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JANUARY, 1956

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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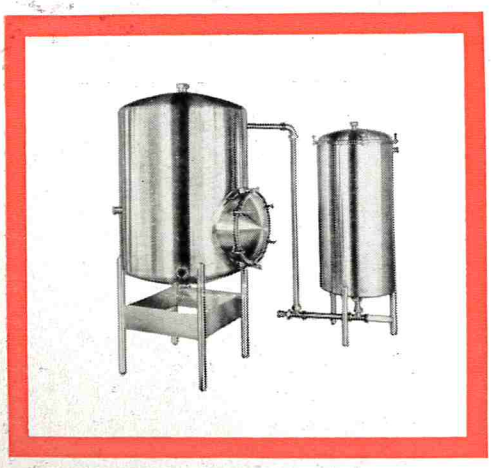

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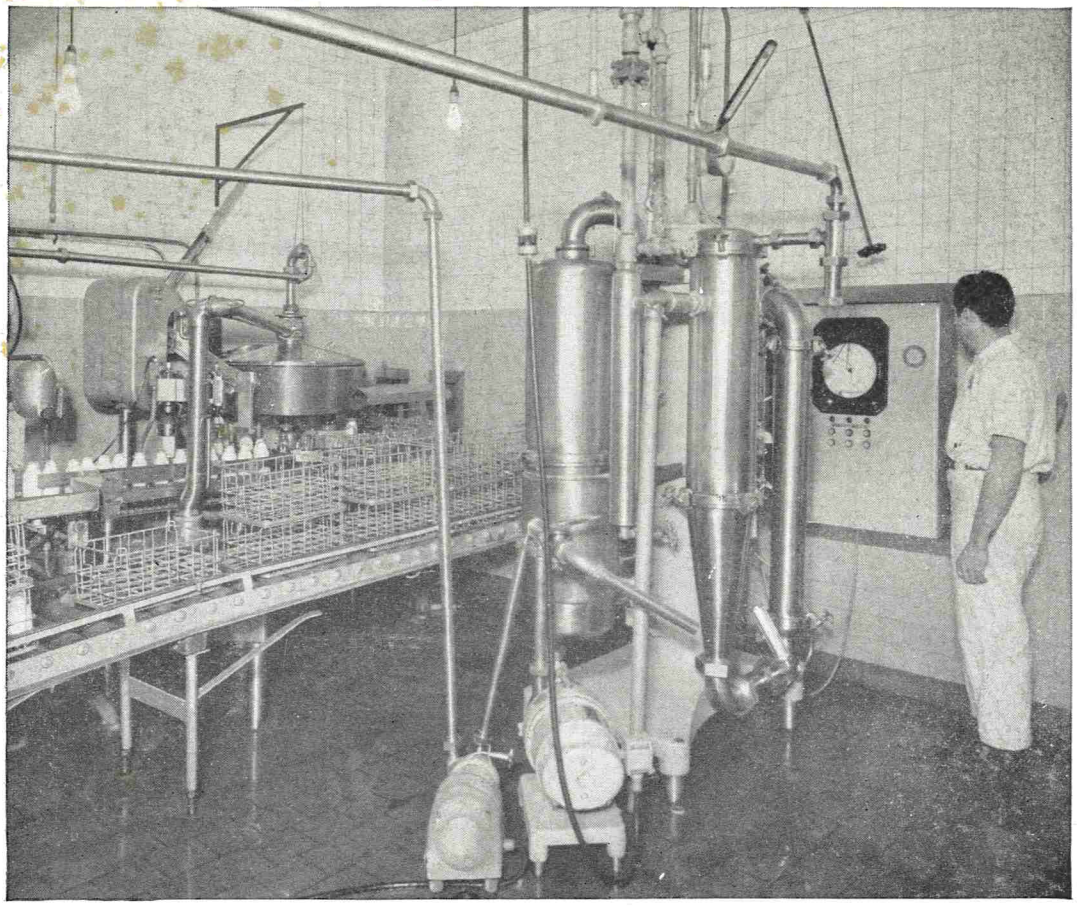

