. Milk supply greatly improved	Yes. Milk supply greatly improved
Hartford City	No inspection	No bacteria counts
Huntington	No inspection	No bacteria counts
Indianapolis	Yes. No data given	No opinion expressed
Jeffersonville	No inspection	No bacteria counts
Kokomo	No inspection	Yes. No data given
Lafayette	Yes. Since inspection began dairies are kept in sanitary condition	Yes. No data given
Laporte	No inspection	No bacteria counts
Mt. Vernon	No inspection	No bacteria counts
Muncie	No inspection	No bacteria counts
New Albany	Yes. No data given	No opinion expressed
Portland	No inspection	No bacteria counts
Potaka	No opinion expressed	No bacteria counts
Richmond	Yes. No data given	Yes. No data given
Seymour	Yes. No data given	Yes. No data given
South Bend	Improvement	Yes. Improvement

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	INDIANA—*Continued*	
Terre Haute	Yes. Improvement in dairy farm control	Yes. No data given
Valparaiso	No inspection	No bacteria counts
Washington	No opinion expressed	No opinion expressed
Whiting	Yes. No data given	Yes. No data given
	IOWA	
Burlington	Yes. Sediment test shows marked improvement	Yes. No data given
Cedar Rapids	Yes. Quite an improvement from farm inspection	Yes. No data given
Creston	No inspection	No bacteria counts
Davenport	Yes. No data given	Yes. No data given
State Board of Health	No opinion expressed	No opinion expressed
Dubuque	Yes. No data given	Yes. No data given
Grinnell	Better light and ventilation and drainage of barns	Yes. Better kept utensils
Iowa City	No opinion expressed	No opinion expressed
Mason City	No, judging from results	No bacteria counts
Ottumwa	No inspection	No bacteria counts
Sioux City	Yes. No data given	Yes. No data given
Webster City	No inspection	No bacteria counts
	KANSAS	
Coffeyville	No. Complete sanitary conditions. No sickness reported from use of milk	No. Vessels are thoroughly cleansed and milk kept cold
Fort Scott	Yes. No data given	Yes. No data given
Hutchinson	No opinion expressed	No opinion expressed
Independence	No specific opinion expressed	No specific opinion expressed
Iola	No inspection	No bacteria counts

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	KANSAS—*Continued*	
Kansas City	Yes. No data given	No. Bacteria counts are useless unless a prohibitive number of samples are taken
Topeka	Yes, when it is used as follow-up work after laboratory analysis	Yes. Counts reduced from 6,000,000 in 1913 to 89,000 in 1917
Wellington	Yes. Can be stopped if bacterial work is done properly	Yes. No data given
Winfield	No inspection	No bacteria counts
	KENTUCKY	
Henderson	Yes. No data given	Yes. No data given
Hopkinsville	No inspection	No bacteria counts
Lexington	Yes. Cleaner barns, cleaner milk houses	Yes. Reduction in bacteria counts
Louisville	Yes. No data given	Yes. Decrease in bacteria counts
Maysville	Yes. Dairy conditions have greatly improved.	Yes. No data given
Winchester	Yes. No data given	Yes. Tests show great improvement each year
	LOUISIANA	
State Board of Health	Yes. Improvements in many instances	Yes. Laboratory control is point from which to direct inspection
Alexandria	Yes. No data given	Yes. Decrease in bacteria counts
New Iberia	No inspection	No bacteria counts
New Orleans	Yes. No data given	No opinion expressed
Shreveport	Yes. Conditions much improved	Yes
	MAINE	
Bangor	No inspection	No bacteria counts
Bath	Yes. No data given	Yes. No data given
Carabou	No inspection	No bacteria counts
Gardiner	Yes. No data given	Yes. No data given
Rumford	Yes. No data given	Yes. No data given

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	MARYLAND	
State Dept. of Health	Yes. No data given	Yes. No data given
Baltimore	Yes. No data given	Yes. No data given
Cambridge	Yes. No data given	Yes. Total count lower
Cumberland	Yes. General improvement of dairy premises	Yes. Material reduction in bacteria content
Frederick	No inspection	No bacteria counts
	MASSACHUSETTS	
Andover	Yes. No data given	Yes. No data given
State Dept. of Health	No opinion expressed	No opinion expressed
Belmont	No opinion expressed	Yes. Most of dairies below 50,000
Bridgewater	No inspection	No bacteria counts
Brookline	Yes. Cleaner cottons and decrease in bacteria noticeable just after farm inspections.	Yes
Cambridge	No opinion expressed	No opinion expressed
Chelmsford	Yes. No data given	No opinion expressed
Chelsea	Yes. Modern dairy buildings and equipment.	Yes. No data given
Concord	Yes. No data given	Yes. No data given
Danvers	Yes. Very important	Yes. No data given
Everett	Yes. No data given	Yes. No data given
Fairhaven	Yes. No data given	Doubtful. No data given
Framingham	No opinion expressed	Yes. No data given
Franklin	Yes. No data given	No opinion expressed
Greenfield	Yes. Barns and milk have improved 40%	Sediment test is as good a system for obtaining clean milk as bacteria count unless confronted with an epidemic of contagious disease
Haverhill	Yes. Records show very great improvement.	Yes

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	MASSACHUSETTS—*Continued*	
Lawrence	Yes. Slow but continuous improvement	Yes. From the standpoint of farm inspection more good can be done by sediment tests than by bacteria count
Leominster	Yes. No data given	No. No data given
Lynn	Yes. Dairy inspection an important factor to improve conditions	Yes. Bacterial work has caused a marked improvement in cleanliness of milk
Malden	Yes. Conditions at farm must be looked after carefully	Yes. Publication of analyses promotes rivalry among producers and gives information to consumers
Mansfield	Yes. No data given	Yes. No data given
Maynard	No inspection	No bacteria counts
Middleboro	Yes. No data given	Yes. No data given
Milford	No inspection	No bacteria counts
New Bedford	Yes	Yes. Improvement in the general milk supply
North Adams	Yes. No data given	No opinion expressed
North Attleboro	No inspection	No bacteria counts
Norwood	No inspection	No bacteria counts
Orange	Yes. No data given	No opinion expressed
Palmer	Yes. No data given	No opinion expressed
Plymouth	Yes. Unmistakable improvement and co-operation by producers	Yes
Reading	Yes. No data given	Yes. No data given
Salem	Yes	Lower counts and cleaner cotton
Saugus	No opinion expressed	No opinion expressed
Stoneham	Yes. Conditions have improved 20%	Yes

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	MASSACHUSETTS—*Continued*	
Stoughton	Yes. No data given	No opinion expressed
Somerville	No, except in special cases	Yes. Milk handling should be controlled by bacteria count and sediment test
Southbridge	Yes. No data given	Yes. No data given
Springfield	Yes. Many improvements have been made	Yes
Wakefield	Yes. No data given	Yes. No data given
Waltham	Yes, in part	Yes. Microscopical examination of milk is more valuable to a person understanding the importance of the varieties of bacteria than the incubation for quantity only
Wellesley	Yes. No data given	Yes. 85% of product below 50,000
Westboro	Yes. Farm inspection gives cleaner products.	Yes
Westfield	Yes. No data given	Yes
Weymouth	Yes. Milk supply improved	No opinion expressed
Winchendon	Yes. Infant mortality decreased from 184 in 1913 to 53 in 1917	Yes, as a guide only
Winchester	Yes	Yes. Infant mortality decreased over half
Winthrop	No inspection	No bacteria counts
	MICHIGAN	
Albion	Yes. No data given	Yes. No data given
Boyne City	No inspection	No bacteria counts
Detroit	Yes. Good milk supply due to dairy farm score	Yes.
Dowagiac	No inspection	No bacteria counts
Escanaba	Yes. No data given	Yes. Count reduced
Grand Rapids	Yes. No data given	Yes. No data given
Iron Mountain	No opinion given	No opinion given
Ironwood	Yes. Most important feature	Yes. Laboratory tests very essential

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	MICHIGAN—*Continued*	
Ishpeming	Yes. No data given	Yes. No data given
Jackson	Yes. No data given	Yes. No data given
State Food & Drug Dept.	Yes. No data given	No opinion expressed
Ludington	Yes. No data given	Yes. No data given
Marquette	Yes. Great improvement	Yes. Larger dairies anxious to get low bacteria counts
Monroe	No inspection	No bacteria counts
Niles	No inspection	No bacteria counts
Pontiac	Yes. No data given	Yes. No data given
Three Rivers	Yes. No data given	Yes. No data given
	MINNESOTA	
Albert Lea	No inspection	No bacteria counts
Austin	No inspection	No bacteria counts
Cloquet	No inspection	No bacteria counts
Crookston	No inspection	No bacteria counts
Duluth	Yes. Dairy conditions improved	Yes. Count cut in half
Minneapolis	Yes. Bad dairies eliminated; other dairies improved	Yes. No data given
Rochester	Yes. No data given	Yes. No data given
St. Cloud	Yes	Possibly in summer but hardly think so in winter
St. Paul	Yes. Marked improvement	Yes. Marked improvement
Stillwater	No inspection	No bacteria counts
Virginia	No inspection	No bacteria counts
	MISSISSIPPI	
Biloxi	Yes. Marked improvement in equipment and methods	No opinion expressed