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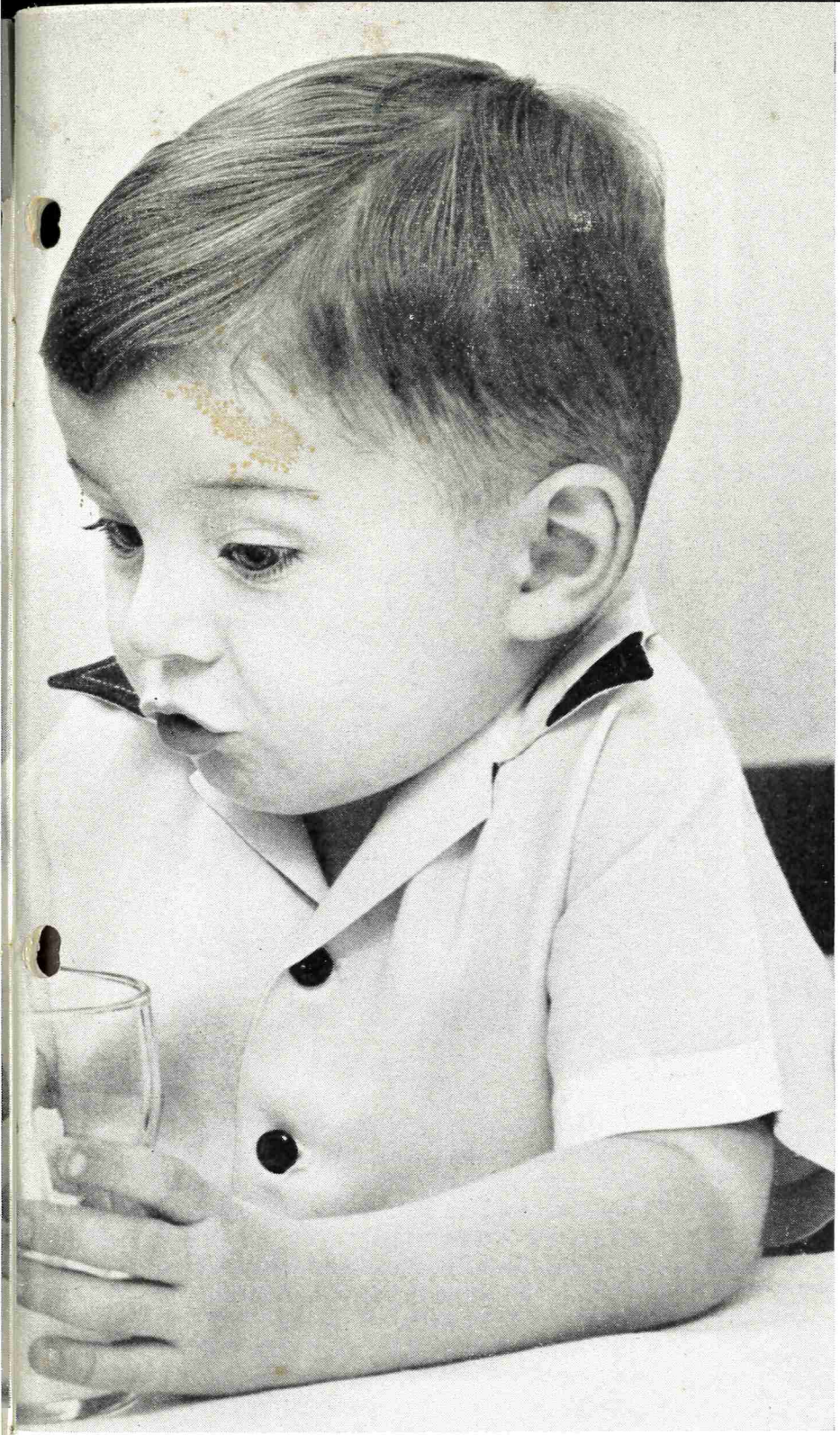

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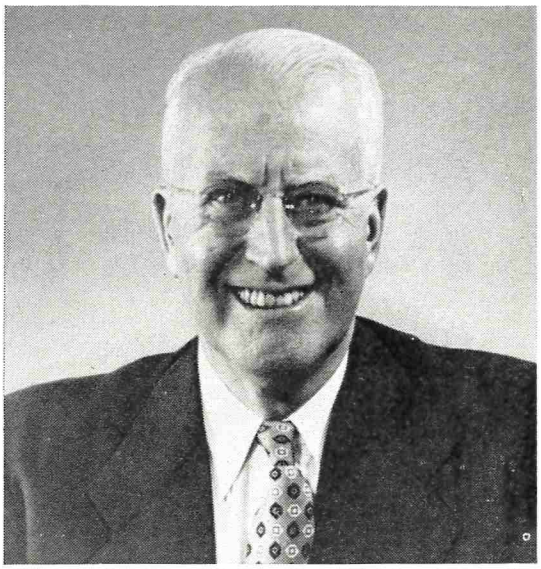

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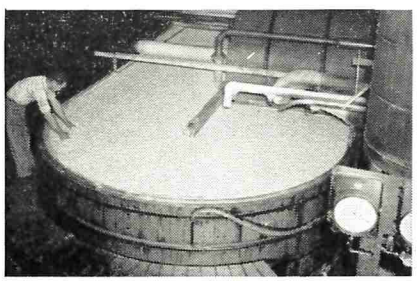

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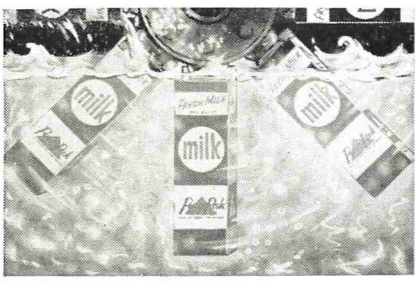

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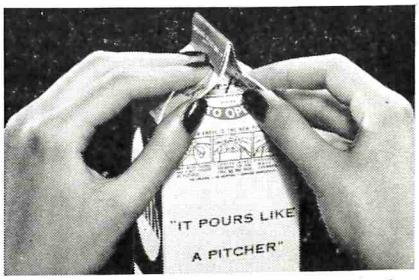

Exclusive tamperproof seal protects pouring spout and cannot be accidentally flipped open . . . extra protection for your family's health!

The Journal of Milk and Food Technology (including Milk and Food Sanitation) is issued monthly beginning with January number. Each volume comprises 12 numbers. Published by the International Association of Milk and Food Sanitarians, Inc., with executive offices of the Association, Blue Ridge Rd., P. O. Box 437, Shelbyville, Ind.

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Manuscripts: Correspondence regarding manuscripts and other reading material should be addressed to J. C. Olson, Jr., Associate Editor, Dept. Dairy Husbandry, University of Minn., St. Paul, Minn.

"Instructions to Contributors" can be obtained from the Edtor for the use of contributors of papers.

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Contents

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Membership Dues: Membership in the International Association of Milk and Food Sanitarians, Inc., is $5.00 per year, which includes annual subscription to the Journal of Milk and Food Technology, (including Milk and Food Sanitation). All correspondence regarding membership, remittances for dues, failure to receive copies of the Journal, changes of address, and other such matters should be addressed to the Executive Secretary of the Association, H. L. Thomasson, Box 437, Shelbyville, Indiana.

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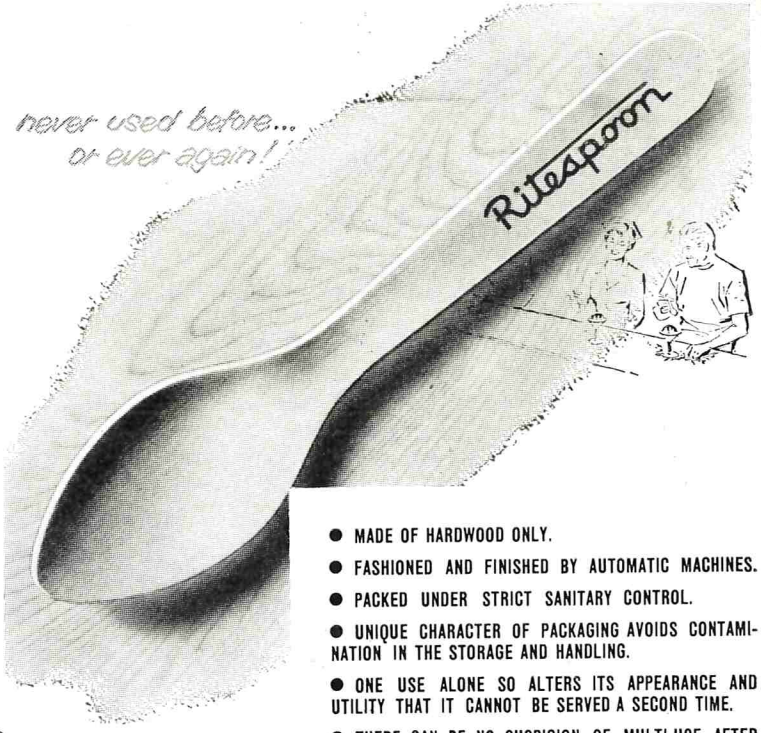

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ANNOUNCEMENT CONCERNING THE SANITARIANS AWARD FOR 1956

Announcement is made that nominations will be accepted for the annual Sanitarians Award until May 1, 1956, and members of the International Association of Milk and Food Sanitarians, Inc., are requested to give consideration to the nomination of individuals whose professional work in the field of milk and food sanitation in their communities has been outstanding.

The Award consists of a Certificate of Citation and $1,000 in cash, and is sponsored jointly by the Diversey Corporation, Klenzade Products, Inc., Oakite Products, Inc., Pennsylvania Salt Manufacturing Company, and the Olin Mathieson Chemical Corporation. It is administered by the International Association of Milk and Food Sanitarians, Inc., and is presented annually. The next presentation will be made at the 43rd annual meeting of the Association which is to be held at Seattle, Washington, in September 1956. The Sanitarians Award was initiated in 1952, and was presented in 1955 to Mr. B. G. Tennant, Chief Sanitarian, Escambia County Health Department, Pensacola, Florida.

The Executive Board of the Association has established the following rules and procedures governing the Sanitarians Award.

Eligibility

The rules concerning eligibility of candidates for nomination are:

(1) Any living citizen of the United States or Canada who, at the time of nomination, is employed as a professional milk and food sanitarian, or both, by a county or municipality, is eligible for the Award, except members of the Executive Board and members of the Committee on Recognition and Awards of the International Association of Milk and Food Sanitarians, Inc. Employees of State or Federal agencies and of industry are not eligible for the Award. Membership in the International Association of Milk and Food Sanitarians, Inc., is not a prerequisite of eligibility, and there are no restrictions as to race, sex, or age.

(2) A candidate shall have made a meritorious contribution in the field of milk and food sanitation to the public health and welfare of a county or municipality within the United States or Canada.

(3) The achievements and contributions on which the Award is to be based, must have been completed during the five-year period immediately preceding January 1 of the year during which the Award is to be made. Under special circumstances, consideration will be given to related work accomplished by the candidate during the seven-year period preceding January 1 of the year during which the Award is to be made. Under this rule, the principal work to be considered for the 1956 Award must have been performed during the period January 1, 1951 to January 1, 1956, and the related work during the period January 1, 1949 to January 1, 1956.

(4) Co-workers are eligible for nomination if both have contributed equally to the work upon which the nomination is based.

(5) No person who has once received the Award shall be eligible for nomination.

Nominations

Nominations of candidates for the Sanitarians Award may be submitted by the Affiliate Associations of the IAMFS, or by any member of the Association in good standing except members of the Executive Board, members of the Committee on Recognition and Awards, and employees of the sponsoring companies. Nominations from persons who are not members of the Association cannot be accepted. No member or Affiliate may nominate more than one candidate in any given year.

Each nomination must be accompanied by factual information concerning the candidate, a resumé of his work and achievements, evidence supporting his achievements and, if available, reprints of publications. A form for the submission of nominations may be obtained upon request from John D. Faulkner, Milk and Food Program, DSES, Public Health Service, Washington 25, D. C., or H. L. Thomasson, Executive Secretary, International Association of Milk and Food Sanitarians, Inc., P. O. Box 437, Shelbyville, Indiana.

Deadline for Submission of Nominations

The deadline for submission of nominations is May 1, 1956, and all nominations and supporting evidence must be postmarked prior to midnight of that date.