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	MISSISSIPPI—*Continued*	
Columbus	No inspection	No bacteria counts
Greenville	Yes. No data given	Yes. No data given
Hattiesburg	Yes. General cleanliness of dairy barns; improved construction	Yes. Reduction in count and less souring
Laurel	No inspection	No bacteria counts
Yazoo City	Yes. Better barns; healthier cows	Yes. No data given
	MISSOURI	
Brookfield	Yes. No data given	No opinion expressed
Cape Girardeau	No inspection	No bacteria counts
Fulton	No inspection	No bacteria counts
Joplin	Yes. Improvement in cleanliness of dairies.	No opinion expressed
Mexico	No inspection	No bacteria counts
St. Charles	Yes. No data given	No opinion expressed
St. Joseph	No, except where trouble is manifested	Yes. Laboratory inspection checked adulteration
St. Louis	Yes. Improvement apparent	Yes
Springfield	Yes. Improvement made	Yes. Both are necessary for satisfactory results
Webster Groves	Yes. No data given	Yes. No data given
	MONTANA	
Anaconda	No inspection	No bacteria counts
Billings	Yes. A noticeable betterment in dairy equipment. Bad dairies eliminated	No opinion expressed
Bozeman	No opinion expressed	No opinion expressed
Butte	Yes. No data given	Yes. No data given
	NEBRASKA	
Lincoln	Yes	Yes, as corroborative evidence

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	NEW HAMPSHIRE	
State Lab. Hygiene	Yes	Yes, as a check on methods
Portsmouth	No laboratory	No bacteria counts
Rochester	No laboratory	No bacteria counts
Somersworth	No. Not in such a small town as this	Yes. No data given
	NEW JERSEY	
State Dept. of Health	No. To be cut down very materially	Yes. To be extended in the future
Asbury Park	Yes. Must be supplemented with bacteriological examination	Yes. Of great assistance in controlling milk supply
Atlantic City	No opinion expressed	No opinion expressed
Bayonne	Yes. No data given	Yes. No data given
Bloomfield	No inspection	No bacteria counts
Bridgeton	No opinion expressed	No opinion expressed
Camden	No opinion expressed	No opinion expressed
Dover	Yes	Yes, as a check to farm inspection
Elizabeth	Yes. A means of finding the cause of high counts and applying the remedy	Yes, as a check on dairy inspection and methods for determining the true quality of the product of various sources
Gloucester	Yes. No data given	Yes. No data given
Hackensack	Yes. No data given	Yes. No data given
Harrison	No opinion expressed	No opinion expressed
Hoboken	No opinion expressed	No opinion expressed
Jersey City	Yes. To determine health of cattle	Yes, very important
Kearney	Yes	Yes. Counts decreased
Long Branch	Yes, if made at time of milking	Yes
Montclair	Yes	Yes. Milk can be controlled in no other way

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	NEW JERSEY—*Continued*	
Morristown	Yes. No data given	Yes. No data given
Newark	Yes	Yes. Necessary for proper supervision of milk supply
Nutley	Yes. No data given	Yes. No data given
The Oranges	Yes	Yes. Bacteria counts reduced
Passaic	Yes. General improvement in sanitary conditions	No bacteria counts
Princeton	Yes. No data given	Yes. No data given
Ridgewood	Yes. Dairies greatly improved	Yes. Counts reduced
Salem	Yes. No data given	No opinion expressed
Summit	Yes. Milk supply improved due to rigid inspection	Yes.
Trenton	Yes. By State Dept. only which has jurisdiction over country dairies	Yes. Bacteria should be differentiated
Union	No inspection	No bacteria counts
	NEW MEXICO	
Albuquerque	Yes. Results in great improvement in equipment and methods; causes a spirit of competition	Yes. No data given
Roswell	Yes. Improvement from farm inspection.	No opinion expressed
	NEW YORK	
Albany	Yes	Yes. Milk delivered with lower temperature and average bacteria count is low
Amsterdam	Yes. 105 dairies have been raised from grade C to B in three years	Yes. 90% cooled with ice
Auburn	Yes. Child death rate has been lowered as regulations have been enforced	Yes

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	NEW YORK—*Continued*	
Batavia	Yes. New barns and milk houses, better water and ice supplies	Yes
Binghamton	Yes	Yes. Better milk supplies by publishing tests
Buffalo	Yes. Great improvement in sanitation. Work is educational	Yes. All important as a clue to careful or careless production
Canandaigua	Yes	Yes. Less sour and dirty milk
Cheektowaga	Yes. No data given	Yes. No data given
East Hamburg	Yes. No data given	No opinion expressed
Franklinville	Yes. Milk is cleaner	Yes
Fulton	Yes. No data given	Yes. No data given
Gloversville	Yes. No data given	Yes. No data given
Holland	General education of farmer due to inspection. Better equipment and better methods.	Yes. No data given
Ithaca	Yes. No data given	Yes. No data given
Johnstown	Yes. Inspections often repeated with special attention to methods most effective means of obtaining milk of good quality.	No
Little Falls	Yes. Average score improved from 35 to 70.	Yes. No data given.
Marilla	Yes. General conditions improved through cleaner utensils, cows and stables	Yes. Bacteria counts kept down by cooling with ice
Medina	Yes. No data given	No opinion expressed
Newstead & Akron	Yes. Improvements since dairy inspections started	Yes. No data given
Niagara Falls	Yes. Improved conditions on farms	Yes. Reduction in number of bacteria
North Tarrytown	Yes. No data given	Yes. No data given
North Tonawanda	Yes. Decided improvement	No. Methods more important

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	NEW YORK—*Continued*	
Olean	Yes. No data given	Yes. No data given
Oneonta	Yes. No data given	Yes. No data given
Plattsburg	Yes. Marked improvement since inspection and scoring has been done	No opinion expressed
Poughkeepsie	Yes, when laboratory examinations show unsatisfactory condition of the milk	Yes
Rensselaer	No inspection	No bacteria counts
Rome	Yes. Big improvement shown on score card.	Yes. No data given
Saratoga Springs	Yes. Dairy scores considerably improved	Yes. Milk has shown less bacteria
Syracuse	Yes. No data given	Yes. No data given
West Seneca	Yes. Since inspection started we received practically no complaints of milk souring the day it is delivered	Yes. No data given
White Plains	Yes. Marked increase in Grade B dairy farms. Nearly all Grade C farms have gone out of business	Yes
Williamsville & Amherst	Yes. Essential that frequent inspections be made for education and for clean methods of production	No opinion expressed
Yonkers	Yes	Yes. Reduction in bacteria counts
Cortland	Yes. No data given	No opinion expressed
	NORTH CAROLINA	
Durham	Yes. To observe sterilization processes, cooling and general sanitary conditions	Yes, if properly interpreted and milk graded according to other conditions found
Goldsboro	Yes. Improvement of farm conditions in general	Yes, for the personal knowledge of the Health Department, but not for the information of the public.

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	NORTH CAROLINA—*Continued*	
Kinston	No inspection	No bacteria counts
Rocky Mount	Yes. One of the most important measures to obtain pure milk	Yes, as a means of detecting old milk as well as improperly cooled and dirty milk
Wilmington	Yes	Yes. Bacteria count has dropped from 25,000,000 average to about 30,000 average
Winston-Salem	Yes. Great improvement in dairy sanitation.	Yes. Lower bacteria counts with sterilization of utensils and cooling of milk
Wilson	Yes. More important than anything else	Yes. No data given
	OHIO	
Ashtabula	Yes. Great sanitary improvement. Dairies now averaging 75	Yes. No data given
Ashland	No inspection	No bacteria counts
Athens	Yes. No data given	No opinion expressed
Bellaire	No inspection	No bacteria counts
Bellevue	Yes. Farm inspection has tendency to improve milk supply	No opinion expressed
Cambridge	No opinion expressed	No opinion expressed
Canton	Yes. No data given	Yes. No data given
Chillicothe	Yes. No data given	Yes. No data given
Cincinnati	Very important	Very necessary
Cleveland	Yes; of secondary value	Yes. Marked improvement in quality of milk
Columbus	Yes. For follow-up inspection after laboratory results are had	Yes. Bacteria counts greatly reduced
Conneaut	No inspection	No bacteria counts
Dayton	Yes. No data given	Yes. Count decreased
Defiance	Yes. No data given	Yes. No data given
Delphos	No inspection	No bacteria counts

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	OHIO—*Continued*	
Findlay	Yes. General improvement in sanitation	No opinion expressed
Galion	No inspection	No bacteria counts
Greenville	Yes. No data given	No opinion expressed
Hamilton	Yes. Inspection helps farmers to understand reason for improvement	Yes
Kenton	No opinion expressed	No opinion expressed
Lorain	Yes. No data given	Yes. No data given
Mansfield	Yes, with proper modification	Yes. No better indication of conditions of production, storage, age, etc.
Martin's Ferry	No opinion expressed	Yes. No data given
Massillon	Yes. No data given	Yes. No data given
Nelsonville	No inspection	No bacteria counts
Norwood	Yes. Great improvement	Yes
Piqua	Yes. No data given	No opinion expressed
Salem	Yes. Has undoubtedly raised standard of milk	No opinion expressed
Sandusky	Yes. Cows and barns are cleaner	Yes. No data given
Springfield	Yes, for the education of the farmer. Personality of inspector very important	Yes, only in so far as they educate farmer and distributer
Toledo	Yes. No data given	Yes. No data given
Troy	No inspection	No bacteria counts
Wapakoneta	No inspection	No bacteria counts
Wellsville	Yes. Marked improvement	Yes
Xenia	No inspection	No bacteria counts
Youngstown	Yes. Improvement in dairies	Sediment tests substituted for bacteria counts
Zanesville	No opinion expressed	Yes. Milk supply improved

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	OKLAHOMA	
El Reno	No inspection	No bacteria counts
Oklahoma City	Yes. For raw milk supplies but not for dairies producing milk for pasteurizing plants	Yes. Very stimulating when results are published
	OREGON	
Ashland	No inspection	No bacteria counts
Astoria	Yes. No data given	No opinion expressed
Baker	No inspection	No bacteria counts
Medford	No inspection	No bacteria counts
Portland	Yes. Farm inspection and laboratory control only incidental	Yes. Improvement here is due to holding periodical contests giving each dairyman and dealer a rating and publishing same
	PENNSYLVANIA	
Allentown	Only as to cleanliness to cattle and barnyard. Does not believe in using dairy farm score cards	Yes
Altoona	Yes. A big improvement about the barns	Yes. No data given
Ashland	No inspection	No bacteria counts
Beaver Falls	No inspection	No bacteria counts
Bellevue	Yes. No data given	Yes. No data given
Bradford	No inspection	No bacteria counts
Butler	No inspection	No bacteria counts
Carbondale	No inspection	No bacteria counts
Catasaugua	No inspection	No bacteria counts
Chambersburg	Yes. No data given	No opinion expressed
Clearfield	No opinion expressed	No opinion expressed

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	PENNSYLVANIA—*Continued*	
Coatesville	Yes. Cleaner and more carefully handled milk supply	Yes
Coraopolis	No inspection	No bacteria counts
Dickson City	No inspection	No bacteria counts
Donora	No inspection	No bacteria counts
Du Bois	No inspection	No bacteria counts
East Pittsburgh	Yes. No data given	Yes. No data given
Fayette	No inspection	No bacteria counts
Forest City	No inspection	No bacteria counts
Glassport	No inspection	No bacteria counts
Greenville	Yes. Use of score cards has caused improvement in farm conditions	No opinion expressed
Hazelton	No opinion expressed	No opinion expressed
Indiana	No inspection	No bacteria counts
Kingston	No inspection	No opinion expressed
Lancaster	Yes. No data given	Yes. Counts have been lowered greatly
Lock Haven	No inspection	No bacteria counts
Lucerne	No inspection	No bacteria counts
Mahanoy	No opinion expressed	No bacteria counts
Morristown	No inspection	No bacteria counts
Philadelphia	No opinion expressed	Yes. No data given
Pittsburgh	Yes. Remarkable improvement	Yes
Pittston	No	No opinion expressed
Punxsutawney	No inspection	No bacteria counts
St. Clair	No opinion expressed	No opinion expressed
Scottdale	No inspection	No bacteria counts
Sharon	Yes. No data given	Yes

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	PENNSYLVANIA—*Continued*	
Scranton	Yes	Yes. Splendid analytical record due to constant use of sediment tests, which is mailed to producers with report of complete tests
Stolton	No inspection	No bacteria counts
Sunbury	No inspection	No bacteria counts
Taylor	No inspection	No bacteria counts
Washington	No opinion expressed	No opinion expressed
Windber	No inspection	No bacteria counts
	RHODE ISLAND	
Bristol	Yes. No data given	Yes. No data given
Central Falls	Yes. No data given	Yes. No data given
Newport	Yes. Improvement noticed	Yes
Providence	No. Better control of milk supply through dealers than by routine farm inspection. Farm inspection gave practically no results.	Yes
Warren	No opinion expressed	No bacteria counts
Warwick	Yes. Farms have improved 100% within the last year	No opinion expressed
	SOUTH CAROLINA	
Anderson	Yes. No data given	Yes. No data given
Greenville	Yes. No data given	Yes. No data given
	SOUTH DAKOTA	
Aberdeen	Yes. No data given	Yes. No data given
Huron	No inspection	No bacteria counts
Mitchell	No. Not here	No.
Lead	Yes. No data given	No opinion expressed
Sioux Falls	Yes. No data given	No opinion expressed
Watertown	Yes. No data given	No opinion expressed

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	TENNESSEE	
Chattanooga	Yes. Equipment and methods improved. Combination laboratory and inspection best	Yes, provided all data relative to collection of samples and conditions of dairies and employees are available
Knoxville	Yes. Steady improvement	Yes
Memphis	Yes, when made by competent inspectors	Yes. When ably assisted by farm inspector
Nashville	Yes. No data given	Yes. No data given
	TEXAS	
Austin	Yes. Considerable improvement	Yes. No data given
Corpus Christi	Yes. No data given	Yes. No data given
El Paso	Yes. No data given	Yes. No data given
Ennis	No inspection	No bacteria counts
Gainesville	No inspection	No bacteria counts
Galveston	Yes. For prophylactic effect	Yes, for guide and comparison
Hillsboro	No inspection	No bacteria counts
Palestine	No inspection	No bacteria counts
Waco	Yes, in smaller cities in absence of compulsory pasteurization	Yes
Weatherford	Yes, no data given	Yes. No data given
	UTAH	
Ogden	Yes. No data given	Yes. No data given
Provo	No opinion expressed	No opinion expressed
	VERMONT	
State Health Department	No. Too much emphasis has been placed on equipment and too little on character of product	Yes

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	VERMONT—*Continued*	
Brattleboro	Yes. No data given	Yes. No data given
Burlington	Yes, but consider final inspection of product more important	Yes
St. Albans	Yes. No data given	Yes. No data given
	VIRGINIA	
Dairy & Food Department	Yes, in connection with laboratory control	Yes. Laboratory control has brought about material improvement
Danville	Yes. No data given	Yes. No data given
Fredericksburg	No inspection	No bacteria counts
Lynchburg	Yes. Barns are now modern and sanitary	Yes. No data given
Newport News	Yes. No data given	Yes. No data given
Norfolk	Yes. Printed report furnished	Yes. Printed report furnished
Richmond	Yes. Printed report furnished	Yes. Printed report furnished
Roanoke	Yes. Marked improvement in dairy scores.	Yes. Quality of milk improved
Winchester	Yes	Yes
	WASHINGTON	
Aberdeen	No opinion expressed	No opinion expressed
Bellingham	No opinion expressed	No opinion expressed
Centralia	No opinion expressed	No opinion expressed
Everett	Yes. No data given	Yes. No data given
Tacoma	Yes. Marked improvement in dairy equipment and sanitation	Yes. Marked improvement in quality of milk
	WEST VIRGINIA	
State Health Department	Yes. Inspection and laboratory control do a great deal of good	Yes, when samples are properly collected and iced

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	WEST VIRGINIA—*Continued*	
Moundsville	Yes. No data given	Yes. No data given
Wheeling	Yes. No data given	Yes. No data given
	WISCONSIN	
Baraboo	No inspection	No bacteria counts
Beaver Dam	No inspection	No bacteria counts
Beloit	Yes. No data given	Yes
Chippewa Falls	Yes. No data given	Yes. No data given
Eauclair	Yes. Marked improvement in condition of dairies, equipment and cleanliness of cattle.	No opinion expressed
Kenosha	Yes. No data given	Yes. No data given
Madison	No, except when analytical reports show the product to be bad	Yes. Great good accomplished
Manitowoc	Yes. General improvement	Yes
Marinette	Yes. No data given	No opinion expressed
Marshfield	Yes. No data given	Yes. No data given
Menomonie	No inspection	No bacteria counts
Oconto	No inspection	No bacteria counts
Oshkosh	Yes	Yes. The bacteria count is much lower and the milk much cleaner
Rhinelander	Yes. No data given	Yes. No data given
South Milwaukee	Yes. Personal acquaintance with producer obtains good results	No opinion expressed
Superior	Yes	Yes. Bacteria counts are only half as large since farm inspection and laboratory control were instituted and results published
	WYOMING	
Laramie	No inspection	No bacteria counts

City	*Do you consider farm inspection important enough to be continued?*	*Do you consider bacteria counts important enough to be continued?*
	NORTH DAKOTA	
State Health Laboratories	Yes. No data given	Of doubtful importance
Bismarck	Yes. Especially for this new country	Yes. By strict enforcement of bacterial standard the quality of the milk is being gradually bettered
Devils Lake	No opinion expressed	No opinion expressed
	HAWAII	
Territorial Board of Health	Yes. No data given	Yes. No data given
Honolulu	Yes. No data given	Yes. No data given
	PORTO RICO	
Mayaguez	Yes. No data given	No opinion expressed

"Experience teaches slowly, and at the cost of mistakes."

SIMPLIFIED CITY MILK INSPECTION

PROF. H. A. HARDING, University of Illinois

Municipal milk inspection in this country is now about sixty years old. In the beginning this inspection was an extremely simple matter but as time passed it became complex. Recently our attention has been repeatedly drawn by papers before this and related societies to the fact that there has grown up a chaotic mass of milk requirements. A reaction is on and we are now intent on the reduction of requirements to the simplest basis consistent with the proper supervision of the milk supply. As milk inspectors we are naturally interested in having this simplification take such form as to make it possible to conduct efficient inspection.

OBJECT OF INSPECTION

The early inspectors concerned themselves with watering and skimming of milk, their object being to protect food value and prevent fraud. At this stage the inspectors were simply special policemen.