Selection of the Recipient

The Committee on Recognition and Awards of the International Association of Milk and Food Sanitarians, Inc., has full responsibility for selecting from among the candidates nominated the recipient of the Sanitarians Award. In judging the contributions of each candidate, the Committee will give special consideration to (a) originality of thought, mode of planning, and techniques employed, (b) the comprehensive nature of the candidate's achievements, and (c) their relative value as they affect the health and welfare of the candidate's community. The Committee will give consideration also to the efforts of the candidate to establish professional recognition in the community in which he serves, as well as to his research and development, administrative, and educational achievements. Additional information or veri-

fication of submitted information will be requested when considered necessary by the Committtee. *Testimonial letters in behalf of a candidate are not desired.*

If, after reviewing the nominations and supporting evidence, the Committee should decide that the work and achievements of none of the candidates have been significantly outstanding, the Award shall not be made. In this connection, it is fundamental that if meritorious professional achievement cannot be discerned the Award shall be omitted for a given year, rather than to lower the standards for selection of a recipient.

The 1956 Committee on Recognition and Awards consists of: John D. Faulkner, *Chairman,* Washington, D. C.; William V. Hickey, Salt Lake City, Utah; John H. McCutchen, Jefferson City, Missouri; Ivan E. Parkin, University Park, Pennsylvania; Hubert Shull, Texarkana, Texas; and George H. Steele, St. Paul, Minnesota.

COMMITTEES OF THE INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., FOR 1956

The work done by the several committees of the International continues to be one of the most important contributions to the steady advancement and vigor of this Association. All members are encouraged to suggest topics and projects for Committee deliberations. From personal observation or through the suggestion of others, there may be problems upon which research or inquiry is needed. In this connection, you are encouraged and urged to contact the Chairman of the appropriate Committee.

COMMITTEE ON APPLIED LABORATORY METHODS

OBJECTIVES

To study new laboratory procedures and bacteriological problems of current interest to milk and food control authorities, to evaluate both published and unpublished data, and to present conclusions which will be helpful to the sanitarian in the conduct of his work.

MEMBERS

Dr. Franklin W. Barber, *Chairman,* National Dairy Research Laboratories, Oakdale, Long Island, New York.

Dr. Ralph N. Costilow, Department of Bacteriology, Michigan State University, East Lansing, Michigan.

T. R. Freeman, Dairy Section, University of Kentucky, Lexington, Kentucky.

Dr. James J. Jezeski, Department of Dairy Husbandry, University of Minnesota, St. Paul, Minn.

Dr. C. K. Johns, Canadian Dept. of Agriculture, Science Service Building, Ottawa, Ontario, Canada.

Dr. W. C. Lawton, Director, Minneapolis and St. Paul Quality Control Laboratory, 2274 Como Ave., St. Paul, Minn.

J. C. McCaffrey, Bureau of Sanitary Bacteriology, Division of Laboratories, Illinois Dept. of Public Health, Chicago, Illinois.

Dr. Earl F. McFarren, Dept. of Health, Education, and Welfare, Robert Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati, 26, Ohio.

Dr. W. K. Moseley, 3826 E. Washington Street, Indianapolis, Indiana.

Dr. W. S. Mueller, Dept. of Dairying, University of Mass., Amherst, Mass.

Dr. R. B. Parker, Dept. of Bacteriology, University of Wisconsin, Madison, Wisconsin

Dr. H. B. Richie, Swift and Company, Union Stock Yards, Chicago 9, Illinois

Dr. George W. Shadwick, 1562 S. State St., Chicago, Illinois.

Dr. H. W. Weiser, Dept. of Bacteriology, Ohio State University, Columbus 10, Ohio.

COMMITTEE ON BAKING INDUSTRY EQUIPMENT

OBJECTIVES

The objectives of this Committee are to provide consultative assistance to the Baking Industry Sanitation Standards Committee in the development of standards for items in the Baking Industry.

MEMBERS

Vincent T. Foley, *Chairman,* 21st Floor, City Hall, Kansas City, Missouri

James H. Burrows, City Health Department, Niles, Michigan

Richard S. Doughty, Philadelphia Dairy Products Co., 5 Lane of Acres, Haddonfield, New Jersey

W. R. McLean, U. S. Public Health Service, Regional Office VI, 50 Seventh St. N. E., Atlanta 5, Georgia

Louis W. Pickles, Director of Division of Sanitation, Peoria Health Department, City Hall, Peoria, Illinois

Armin Roth, Health Department Relations, Technical Service Dept., J. B. Ford Division, Wyandotte Chemicals Corp., Wyandotte, Michigan

COMMITTEE ON COMMUNICABLE DISEASE AFFECTING MAN

OBJECTIVES

To study problems related to those diseases communicable to man through the consumption of foods, including milk, and milk products, meat, poultry, and shellfish, and to recommend specific measures that can be taken by the sanitarian to control such diseases.

MEMBERS

Dr. R. J. Helvig, *Chairman*, Milk and Food Sanitation Program, Division of Sanitary Engineering Services, U. S. Public Health Service, Washington 25, D. C.

John Andrews, Sanitary Engineering Division, North Carolina State Board of Health, Raleigh, North Carolina.

Dr. H. L. Bryson, Vancouver Health Department, Vancouver, British Columbia, Canada

Dr. Raymond Fagan, University of Pennsylvania, School of Veterinary Medicine, New Bolton Center, R. D. 1, Kennett Square, Penn.