Beginning about 1890 the possibility of spreading disease through milk began to be generally recognized and the protection of public health became a primary object of milk inspection. The inspectors then became health policemen. It soon became apparent that disease germs found their way into milk not through malice but through carelessness or ignorance. The inspectors began gradually to exercise less the function of policemen and more and more to take the part of teachers. The range of the teaching expected of them is surprisingly wide. In addition to questions of healthfulness the producer desires information regarding costs of production and markets for product. The dealer expects information on various aspects of his processes and the consumer in addition to knowing that the milk is safe

asks where he can get the most food for his money, which milk is cleanest and which will keep sweet longest.

PLAN OF INSPECTION

During the first forty years the field of activity of the milk inspector was practically confined to the municipality. It was held that in common with other police officers he was powerless outside of his municipal jurisdiction. Attention was mainly directed toward detecting and punishing skimming and watering. First the lactometer and later the Babcock test were singled out as simple and satisfactory aids to inspection. To facilitate conviction before the courts the laws regarding minimum legal limits were developed. They are undoubtedly valuable for this purpose but are becoming more and more a stumbling block to progress in other particulars. They are by no means the only laws enacted for the convenience of the inspector and in disregard of the rights of the public. For a generation the sale of skim milk in New York City was forbidden because such sale would complicate the conviction of parties guilty of fraud through skimming and watering milk.

During the last decade of the nineteenth century attention turned to the spread through milk of diseases, particularly tuberculosis. In isolated instances inspectors began to go beyond the limits of the municipality. Epidemics of various diseases began to be traced to their sources even when these sources lay in the country.

Along with the changed view of their responsibilities, the inspectors in the city began to take interest in other things than lactometer readings and fat determinations.

Pasteurization began to be discussed and later to be practiced and attention was given to the time and temperature employed in the process. The lot of the inspector was particularly hard at this time because while the milk reformers were all strenuously advocating pasteurization as

an ideal safeguard against disease germs in milk the inspector was painfully conscious that the process as actually employed in practically all commercial plants prior to 1898 was a fraud so far as protecting the public health. Beginning with the work of Theobald Smith in 1898 and Russell and Hastings in 1900 pasteurization came into its own and has gradually become our efficient protection against disease germs in milk.

Early in the present century the insistent demand of the public for clean milk directed attention to the various forms of sediment test. For a time the inspector's attention was strongly drawn in this direction. However, the great bulk of the milk in practically every market was found to contain surprisingly little dirt and as soon as attention was directed toward them the few bad cases rapidly improved or were summarily dealt with. The interest in the sediment test largely subsided, partly because so little dirt was found and partly because in its earlier form the sediment test was not on a quantitative basis. Later the Chicago Department showed how the sediment test might be made quantitative but interest did not revive.

Most recent of all came the interest in bacterial counts. They were first suggested as a measure of disease germs in milk. That bacterial counts were of no value for this purpose was evident from the beginning to those at all familiar with bacteriology and later studies have made this evident to practically every one. Bacterial counts were widely accepted as an indication of dirt in milk. It is true that bacteria are more or less abundant on all forms of dirt and accordingly dirt getting into milk adds to the germ content. The amount of dirt which enters milk under even the most careless handling is so small that the bacterial content thus added is relatively insignificant. Accordingly as a test of the cleanliness of the milk found in the market by the inspector the bacterial count is practically worthless.

The value of the bacterial count in connection with the

general milk supply is practically limited to the information which it gives regarding the probable time during which the milk will remain sweet and essentially unchanged —the keeping quality of the milk. While the bacterial count is not an accurate test even for this purpose, in general a sample containing but a few thousand bacteria per cubic centimeter will with reasonable care remain sweet and in good condition for at least twenty-four hours while if the germ content is in the millions it will probably sour within a short time.

From this brief survey it will be seen that during the time the field of the inspector was limited to the city he had focused his attention successively upon the lactometer and the Babcock test, pasteurization, the sediment test, and the bacterial count. He attempted successively to make a hobby of each of these but made no serious effort to coordinate them. He was intent upon finding some single standard by which good milk might be characterized.

When the public was informed that a given milk was high in fat but unpasteurized or another was well pasteurized but dirty or a third was high both in fat and in germ life it found itself confused rather than instructed.

In some cities a little before, but in many cities just about the opening of the present century there began a remarkable pilgrimage of inspectors out into the open country. The zeal which the inspectors displayed for the fresh air treatment was due partly to the lack of satisfactory results from the earlier inspections in the city and partly to confidence in the dairy score card.

A considerable number of different cards were used but they had two things in common in that they took account of about as many different items as a social survey and at the end they reduced the observations to a numerical expression which somehow gave a feeling of exact knowledge. If one dairy scored forty-eight it was perfectly evident that it must be distinctly less desirable than a neigh-

boring one which scored forty-nine. No one really knew what such a score meant, which was the best possible reason why no one cared to make adverse criticisms regarding the score card system.

In all justice to score cards and to farm inspection it must be admitted that this work has been productive of many good results, among which must be reckoned the contact which it produced between the health representative and the milk producer. People must be acquainted before they can work together to best advantage.

The use of score cards in farm inspection threw light upon two important angles of the inspection problem. As has been noted in connection with earlier city inspection, dividing the attention of the public among a number of items leads to confusion. The use of the score card showed that an almost endless number of items could be successfully handled if they were properly combined and presented as a single result. On the other hand the serious attention given by the public to the results of this score card inspection even when the results were on such an uncertain foundation suggested that the public would give even more consideration to well founded observations.

During the past decade farm inspection has been extensively tested by most large and many medium-sized cities. Those who have had experience will agree that it is far from satisfactory and the most that could be claimed for it was that nothing better was available. During the earlier years many of us thought that the difficulty lay in the deficiencies of the available score cards. Accordingly the research forces of a number of institutions were focused upon the problem and the foundations underlying the score cards were carefully studied.

After years devoted to this study we were compelled to confess that the time required to make a proper inspection of a single farm, the large number of farms involved, and the limited amount of money available for the inspection

work made accurate score card farm inspection practically impossible.

BASIS FOR INSPECTION

Milk inspection is designed primarily to serve the consumer. If it is to be of greatest service it should be based upon a clear conception of the points at which the consumer needs service. These points may be summarized in various ways but as inspectors we are interested in having them so arranged that we have available means for getting accurate information on the points at issue. As has been suggested the four questions which the consumer will ordinarily ask the inspector are:

(1) Where can I get the most food for my money?
(2) Is the milk safe?
(3) Is it clean?
(4) Will it keep sweet for a satisfactory length of time?

If we accept these as the questions to be answered how shall we conduct our inspection in order to answer them correctly?

The question of food value is really quite complex but when it is all summed up it will be found that the fat content of normal milk is an excellent index of food value. As we all know, the fat content can be quickly determined by the Babcock test.

The safety of the milk presents another difficult question. Certified milk is rendered fairly safe by a system of veterinary inspection of the cows and medical inspection of the people coming into contact with the milk. This has the drawback of being too expensive to apply to the general milk supply. Perhaps an even greater degree of safety is secured by a proper pasteurization of milk. For the ordinary milk supply the question of safety may well

be answered by frequent inspection of the pasteurization plants, together with the requirement of temperature recording devices and the preservation of the daily records.

The inquiry regarding cleanliness can be answered accurately by a sediment test.

The inquiry regarding the length of time the milk will remain sweet, that is, the keeping quality of the milk, likewise presents difficulties. The bacterial count may be utilized if the facilities for making it are at hand. A more direct answer may be obtained if a sample of the milk in question is placed for twenty-four hours at some definite temperature as 60 or 65° F., and at the end of that period it is examined as to acidity and other changes.

While the consumer is naturally curious regarding the entire history of his milk supply he is primarily interested in the condition of the milk as it is delivered to him. Accordingly the samples collected for the above tests are best taken from the wagons of the distributers, this collection of samples being supplemented by an inspection of the pasteurizing processes and pasteurizing records at the milk plants.

The collection and examination of these samples may be properly characterized as simplified milk inspection. The execution of this program will be found within the financial possibilities of any municipality which is prepared to devote any attention and money to the milk problem. The Health Departments which are now conducting an elaborate system of inspection will undoubtedly consider this plan as too simple, though I believe a careful study will show that it will accomplish as much if not more than the present system.

The inspection having been made and the significant facts determined there remains the problem of making the records of the inspection usable by the consumer. Here we may well utilize the experience gained from score cards and summarize the facts under market grades.

Most attempts at milk grading have erred by providing too many grades. Even in markets where no official grading exists the public is often confused by the number of grades present. The needs of the market would seem to be fully met by three grades which may be characterized as Special, Table, and Cooking Milk.

The grade here referred to as Special Milk is designed primarily to meet the needs of babies and invalids and would rarely make up more than ten per cent of the market demand. The great bulk of the milk in any market should be entirely satisfactory for direct consumption by growing children and adults and may be called Table Milk. Milk which is satisfactory in other respects but which is not so fresh or so carefully protected as the Table Milk may be classed as Cooking Milk.

The exact definition of these grades might vary in some particulars with the condition of the local market supply but in general these grades may be fixed about as follows:

Special Milk

Food Value.—In certified milk and many special milks there is a tendency to require four per cent of fat. In some instances pediatricians are in favor of a lower percentage. In all cases they desire that milk for baby feeding shall be of a constant and known composition.

Healthfulness.—The health of the cows and the people coming in contact with the milk should be safeguarded to the highest practical extent. In some instances, as in certified milk, it is possible to carry this protection to a degree which makes the milk fairly safe. However, in best practice certified milk is pasteurized before being fed and in all cases where the protection surrounding the milk is less than that demanded by certified milk, the milk should be pasteurized at 140 to 145° F. for thirty minutes. Frequent inspection of the pasteurizing plant and recording

thermometers should make certain that the pasteurization is at all times effective.

Cleanliness.—The visible dirt present should not be more than a trace and in no case should the sediment test indicate as much as .25 milligram per pint.

Keeping Quality.—The milk should be so fresh and sweet that during the period within which it would be normally used for baby feeding there would be no question of its undergoing observable change. Samples kept forty-eight hours at 60° F. should show no increase in acidity or development of objectionable flavors.

Table Milk

Food Value.—The milk may be of widely varying fat content but the percentage of fat should be stated upon each bottle and the fat content of the milk should be in accord with the statement.

Healthfulness.—The expense of guaranteeing the healthfulness of the cows and all the people coming in contact with a large milk supply is practically prohibitive. Accordingly the healthfulness of Table Milk is ordinarily best guaranteed by the pasteurization requirement outlined under baby milk, supplemented by such inspection of the cows and men as is practicable. Such inspection is most important in connection with the persons coming in contact with the milk during and after pasteurization.

Cleanliness.—Table milk should not carry visible foreign matter in excess of two milligrams to the pint and ordinarily should carry less than .5 milligram to the pint.

Keeping Quality.—Table milk should remain sweet and in satisfactory condition for use for at least twenty-four hours after delivery to the consumer and ordinarily should keep in satisfactory condition for 48 hours at this temperature.

Cooking Milk

Milk which in food value and healthfulness would be acceptable as Table Milk but which is below the requirements of that grade in cleanliness or keeping quality may be sold as cooking milk.

The complexity of the milk situation will generally call for elaboration of this outline. A standard of milk prior to pasteurization will be desired by many. In practically all places a revocable license should be required of all milk distributers. The requirement that all milk bottles should be rendered safe before being filled with milk should be universal and the bottle cap should plainly state the grade of milk contained. This summation of the milk qualities in a grade name and its constant presentation to the consumer with each bottle of milk most quickly and directly brings the consumer into cooperation with health officials. Former requirements and personal beliefs will frequently suggest further additions. These should be carefully scanned both as to their soundness and as to their results. The price of milk is already high. Every additional requirement either raises the price of milk or decreases the supply and neither of these results will be taken kindly by the consuming public.

With the grades of milk defined in this way and the requirement that each bottle of milk should state on the cap the grade to which it belonged the above-described simple form of inspection would enable the inspector to determine with accuracy whether a given sample of milk was true to the grade under which it was sold.

Such a simple form of inspection and grading would make it easy for the milkman to conduct similar tests himself and thereby know exactly the true grade of the milk he was offering for sale. With the requirements so simply stated and the facts so easy of accurate determination the active cooperation of the great majority of the dairymen would be easy to obtain and we all know that

without such cooperation satisfactory results are well-nigh impossible.

The plan as here outlined has been tried out in connection with the milk supply of Champaign, Ill., during the present year and while sufficient experience has not yet been obtained as to the effect of the plan upon the market conditions experience has shown that from the standpoint of the inspection itself the plan is entirely workable.

DISCUSSION

MR. TUCKER. Where will we start to grade?

DR. HARDING. The man must deliver the goods according to grade.

DR. LEVINE. I do not approve the points regarding the sediment test. People without sense demand the cheapest milk regardless of its price. I recommend positive pasteurization. Pasteurized milk reinfected by bottle or otherwise becomes increasingly dangerous as time becomes an element, under ordinary household conditions.

MR. KELLY. Clean milk is what we want, and that, primarily, is what we are here for. We exist to protect the public health, especially our people in the cities. The keeping quality alone is purely a test for the dealer who wants to know whether milk is sweet or sour. A test for keeping quality will not help in protecting the public health. No amount of pasteurization will remove byproducts of bacterial growth. There are but few cities where milk is really perfectly pasteurized. We can control pasteurization time and temperature. There is no reason why anyone should produce "cooking" milk. I do not regard the sediment test as one of value when used as a basis for grading.

DR. STATES. I desire to state briefly my experience will support everything Mr. Kelly has just said. There is no good milk that has been dirty. Keep the dirt out.

PROF. STOCKING. We cannot deny that a lot of good has resulted from the use of the dairy farm score card. Especially has its educational value been particularly effective, although scores as they are made and bacterial counts as they are made do not always agree. The production of milk can be carried on successfully even in barns that are ordinary and far from the ideal. We should not let go what we have until we have something better to take its place. I believe we should use both the laboratory and dairy farm inspection for all they are worth.

DR. BREED. We make laboratory examinations, which are followed by farm inspection only where trouble apparently existed. After two or three years' work we find we are not completely satisfied. We examine milk directly from the farms. We trace high counts back to cans and milking machines. We have succeeded in correcting conditions.

MR. KELLY. What decides whether or not the milk is O. K.?

DR. BREED. The absence of watering or skimming. We have found no satisfactory method for entirely controlling sediment. We make both microscopic and plate examinations, as well as qualitative work, in examining its bacterial condition.

DR. HARDING. Mr. Kelly is always fair. Mr. Kelly and I never agree, so our conversation is always interesting.

There has been an interest in, and we want to know more about toxins. Milk is a complex compound. It in itself hinders the development of troubles within. If objectionable byproducts are formed, they are taken care of, in part, at least. Up to date we have no information that there is anything serious to expect from toxins. Even in the best plants, pasteurization falls short of our ideals. Sediment in milk is more a matter of sentiment than of danger. We with the resources of the State behind us hardly put out a bottle that does not contain at least a

trace. Most of ours comes from steam pipes. We cannot get results from dairy farm inspection with a reasonable expenditure of money.

MR. KELLY. How are you going to determine and judge results?

DR. HARDING. What concrete evidence have we that milk is better than it was ten years ago? The only thing that would stand two minutes in a cross-examination in court would be sediment test records.

MR. KELLY. What system would you use to demonstate an improved supply?

DR. HARDING. If cleaner; if pasteurized, or partly pasteurized; if it will keep sweet better.

While in conversation with the health officer of a very large city recently—a man who has quite a reputation around the country—he stated that according to his notion dairy farm inspection did not amount to much anyway.

DR. STATES. What does that health officer know about dairy farm inspection? Who is this man whom you are quoting, and whom you are attempting to place before us as an authority on the subject?

DR. HARDING. He would use dairy farm inspection to keep check, and so forth, on the producers.

DR. STATES. You have not answered my question.

"Municipal sanitary reform is usually inspired by a great epidemic, notwithstanding the fact that many epidemics can be foretold and also that it is easier, better and cheaper to prevent disease than to cure the sick."

REPORT OF COMMITTEE ON ORGANIZATION OF MILK CONTROL

DR. WM. H. PRICE, *Chairman*

Organization consists in the harmonious arrangement of the various elements of a scheme so that it will work efficiently.

The membership of this Association is composed of men "who now are or have been actively engaged in dairy or milk inspection." The object of this Association is "to develop uniform and efficient inspection of dairy farms, milk establishments, milk and milk products, and to place the inspection of the same in the hands of men who have a thorough knowledge of dairy work." It is believed that a liberal interpretation of these provisions of the Constitution will permit the inclusion in this report of anything calculated to improve human welfare as it may be affected by the milk supply.

A review of the published Proceedings of the Association indicates that numerous elements are concerned with the milk problem. They may be stated as follows:

Dairy farm management.
Transportation management.
City milk plant and distribution management.
Chemistry.
Bacteriology.
Epidemiology.
Human and veterinary medicine.
Sociology.
Economics.

Various agencies also are recorded as having to do with the milk problem and with proposals for its solution. They may be enumerated as follows:

Federal, State and local health and agricultural authorities.

Producers.

Transportation agencies.

Milk dealers.

Consumers.

Legislative bodies.

Medical societies.

Official and voluntary organizations for establishing milk standards or arbitrating the price of milk.

Women's and civic clubs.

Newspapers.

Necessity has created the following standing committees of this organization, and their reports have usually been endorsed at the Annual Conventions.

Committees

Rules and Regulations Necessary for Securing a Clean and Safe Milk Supply.

Cost of Dairy and Milk Inspection.

Bovine Diseases—Their Relation to the Milk Supply and to the Public Health.

Diseases of Man—Their Relation to the Milk Supply and to the Public Health.

Dairy Farm Inspection.

City Milk Plant Inspection.

Legislation Affecting Milk and Milk Products.

Transportation and Marketing of Milk and Milk Products.

Methods of Appointment of Dairy and Milk Inspectors, and their Compensation.

Methods of Bacterial Analyses of Milk and Milk Products, and the Interpretation of Results.

In addition the Association has been favored with readings of valuable Committee reports prepared for other organizations, and contributed papers by its own members and by authorities of national reputation on the milk question, many of which reports and papers have been given

official endorsement by the Association or general approval by its members.

The Committee believes that consideration of all the elements and agencies heretofore enumerated is fundamental to solution of the milk problem, and that whatever progress has already been made toward solution of the problem has been materially and favorably influenced by the committee reports and individual papers above referred to.

Theoretically then, it becomes the task of the Committee on Organization of Milk Control to formulate a report in which the various elements entering into the milk problem are arranged harmoniously in correct relation and proportion, drawing upon the published committee and other reports and papers for that purpose, and to recommend an alignment of the groups and agencies heretofore referred to in a scheme well calculated to work efficiently toward the solution of the milk problem.