John H. Fritz, Chief Food Sanitarian, Kansas City Health Dept., Kansas City, Missouri

Dr. Stanley L. Hendricks, Iowa State Department of Health, Des Moines, Iowa

Dr. Harry G. Hodges, R. D. 2, Ithaca, New York

Dr. E. R. Price, Missouri State Health Department, Jefferson City, Missouri

Dr. H. H. Rothe, State Dept. of Agriculture, P. O. Box 163, Gainesville, Florida

T. E. Sullivan, Director, Division of Foods and Drugs, Indiana State Board of Health, 1330 West Michigan Street, Indianapolis, Indiana

COMMITTEE ON DAIRY FARM METHODS

OBJECTIVES

To study dairy farm methods and procedures, to determine the sanitary problems involved, and to make recommendations for the solution of such sanitary problems, and for the improvement of dairy farm methods which have a relationship to the sanitary quality of milk.

MEMBERS

Chester Bletch, *Chairman*, Maryland and Virginia Milk Producers Ass'n, Inc., 1756 K Street, N. W., Washington 6, D. C.

Paul Corash, Department of Health, 125 Worth Street, New York 13, N.Y.

Lawrence C. Dormuth, Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

J. C. Flake, Evaporated Milk Association, 228 North LaSalle Street, Chicago 1, Illinois

Floyd J. Gregarek, 2975 South Jackson, Denver 10, Colorado.

John Guinn, State Department of Health, State Office Building, Cheyenne, Wyoming

Dr. Richard S. Guthrie, De Laval Separator, 812 N. Fourth Street, DeKalb, Illinois

C. F. Hanger, Dairy and Food Division, State Office Building, Richmond 19, Virginia

Milton Held, U. S. Public Health Service, Regional Office VII, 2200 Federal Office Bldg., Kansas City 6, Missouri

Harold Hieskell, P. O. Box 2088, Sacramento, California

Fred Jolly, Rt. 2, Rapid City, South Dakota

Robert M. Keown, Elkhorn, Wisconsin

A. G. McLeod, Manitoba Dept. of Health and Public Welfare, Winipeg, Manitoba, Canada

Lyle Littlefield, Michigan Dept. of Agriculture, Lansing, Michigan

Dr. Robert Metzger, Dairymen's League Coop. Ass'n Inc., 100 Park Avenue, New York N. Y.

Mike O'Conner, 425 South Garden, Gellingham, Washington

Russell R. Palmer, Detroit Dept. of Health, Detroit 26, Michigan

Dr. Richard M. Parry, Rhode Island Quality Milk Ass'n., Warwick, R. I.

C. W. Pegram, State Dept. of Agriculture, Raleigh, North Carolina

L. O. Tucker, State Department of Health, Smith Tower, Seattle 4, Washington

Alex G. Shaw, 916 W. College Avenue, Tallahassee, Florida

COMMITTEE ON EDUCATION AND PROFESSIONAL DEVELOPMENT

OBJECTIVES

First, to develop plans and to devise methods whereby the Sanitarian can more fully gain recognition as a professional worker in public health and secondly, to recommend standards of education, training and experience designed to establish desirable professional qualifications to the end that the title Sanitarian will denote adequate preparation for professional work and attainment.

MEMBERS

Dr. John J. Sheuring, *Chairman*, Dairy Department, University of Georgia, Athens, Georgia

W. Howard Brown, 940 Main Street, Jacksonville, Florida

Tom S. Gable, University Health Service, University of Nebraska, Lincoln, Nebraska

Harry Lindquist, Flint Laboratory, University of Massachusetts, Amherst, Mass.

Richard Mansfield, Knox County Health Dept., Clinton, Tennessee

William Miller, Milk and Food Program, Division of Sanitary Engineering Service, U. S. Public Health Service, Washington 25, D. C.

E. J. Rigby, D. V. M., City Health Department, Winnepeg, Manitoba, Canada

Lyle Searing, King County Health Department, Public Safety Building, Seattle, Washington

B. G. Tennant, Escambia County Health Dept. Pensacola, Florida.

Dr. James White, Dept. of Dairy Industry, Cornell University, Ithaca, New York

COMMITTEE ON FOOD EQUIPMENT

OBJECTIVES

To participate with other health organizations and industries in the formulation of sanitary standards for food equipment. Specifically, the functions of this Committee include: (1) cooperation with other health agencies and industry, under the auspices of the National Sanitation Foundation, in the joint development of NSF Standards for Food Service Equipment; (2) when directed by the Executive Board, to cooperate with other health groups and industry in the development of sanitary standards for food equipment: (3) to present to the membership at the annual meeting those standards which the Committee recommends be endorsed or approved by the Association.

MEMBERS

William V. Hickey, *Chairman*, Department of Health, 115 So. State Street, Salt Lake City, Utah

Charles Cotton, Idaho State Health Department, Boise, Idaho

Lewis Dodson, Lewis Dodson Engineering Co., P. O. Box 287, Amarillo, Texas

F. H. Downs, Jr., Headquarters 4th Army, Fort Sam Houston, Texas

D. E. Hartley, State Board of Health, 1330 West Michigan Street, Indianapolis, Indiana

John H. McCutchen, Director, Bureau of Food and Drugs, Division of Health of Missouri, Jefferson City, Missouri

W. R. McLean, U. S. Public Health Service, 50 Seventh St. N. E., Atlanta 5, Georgia

J. H. Millar, State Department of Health, Charleston, West Virginia

James A. Stalbird, New York State Health Department, 18 Dove Street, Albany, New York

Jerome Trichter, New York City Dept. of Health, 125 Worth Street, New York 13, N. Y.