To do this satisfactorily to all concerned has been a task baffling to earnest and industrious workers even in normal times when proposals for milk control were concerned almost exclusively with sanitary considerations. In view of additional light with respect to the public health importance of maintenance of present and increased consumption of milk, and of revolutionary changes in the economic situation adversely affecting maintenance of present consumption per capita, the Committee approaches its task with no little trepidation. Reorganization, to some extent, of the milk industry in the interest of economic reforms in production, handling, safeguarding and distribution, together with better appreciation of the food values contained in milk have come to be fundamental factors in any well organized system for milk control.

The Committee is not disposed to offer unproven theories as measures for the solution of this enlarged milk problem. While several plausible schemes that seem to

promise practical results to that end are under observation none of these has progressed to the point of proven adequacy.

The Committee ventures therefore only a restatement of the milk problem to include this larger conception of milk control and to offer the suggestion that additional information relative to the amount of milk consumption and to the economics of production, handling, safeguarding and distribution, for opportune use, be collected coincidently with collection of data regarding sanitation in localities where personnel for sanitary control is already available, and be included in milk surveys where measures for sanitary control are about to be undertaken.

A fair but brief statement of the current milk problem is believed to be contained in the following three paragraphs:

1. Because of the importance of milk as a food, particularly as a specific preventive and cure for a prevalent disease of unbalanced diet and as a necessity for which there is no substitute for the proper nutrition of children, *maintenance* of an adequate milk supply is an imperative consideration for every community.

2. Because of danger of communicable disease transmission incident to uncontrolled milk supplies the necessity for safeguarding against milk-borne epidemics is essential to maintenance of adequate milk supplies.

3. Increase in price of milk in common with other necessities is a matter of public concern and leads to consideration of ways by which the increasing price of milk may be restrained within reasonable limits by scientific methods of production, handling and distribution. However, maintenance of a sufficient supply properly safeguarded against becom-

ing a transmitting agent of communicable disease takes precedence over price; food value contained considered, the present price of milk is well below prices of other animal product foods which are no substitutes for milk.

It is deemed expedient to submit this restatement of the milk problem to discussion by the Association without further comment than the following extracts from "Pellagra: Its Nature and Prevention," by Goldberger, published in Public Health Reports, April 5, 1918.

"The suspicion of pellagra may with confidence be dismissed in one who is known to be, and to have been, a habitual milk drinker and meat eater."

"Under proper treatment and with careful nursing only a small percentage of cases die; nevertheless the actual number of deaths is deplorably large. Indeed, in nearly all the Southern States pellagra is one of the foremost causes of death. Thus, in 1916, it ranked fourth in Mississippi, third in Alabama, and second in South Carolina. In that year, probably an average one so far as pellagra is concerned, this disease was charged with having caused 677 deaths in Alabama, 840 in Mississippi, 467 in North Carolina, 627 in South Carolina, 607 in Tennessee and 452 in Texas, or an aggregate of some 3,700 deaths for these six States alone. As the fatality rate, counting all types of cases, was probably not in excess of 5 per cent, it can readily be seen that not only is this disease among the most important as a cause of death, but it probably ranks with the first in importance as a cause of sickness and lowered physical efficiency of the people in the area affected. In the six States named there probably occurred some 70,000 definite cases of pellagra. As it is quite safe to assume that there were in the remaining 7 of the 13 States south of the Potomac and Ohio Rivers—the section most seriously affected—at least half as many more, there

probably occurred in this region in 1916 upward of 100,000 cases. The incomplete figures at hand indicate a considerable increase of the disease in 1917. It seems safe to assume that this increase averaged about 25 per cent, so that it may be estimated that in 1917, in the part of the country mentioned, fully 125,000 people were attacked."

"Milk is the most important single food in balancing a diet and preventing or curing pellagra."

It is taken to be common knowledge that increases in price of milk lead to reduced consumption, with coincident lowering of child resistance and vitality and increase in morbidity and mortality. It may be further said that per capita consumption of milk may be taken as an index of the intelligence of a community with respect to nutritional values.

Relative to the collection of additional data the following suggestions are offered:

1. Relative to maintenance of supply.
   a. That careful compilations of present available milk supplies be made an essential part of milk inspection.
   b. That estimates be made of prospectively available supplies, and what considerations will make them actually available.
   c. That consideration be given to improving transportation facilities in the interest of sanitation, convenience and economy.
   d. That information be secured regarding the proportions of the milk supply distributed and consumed for family use, i. e. the amount distributed in family retail trade both direct—including that produced in the heretofore much despised backyard dairies — and through the medium of depots: and the amount used in

restaurants, soda fountains and for manufactured milk products, especially ice cream.

Data is also desirable relative to the amount of milk consumed in rural districts, and by different classes of the population, economically considered, and of the low age groups; but such information may be practically impossible to secure and it is not desired to overload this survey with hopeless undertakings.

e. In places of known low per capita milk consumption more definite data than is commonly available in morbidity and mortality tables should be acquired relative to the prevalence of pellagra.

2. Relative to safeguarding.

This Committee has already approved the proposals for safeguarding contained in the published Proceedings of this Association and adds here only the comment that those proposals tend toward simplicity in requirements and emphasize those factors having most to do with quality in the final product.

In addition to those proposals the Committee recommends more intensive investigations regarding pasteurizing equipment and methods, both by a committee of this Association and by milk control authorities who have not already undertaken such investigations. While this recommendation is included under the paragraph "safeguarding" it is believed that investigations relative to pasteurization should be conducted as well in the interest of maintenance of supply and reducing cost.

It is further recommended that more accurate data be obtained of prevalence of communica-

ble diseases, especially typhoid fever, in milk producing areas.

3. Price.

The milk problem can no longer be regarded from the sanitary angle alone. In this connection it is a matter of satisfaction that the published Proceedings give recognition to maintenance and price. It has been well said that "the use of milk in a community is an index of its knowledge of food values," and "the general health and welfare of a community may be roughly judged by its daily per capita consumption of milk."

No single factor has so much to do with determining per capita consumption as the selling price of a unit of milk. The Committee has no intention of arbitrarily recommending reductions in milk prices or even restraining milk prices at their present level and refers to the language of paragraph 3 to avoid misunderstanding in that respect.

Nevertheless it is commonly known that inefficiency and personal caprice characterize average market milk production, and to some extent handling and distribution, thus adding unnecessary costs leading to reduced consumption and adverse public health results.

While resentful of prices that do not pay cost of production, or barely pay cost of production, by inefficient methods a considerable proportion of producers are remiss in failing to take advantage of already demonstrated methods that assure increased net return at the same selling price. It is clear that efficient dairy farm management is of prime public health importance.

Again it is not desired to recommend sweep-

ing changes in existing conditions, but it is believed that a survey undertaken for the purpose of organizing a system of milk control under present and prospective conditions may with advantage record individual custom regarding:

a. Use of pure bred sire.
b. Weighing each cow's milk.
c. Adjustments of feed to individual animals.
d. Production of feed.
e. Utilization of manure.

No hardship is entailed nor is superior intelligence required for the introduction of these simple reforms. It is consistent that the producer should present his case for an increased price for milk, or for maintenance of present price, on a basis of having accomplished these minor reforms, and a milk survey such as is here proposed should disclose how many and what producers conform to them in practice. Because of inefficient methods, and duplication in investments and in field, office, plant and delivery forces gross extravagance is believed to exist in the milk plant and delivery system at present prevailing in many places, and there is the further suspicion in the mind of the public that undue charges for plant handling and delivery are concealed behind overcapitalizations and stock watering. Very little information seems to be available regarding city milk plant operation and delivery. Twenty letters of inquiry regarding plant and delivery costs recently sent out brought only six replies, though a Government stamped envelope was inclosed. Of the six replies received only two contained information of any value for the purpose intended. It is obvious that constructive reor-

ganization of milk handling and delivery systems must proceed in the light of much more data relative to costs than is now available.

In submitting this report the Committee has no illusions that it approaches, even remotely, a solution of the problem of Organization of Milk Control. It offers this only as a suggestion of rudimentary data that should be available to more adequately harmonize the contending factors in the milk problem in the interest of public health and welfare. It is believed that such data, accurately collected and intelligently promulgated, would stimulate economic reforms and greater production and consumption of milk, even at a higher price, provided a higher price is shown to be justified. It is also believed that such data would be of value to Commissions, whether voluntary or officially appointed, to adjust milk prices. It is further believed that the proceedings of such Commissions should be attended by representatives of interested Federal Bureaus, and should be recorded to the end that a standard system for such adjustments may be devised.

DISCUSSION

DR. HARDING: If lack of milk is responsible for so many deaths has our agitation of the milk question been productive of more harm than good?

DR. MALONEY: I cannot conceive that any agitation directed toward infected milk may have applied to that section of the country in which pellagra has been prevalent. In our city we have agitated the use of safe milk. The price of milk has advanced. The consumption per capita has increased one ounce. We have concluded that the lack of use of milk has as much bearing as the use of unsafe milk. During the agitation the consumption of milk has increased, and morbidity and mortality of children has decreased.

MR. KELLY: New England had the first milk laws enacted. New England has a large association of inspectors, and probably more agitation of the milk question and more inspection than any other section of the country, and the greatest per capita consumption of milk of any section in the United States.

DR. BURTON ROGERS: Has pellagra appeared in Europe, where the milk supply has decreased?

DR. PRICE: Pellagra is not likely to appear in one year or two.

Dr. Goldberger's article on "Pellagra, Its Nature and Prevention," has been published by the United States Public Health Service as Reprint No. 461 from the Public Health Reports, and is now available. Few articles have been written which have a more important or direct bearing on the desirability of milk in the diet, and it should be carefully read by all interested in the milk question.

"The shortest and surest way to prove a work possible is strenuously to set about it."

REMARKS BY DR. PEASE, NEW YORK CITY

It is important for inspectors to study the bacterial condition of froth on milk. I hunted for a long time for the source of B. Coli and high counts. We eventually found in the pasteurizing tanks that foam on milk had the same number of bacteria as the milk. After some time the froth would have a very high count as compared with milk. Pasteurization is effective only when all milk, including the froth, is heated and held for the full time. Foam is one of the greatest sources of trouble in pasteurizing milk. Foam may, in fact, be an incubator for bacteria.

DR. PRICE: What form of pasteurizing apparatus does Dr. Pease refer to?

DR. PEASE: To that type having a series of revolving vats.

"The unprepared community, roused from lethargy by pestilence, often resorts to hysterical measures for the protection that should have been established as a quiet and conservative system of municipal hygiene."

REMARKS BY MR. THOMAS C. GAULT

Chief, Dairy and Food Division, Ohio State Board of Agriculture

I came to listen rather than to be heard.

We have been handicapped in our inspections during the past two years because we cannot pay sufficient salary to attract qualified men. Some of our men have gone into positions paying more money.

One of our troubles is with the enforcement of laws regarding the fat testing of cream so that fair results may be obtained. Cream stations are located in all parts of the State and are not always well equipped for the handling of cream. Milk inspection is confined to those places which are not provided with adequate protection. The larger cities take care of themselves The smaller towns do not have adequate inspection, and there is where we make our greatest effort. We apply our efforts to get results in one community, and we stay until we get results.

When condenseries offered a higher price than "permitted" dairies producing for cities, inspection broke down, because the proprietors of the poorer dairies got as much for their product as the proprietors of the better dairies. Cheesemakers complying with our requirements sold their cheese for two cents a pound higher than others. Only ten per cent of our cheese factories were found this year in an insanitary condition. This condition was speedily corrected in cooperation with the Food Administration.

We have only five inspectors, or about one-fourth as many as we should have.

Prohibition in Ohio has stimulated an interest on the part of breweries regarding dairy equipment.

REMARKS BY DR. J. S. ABBOTT

Bureau of Chemistry, U. S. Department of Agriculture

I am pleased to be here, but was not expecting to talk.

At your Springfield, Mass., convention you appointed a committee to act and report. It has studied and reported regarding the essentials in clean milk production. A similar resolution was introduced in various associations. All have reported and all are getting much closer together. A great number of regulations were conflicting. I believe further study will get views in harmony, and the problem of safe and clean milk production will be simplified. It may be that these rules can be further simplified.

The Proceedings of this organization are classics in their line. The Proceedings of this Association have been, in my opinion, far superior to those of the food and drug officials.

I would like to write a book on the organization of food and drug control in America, if I had the ability. We have some very peculiar organizations working along these lines. Somebody should work on organization and administration of food and drug departments. At present there is no guide. We have the strongest federal control of any government in the world. We have the most incomplete local food and drug control. We have efficient control of milk in many places. In one city only do we have efficient control of drugs. This is a time for serious study to determine what agencies shall do this work and how the laws shall be administered. It is a world movement that is here to stay and is worthy of the study of our best men.

THE PASTEURIZATION OF MILK

F. J. Moore, *City Milk Inspector,* Department of Health
Detroit, Mich.

Probably no problem connected with the milk business is receiving so much attention at present as that of the commercial pasteurization of milk in our large cities.

At the present time the pasteurization of milk is referred to as a process of heating milk to a definite temperature and immediately chilling it to a low temperature.

The term "pasteurization" is derived from the name of Louis Pasteur, the famous French chemist and bacteriologist, who, about the year 1870, discovered in his study of the diseases of wines and beer that heating these liquids to a temperature of 158-176° F., and holding them at this temperature for definite periods of time destroyed the bacteria which caused the deterioration, or abnormal fermentations, or souring of the liquids. Several years later Dr. Jacobi advocated the heating of milk in this country for infant feeding.

The commercial pasteurization of cream was first employed in the dairy districts of European countries to improve the flavor and keeping quality of butter; and later, to prevent the spread of tuberculosis to calves and hogs, all skim milk returned from the creameries to the farm was heated.

In this country, the pasteurization of milk commercially was first used by the large milk dealers to prolong the keeping quality of their product and thereby prevent the enormous losses incurred by the souring of milk during the hot summer months. Little or no attention was paid to the pasteurization of milk as a means of protecting the public from infected milk. It was looked upon with disfavor by physicians, and health authorities called it a fraud and a fake because it was known that the milk dealer often em-

ployed pasteurization as a blind to cover up filthy methods of production and handling.

The ideal sought by public health officials was a milk supply clean, cool, fresh, and free from pathogenic organisms, but after several years of study and work endeavoring to improve our city milk supplies without pasteurization, it has been shown that in large cities with their complex systems of milk production and handling, it has been almost impossible to attain a milk supply free from dangerous disease germs without pasteurization.

It is a known fact that a large percentage of our dairy cattle are afflicted with tuberculosis, and that a large portion of the cases of this dreaded disease found among children is of the bovine type and is contracted through the consumption of infected milk. We also know that health authorities of several cities have tried to eradicate tuberculosis from their milk supplies by the compulsory testing wtih tuberculin of all cattle supplying their respective localities with milk, but owing to the lack of sufficient funds to properly carry out the testing frequently enough and to keep a proper check of the herds tested, and with the shortcomings of the tuberculin test, namely, its inability to detect all animals which are infected, it may be said on good authority that no large city has successfully eradicated tuberculosis from its milk supply. On the other hand, we know from studies carried out by Rosenau, Russell and others, that the tubercle bacillus is killed by subjecting it to a temperature of 140° F. for a period of twenty minutes; also that all other forms of pathogenic organisms dangerous to the public health are killed at this temperature.

Even were it possible to eliminate tuberculosis from the milk supply through the use of the tuberculin test, we would still be confronted with the problem of eliminating all dangers from infection from typhoid, scarlet fever, diphtheria, smallpox and throat affections. Then, on the other hand, we may be at the mercy of the dishonest

producer and the physician who will not report cases of contagious disease for fear that the dealer's milk will be excluded. Even with the most rigid supervision of a city milk supply, it has not been possible to prevent occasional outbreaks of contagious diseases. In Detroit, through a most rigid surveillance of the milk supply, for the past four years we had not been able to trace a single case of contagious disease to the milk supply, but during the summer of 1916 one of our dealers who maintained his dairy just outside the city limits had a daughter taken sick with typhoid. The case was not reported, and in fact the dealer took every precaution to keep the case from becoming known to the Health Department, fearing a loss to his business. Over eighty cases of typhoid developed on this dealer's three routes in just a few days.

Knowing then that it is practically impossible to eliminate tuberculosis from raw milk through compulsory tuberculin test regulations, also that a most rigid supervision of the milk supply will not prevent milk-borne outbreaks of contagious diseases; knowing that the proper pasteurization of milk will eliminate to a great extent the danger of outbreaks of these diseases, it becomes necessary for health boards to pass regulations compelling all milk and cream sold to be pasteurized.

Numerous objections to such a regulation, however, have been raised by those who oppose pasteurization. They have claimed that pasteurization changes the chemical composition; that pasteurization makes the milk less digestible and therefore less desirable for infant feeding.

These objections are without foundation, for it has been demonstrated by experiments conducted by the Dairy Division of the United States Department of Agriculture that heating milk to a temperature of 145° F. for a period of thirty minutes will not break up the constituent parts, nor destroy the "cream line," but that in heating to a higher temperature, above 160° F., some of its constituent

parts are changed, and that the cream does not rise readily, and that as the temperature is raised these changes take place to an increasing extent.

It was shown in the Baby Milk Stations in Washington, D. C., supported by George M. Oyster, Jr., that 110 babies for whom both pasteurized and raw milk had been prescribed at different times, thrived equally as well on the pasteurized milk as on the raw. In fact, there was a difference in weight in favor of pasteurized milk, amounting to .0295 of an ounce per day per baby.

The chief objection to the pasteurization of milk in some of our large cities has been the looseness with which the word "pasteurized" has been used by milk dealers, due principally to a lack of understanding of the apparatus used, improper heating and gross recontamination of the milk after pasteurization; also the lack of supervision on the part of the health authorities. It has come to my knowledge that raw milk has been labeled "Pasteurized" and sold as such.

Preliminary to the adoption of a code of rules to govern the pasteurization of milk in Detroit, a survey of the milk plants pasteurizing milk was made, particular attention being given to the kind of apparatus used, whether or not it was performing the necessary work required, and the methods of handling the milk after pasteurization. A bacterial check was made of each step in the system employed to determine the efficiency of the pasteurizing apparatus and the methods of handling after pasteurization.

HEATING

It was found in observing the work of continuous heaters that where the temperature of the heating medium was not controlled by an automatic temperature control, the temperature would fluctuate several degrees above or below the required temperature, and therefore part of the milk was being heated too much and part was not hot enough,

and unless the milk was held in a proper holding device where the temperature could be equalized and the milk held at a temperature of 145°, the pasteurization would be very improperly performed. It is also very necessary to have the heating medium in continuous heaters at the proper temperature before starting the milk through or over the heating surface to insure the proper heating of the first milk entering the apparatus. It was also noticed that some types of heaters were very much more difficult to clean than others, especially those in which all parts which came in contact with the milk could not be seen and therefore really had to be washed in the dark. The most efficient heaters were the tank or vat heaters, in which all the milk was gradually raised to the required temperature. It was also observed that the best results were obtained when the heating medium was hot water not more than five degrees hotter than the required temperature to which the milk was to be raised.