James Westbrook, U. S. Public Health Service, Regional Office, 69 West Washington Street, Chicago, Illinois

COMMITTEE ON FROZEN FOOD SANITATION

OBJECTIVES

To study conditions and practices within the frozen food industry, to determine the sanitary problems involved which might contribute to a public health hazard, and to make recommendations for the solution of such problems.

MEMBERS

Frank E. Fisher, *Chairman*, Food and Drug Division, Indiana State Board of Health, 1330 West Michigan Street, Indianapolis, Indiana

W. P. Boylston, Sanitation Consultant, Division of Sanitary Engineering, So. Carolina State Board of Health, Columbia 1, South Carolina.

Joseph J. Donovan, Brookline Health Dept., Brookline, Mass.

Archie B. Freeman, U. S. Public Health Service, Region II, 42 Broadway, New York 4, N. Y.

O. A. Ghiggoile, Bureau of Dairy Service, California Dept. of Agriculture, 1220 N. Street, Sacramento 14, California

S. R. Howe, Associate Chief, Dairy Products Inspection Services, Dept. of Agriculture, Dairy Division, Ottawa, Ontaria, Canada

J. C. McCaffrey, Chief, Bureau of Sanitary Bacteriology, Illinois Dept. of Public Health, 1800 West Fillmore Street, Chicago 12, Illinois

Joseph J. Maguire, Supervising Sanitarian, Department of Health, State Office Building, Providence 2, Rhode Island

Raymond Summerlin, Public Health Sanitarian, Emanuel County Health Dept., Swainsboro, Georgia.

Dr. Kenneth G. Weckel, Dept. of Dairy and Food Industries, University of Wisconsin, Madison 6, Wisconsin

COMMITTEE ON MEMBERSHIP

OBJECTIVES

To make every effort to increase the membership of the organization by bringing to the attention of all qualified persons the advantages of belonging to the International Association of Milk and Food Sanitarians, Inc., and to interest state milk and food sanitarians' organizations in the advantages of affiliation with the International Association of Milk and Food Sanitarians, Inc.

MEMBERS

H. L. Templeton, *Chairman*, Technical Director, Fairmont Food Co., Omaha, Nebraska

H. L. Thomasson, *Co-Chairman,* Executive Secretary, IAMFS, Journal of Milk and Food Technology, P. O. Box 437, Shelbyville, Indiana

Harold Barnum, Denver Department of Health and Hospitals, West 6th and Cherokee, Denver 4, Colorado

L. Wayne Brown, Dairy and Food Control Laboratory, State Department of Agriculture, Madison 2, Wisconsin

Dr. H. E. Calbert, Dept. of Dairy and Food Industry, University of Wisconsin, Madison 6, Wisconsin

Dr. L. K. Crowe, Dept. of Dairy Husbandry, University of Nebraska, Lincoln, Nebraska

H. Clifford Goslee, State Dairy and Food Commissioner, 256 Palm Street, Hartford, Connecticut

Mel Herspring, California Association of Dairy and Milk Sanitation, 1072 Claredon Crescent, Okland 10, California

Dr. C. K. Johns, Canada Dept. of Agriculture, Science Service Building, Ottawa, Ontaria, Canada.

Emil Mikolajcik, Professor of Animal Husbandry, University of Puerto Rico, Magaguez, Puerto Rico

James M. Nakahara, Department of Health, Territory of Hawaii, Hilo, Hawaii

Ivan Van Nortwick, 1237 Tennessee Street, Lawrence, Kansas

Alexander A. Pais, State Dept. of Health, Richmond, Virginia

Kenneth L. Poole, North Central District Health Unit, Lewiston, Idaho

P. E. Riley, Illinois Department of Public Health, 1800 West Fillmore Street, Chicago 12, Illinois

F. L. Schacht, 18 Dove Street, Albany 6, N. Y.

Dr. Hubert Shull, 944 Locust Street, Texarkana, Texas

Otis E. Skiles, 303 Haworth Drive, Knoxville, Tennessee

L. O. Tucker, State Department of Health, Smith Tower, Seattle 4, Washington

COMMITTEE ON ORDINANCES AND REGULATIONS PERTAINING TO MILK AND DAIRY PRODUCTS

OBJECTIVES

To review and study the provision of sanitary ordinances and regulations pertaining to milk, milk products, and frozen desserts, to evaluate data on research findings relative to the sanitary and public health significance of the specific requirements of ordinances and regulations, and to prepare for submission to the members of the Association recommendations for changes in existing ordinances and regulations.

MEMBERS

C. G. Leonard—*Chairman,* Division of Sanitary Engineering, State Board of Health, Columbia, South Carolina.

C. J. Babcock, Chief, Foreign Marketing Branch, Livestock and Livestock Products Div., Foreign Agriculture Service, U. S. Department of Agriculture, Washington 25, D. C.

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Alexander A. Pais, State Department of Health, Richmond, Virginia

D. B. Whitehead, Supervisor, Milk Division and Food Control of Sanitary Engineering, Mississippi State Board of Health, Jackson, Mississippi

Stephen J. Wolff, Pevely Dairy, St. Louis, Missouri

COMMITTEE ON RECOGNITION AND AWARDS

OBJECTIVES

This Committee is charged with the responsibility of implementing those objectives of the Association concerned with (1) recognition of individual milk and food sanitarians whose achievements have contributed greatly to the public health and welfare of their communities, and (2) recognition of those members of the Association who have through distinguished service contributed greatly to the professional advancement growth and reputation of the International Association of Milk and Food Sanitarians, Inc.