HOLDERS

There were three types of continuous holders used and these were tested out to determine the holding efficiency. This was done by filling the holders with water and operating them just as though they were filled with milk. A color solution was added to the water at the intake, and the time for the color to appear at the outlet was noted. In the type which consisted of an upright cylindrical tank, the milk flowing in at the top, and out at the bottom when the tank became full, it took from three to five minutes for the color to appear. In another, consisting of a horizontal tank in which cross partitions retarded the flow of the milk, it took only five minutes for the color to go through the machine, while in a better form of this type it took fifteen minutes. In a third type, consisting of a series of tubes in which the milk entered the top tube of the series and was discharged at the bottom tube, it

took the color thirty minutes to appear at the lower end, thus insuring proper holding. Unless the holder was surrounded by hot water or properly insulated, a loss in temperature as high as five degrees was noted.

Two types of absolute holders were found. One consisted of a series of tanks which were filled and emptied automatically after the milk was held for the required time. Two firms used this type of holder, one having the holding tanks jacketed with a hot water bath, the other having no jacket. In the latter type, a loss of from 6 to 8 degrees was noted in temperature. This made it necessary to heat the milk hot enough to hold it above the required temperature, with the result that the cream line was destroyed.

The other type of absolute holder consisted of the original tank in which the milk had been heated. This method seemed to be the most satisfactory, especially for the small dealer, as it was inexpensive as compared with the other types.

In determining the efficiency of each pasteurizer and the final efficiency, several samples were taken at each step of the system at frequent intervals and the bacteria counts averaged.

It was observed that the pasteurizing efficiency varied considerably, and that the final efficiency was, in nearly all plants, very much lower than the pasteurizing or heating efficiency, due to carelessness in handling.

The chief sources of recontamination were in the use of the coolers and bottle-filling machines, immediately preceding the day's run of pasteurized milk, for the cooling and bottling of cream skimmed the day previous, usually with a very high bacteria count, without washing the system before running the fresh pasteurized product through it; the undue exposure of the milk cooler to dust and flies; complicated bottle-filling machines with a great many valves which were difficult to keep clean; imperfect

capping machines; hand capping; and the use of bottles which had been poorly washed and improperly sterilized.

COOLERS

Three types of coolers were in use:

First: The same apparatus in which the milk had been heated and held. This method of cooling is somewhat slow, taking from thirty to forty-five minutes to cool a vat of milk, depending upon the cooling medium used. Artificial refrigeration accomplishes this purpose more quickly than ice water. This type can be easily cleaned and sterilized with live steam.

Second: A series of pipes or coils over which the hot milk flowed, the cooling medium flowing up through the tubes. With this type of cooler, unless it is placed in a tight room, free from dust and flies, or covered with metal or glass covers, the milk is easily contaminated. These coolers are easy to wash, every part being exposed, but they are difficult to sterilize with live steam.

Third: The internal tubular cooler, in which the milk flowed through jacketed tubes. This method is effective and it is possible to sterilize the tubes with live steam under pressure.

BOTTLE FILLING

Several types of bottle fillers were found, from the small hand filler with just a few valves to the large automatic case fillers with a great many valves. It seemed that the more valves there were to a filler, the more apt the valves were found to be improperly washed, as they were not taken apart each day and thoroughly washed. The most satisfactory fillers were of the rotary type with a few valves which could be easily taken apart to be washed.

The most desirable capping machines were those which missed the fewest caps. Capping by hand was found most undesirable, as the operators often neglected to properly

wash their hands and the danger of soiling the hands by handling cases was great.

It was found that if the bottles were washed, scalded and kept inverted, there was little or no recontamination from this source, but where the bottles were exposed with the mouth up for any great length of time, the bacterial content of the milk after being placed in the bottle was raised materially.

Two plants made it their business to put pasteurized milk in cans and wholesale it to small dealers in various parts of the city. The bacteria counts of milk taken from bottles after these dealers had handled it was often higher than the same milk previous to pasteurizing it. Both these wholesale dealers had very inefficient pasteurizers to begin with, and the poor methods of washing bottles and of bottling milk, used by the small dealers, rendered this method of pasteurization very unsatisfactory.

The Use of Automatic Temperature Controls and Automatic Temperature Recording Thermometers.

The automatic temperature control was used on the heaters by the larger companies, but all continuous heaters should be equipped with them. By this means a more uniform heating temperature may be attained and the danger of under-heating or over-heating the product be prevented.

The automatic temperature recorder is very necessary as a means of knowing whether or not the apparatus is heating properly, and it also serves as a check on the operator, making it less possible for him to slight his work.

The conclusions drawn from my studies of pasteurization are as follows:

That the most satisfactory pasteurizer is one that will quickly heat the milk to the required temperature with hot water as a heating medium, which is automatically kept at

a temperature not more than from five to ten degrees higher than that to which the milk is to be heated.

That the holding method of pasteurizing gives the best results and that the milk should be held at a temperature of 145 degrees for 25 or 30 minutes and cooled immediately thereafter to a temperature below 45° F.

That all apparatus should be equipped with automatic temperature controls and automatic thermometers.

That all work should be done in rooms which are separated, clean, well lighted, dust and fly proof.

That milk should be put into the final container immediately after pasteurization.

That bottles should be thoroughly washed and sterilized and kept inverted until ready to be filled.

The following rules and regulations for the pasteurization of milk were adopted by the Detroit Board of Health to go into effect May 1, 1915:

Rules and Regulations for the Pasteurization of Milk

1. Pasteurization of milk shall be performed by a process whereby every portion of the milk is raised to a temperature of 145° F., and retained at that temperature for a period of 30 minutes by the holding process, and no other process shall be adopted or used, and immediately thereafter cooled to a temperature below 50° F.

2. No pasteurizing equipment shall be used that is not approved by the Detroit Board of Health.

3. Each pasteurizing apparatus shall be equipped with a time and temperature recording apparatus approved by the Board of Health.

The records shall be filed at the pasteurizing plant and mailed to the Detroit Board of Health, Thursday of each week.

4. All pasteurized milk shall be plainly marked on each bottle cap or other container in which such milk is delivered to consumers, with a label bearing the inscription,

"PASTEURIZED MILK," and the day of the week on which milk was pasteurized.

5. Pasteurized milk shall contain not more than 100,000 non-pathogenic colonies of bacteria per c. c. in samples taken from containers being delivered to consumers.

6. Immediately after the process of pasteurization and cooling, the milk must be put into the final container.

7. Milk shall not be pasteurized more than once.

8. Pasteurized milk shall be delivered to the consumer not later than 24 hours after pasteurization.

9. All cream and skim milk shall be pasteurized, or made from pasteurized milk.

10. Buttermilk shall be made from milk or cream pasteurized before churning.

Since this ordinance went into effect, a rule has been added requiring medical examination of all employees now at work, and each and every person before being employed must furnish a clean bill of health furnished by Department of Health, the principal part of the examination being for tuberculosis, venereal diseases, typhoid fever, diphtheria, and all contagious or infectious diseases that may be transmitted into the milk supply.

During September, October and November, 1918, every dealer in Detroit had a count of less than 100,000 non-pathogenic colonies of bacteria per c. c. in samples as delivered to consumers and taken from wagons on streets.

"A study of all phases of the relation of the milk supply to the diseases of man points to one fact: That pasteurization is the only known method of safeguarding a public milk supply."

PRESIDENTIAL ADDRESS

ALFRED W. LOMBARD

In this, the closing hour of our convention, it seems fitting that the President should say a few words in appreciation of the honor which has been conferred upon him during the present year. No man can help but be grateful for this display of trust and confidence in his ability to carry on the work of our Association, and the least that he can do in recognition thereof is to work diligently and faithfully for the welfare and success of our Association.

No organization in this country has done more to promote efficient and effective milk inspection than has our own, and our members have shown that conscientious earnestness of purpose which makes for the success and well being of any association.

We have been holding conventions now for the past seven years, and during that time have issued annually a report of our proceedings which is the most complete compilation of milk inspection activities ever published. I have thought at times, however, that greater effort should be made to put our designs into execution, that is, try to have incorporated by municipalities adopting milk regulations, some of the findings which we have reached after years of study and deliberation, thus making it possible for the milk-consuming public to receive the direct benefit of our work, and at the same time safeguard the public health. If we are able to accomplish this result, then we may safely say that our time has been well spent, and our labor rewarded.

Our accomplishments have been materially aided by reason of the unity of thought and purpose which we as an association have always enjoyed. This leads me to hope for even greater results in the future; and as we

continue our investigations along the lines which have already been proven to be wise, we may reasonably expect our present prosperity to remain unchanged.

In closing, let me urge each one of you to bear constantly in mind during the coming year this thought: How can I best serve the interests of efficient health-protecting milk inspection, and through the medium of the International Association of Dairy and Milk Inspectors give this information to the public in an easily-accepted manner.

"The primary object of applied science is not to create wealth for individuals, but to lessen the hardships, cure the bodily ills, and increase the legitimate comfort and happiness of mankind at large."

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