The Committee receives and reviews nominations for the annual Sanitarian's Award and has full responsibility for the selection of the recipient. The Committee also receives and reviews recommendations on candidates for the annual Citation Awards, and counsels with the Executive Board relative to the selection of the recipients. It is also responsible for handling all matters pertaining to the presentation of awards, publicity and other related items.

MEMBERS

John D. Faulkner, *Chairman,* Milk and Food Sanitation Program, Division of Sanitary Engineering Services, U. S. Public Health Service, Washington 25, D. C.

FOR TWO YEAR TERM

Ivan E. Parkin, 213 Dairy Building, Penn State University, University Park, Pa.

William V. Hickey, City Health Dept., 115 S. State Street, Salt Lake City, Utah

John H. McCutchen, Bureau of Food and Drugs, Division of Health, Jefferson City, Missouri

FOR ONE YEAR TERM

Dr. Hubert Shull, 944 Locust Street, Texarkana, Texas

George H. Steele, Minn. Dept. of Agriculture, 515 State Office Building, St. Paul, Minn.

COMMITTEE ON RESOLUTIONS

OBJECTIVES

To present for consideration at the annual meeting matters on Association policy and matters wherein the Association can make known its official position with respect to proposals affecting (1) the work of professional sanitarians, and (2) the health of the people of the nation.

MEMBERS

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Dr. Kenneth G. Weckel, Dept. of Dairy and Food Industries, University of Wisconsin, Madison 6, Wisconsin

COMMITTEE ON SANITARY PROCEDURES

OBJECTIVES

To participate jointly with the Sanitary Standards Subcommittee of the Dairy Industry Committee and the Milk and Food Branch of the U. S. Public Health Service in the formulation of 3A Sanitary Standards for Dairy Equipment. Specifically, the functions of this Committee are: (1) to receive, consider, and comment on proposed sanitation standards for dairy equipment submitted by the Sanitary Standards Subcommittee, (2) to bring to the attention of the Sanitary Standards Subcommittee items of dairy industry equipment and methods for which formulation of sanitary standards appear desirable, and (3) to cooperate with the Dairy Industry Committee, the U. S. Public Health Service, and health officials in attaining universal acceptance of the sanitary standards upon which mutual agreement has been reached.

MEMBERS

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REPORT OF THE COMMITTEE ON APPLIED LABORATORY METHODS — 1955

Continuing the practice of last year, four Sub-Committees were appointed to study four specific topics: (a) the relationships between various bacteriological methods for the examination of raw milk; (b) fat tests for milk and other dairy products; (c) methods for the detection of proteolytic organisms in dairy products; and (d) a survey of coliform standards which are in effect for pasteurized milk and other dairy products. The reports of each of these Sub-Committees are presented below. Members of the 1955 Committee on Applied Laboratory Methods were F. W. Barber, R. N. Costilow, T. R. Freeman, J. J. Jezeski, W. C. Lawton, J. C. McCaffrey, E. F. McFarren, W. K. Moseley, W. S. Mueller, R. B. Parker, H. B. Richie, G. W. Shadwick and H. H. Weiser, with C. K. Johns as Chairman.

RELATIVE MERITS OF VARIOUS TESTS FOR DETERMINING BACTERIOLOGICAL QUALITY OF MILK FOR PASTEURIZATION

Last year a Sub-Committee considered the control of the bacteriological quality of raw milk entirely by laboratory pasteurization counts. Not too much factual information was available other than in the Chairman's own files. This year, advantage was taken of the opportunity to utilize the results of a large-scale study in the Minneapolis-St. Paul area to obtain information on this, as well as on other points. This year's Sub-Committee comprised T. R. Freeman, W. C. Lawton, W. K. Moseley, W. S. Mueller, J. C. McCaffrey and J. J. Jezeski, *Chairman.* They report as follows:

This report consists of a summary of information obtained from specific investigations and laboratory data available in the files of the several Sub-Committee members.

The specific investigations include: (a) a comparison of the direct microscopic count (DMC), the standard plate raw count (SPC) and the laboratory pasteurized count (LPC) on approximately 700 producers in the Minneapolis-St. Paul milk shed, each test being made monthly on samples obtained from each of the same 700 producers; and (b) a similar type of study on a selected group of producers from seven dairies in the Chicago milk shed. Data are also furnished from the files of a commercial laboratory in Indiana.

The Minneapolis-St. Paul study involved a total of 7,949 samples taken over a 12 month period from June, 1954 through May, 1955 from approximately 700 producers. The three tests—DMC, SPC, and LPC —were run on each individual sample of milk. The local grading standards specify 200,000 and over as unsatisfactory for DMC and SPC and 30,000 and over as unsatisfactory for LPC. A field call was made by one of the producers' association fieldmen within a week after an unsatisfactory DMC or LPC result was obtained. The results of each individual test have been tabulated on cards and classified by IBM system.

A similar comparative study was carried on in the Chicago milk shed on a selected group of producers from seven dairies, using identical count standards. The Chicago study covered a period of June 1954 through May 1955 as well, and involved a total of 547 samples taken during this period.

Tables 1, 2 and 3 summarize the results of the Minneapolis-St. Paul and Chicago studies and offer a comparison of the results obtained in the two milk sheds. From the results in Table 1, it is quite evident that the SPC picked up the largest percentage of unsatisfactory samples in both areas and the DMC picked up a much smaller percentage of unsatisfactory raw samples as compared to the SPC. The relative percentage in the Twin City study was about one-third that obtained in the Chicago study. The ratio of SPC to DMC in the Chicago shed was approximately 2:1 whereas in the Minneapolis and St. Paul milk shed it was approximately 4:1. It is quite evident that the SPC is a much more rigorous and discriminating test for the presence of bacteria in raw milk than is the DMC on the basis of the samples tested in each area.

With respect to LPC, this method picked up approximately the same percentage of samples in both milk sheds as did the DMC; however, it should be recognized that these are not the identical samples in most cases. This is evidence that the methods are operating similarly in both areas even though the microflora of the samples may be somewhat different since the ratio of unsatisfactory LPC samples in Chicago to those in Minneapolis-St. Paul was approximately 2:1 whereas the DMC ratio was 3:1.

From the ratios of the unsatisfactory samples in each category in the Chicago shed as compared with the Twin City shed it is quite apparent that the incidence of unsatisfactory counts in the Chicago study was considerably higher than in the Twin City study. This could be accounted for on the basis that the Chicago study included only a relatively small number of producers and it is possible that some bias may have been introduced unknowingly in their selection. The incidence of unsatisfactory samples obtained in the Twin City study on the 700 producers for the 12 months period compares very

closely with the results on about 36,000 samples taken on all of the 3,000 odd producers in the same area for the same period in which DMC and LPC were run.

Table 2 indicates the classification of the unsatisfactory milk samples obtained by the three methods in the two milk sheds studied. From these results, as in the previous table, it is quite evident that the DMC is not nearly as efficient as the SPC in detecting unsatisfactory raw milk samples. The ratio of SPC unsatisfactory samples to DMC unsatisfactory samples is in excess of 2½ to 1 for both milk sheds studied. It is of interest to note the rather close agreement obtained in both milk sheds for the percentage of unsatisfactory samples detected by the SPC method. In the Chicago shed there appears to be a somewhat greater percentage of unsatisfactory samples detected by the DMC as compared to the Twin City area. However, in spite of this it is quite evident that the DMC is considerably inferior to the SPC on the basis of these results.

The percentage of unsatisfactory samples detected by LPC in both the Chicago and Twin City areas shows quite close agreement; but still it is quite apparent when comparing the LPC "unsatisfactories" with the SPC "unsatisfactories" that at the 30,000 level the LPC method is quite inefficient in detecting unsatisfactory raw samples; furthermore a considerable number of the LPC unsatisfactory samples were unsatisfactory by this method alone, and consequently there is not very good agreement between the LPC and the SPC methods in detecting the same samples.

Table 3 illustrates the relative agreements between the various methods in detecting unsatisfactory samples. It is quite evident that the SPC detects a very large percentage of those samples which are likewise unsatisfactory by DMC, amounting to 83 percent in the Twin Cities study and 97 percent in the Chicago study. The LPC detects only from one-fifth to one-third the samples unsatisfactory by the DMC, amounting to 36 per cent of the samples in the Chicago study and 20 per cent of the samples in the Twin Cities study. Of those samples unsatisfactory by SPC, the DMC picked up only about 40 percent in the Chicago study and 23 per cent in the Twin Cities study. So far as the LPC method is concerned, it detected almost identically the same relative percentages of unsatisfactory SPC samples as it did DMC samples. Of the unsatisfactory SPC samples, the LPC method picked up 35 per cent in the Chicago study and 21 per cent in the Twin Cities study. Of the unsatisfactory LPC samples, the DMC method again picked up only a small part of these samples, amounting to 34 per cent in the Chicago study and 14 per cent in the Twin Cities study. However, the SPC method picked up a considerably greater percentage of the unsatisfactory LPC samples when compared with the DMC method. The SPC method picked up 80 percent of the unsatisfactory LPC's in the Chicago study and 53 per cent of the unsatisfactory LPC samples in the Twin Cities study.

From the above data, it is quite evident on the basis of the grading standards used—200,000 and 30,000—that the SPC method is significantly superior to either of the other two methods in detecting unsatisfactory raw milk samples. The SPC method is certainly far superior to the DMC method for this purpose and can be compared directly with it since they both are measuring bacteria in raw milk. The SPC method is somewhat more rigorous than the LPC method in detecting unsatisfactory raw milk samples and in addition picks up a considerable portion of those samples which are not satisfactory by the LPC method as well.

Considerable seasonal variation was observed in both the Twin City and the Chicago studies; however, the variations were in the incidence of unsatisfactory samples in the entire supply and the relative agreement within methods or between methods remained somewhat more constant. It is apparent that agreement between methods holds fairly constant over the entire year whereas the actual incidence of unsatisfactory samples by any method changes probably because of the influence of outside temperatures.

Detailed data on the Indiana area are as follows: In a milk supply graded by SPC in January 1955, only 2 samples of 128 were 200,000 or over by SPC and only 2 samples of 128 were 30,000 or over by LPC. These were not the same samples in any case. In July, 1955, 16 of 120 samples were unsatisfactory by SPC and only 5 were unsatisfactory by LPC. Of these unsatisfactory samples, only 2 were so graded by both methods.

In another supply in which the raw milk was graded by both DMC and reduction tests, of 160 samples taken in July, 1955, 60 were 30,000 or over by LPC, and there was considerable difficulty with high counts in finished products, which were coliform negative. While no data were presented on incidence of unsatisfactory samples by DMC or reduction test, the abnormally high LPC incidence seems to be the result of the raw milk grading methods.

A third supply was described in which the raw milk was graded by DMC and in which at no time were more than 4 percent of the producers over

200,000 according to the City Board of Health. In June, 1955, of 310 samples, 120 were 30,000 or over by LPC.

The results from the commercial laboratory operating in Indiana milk sheds indicate that the use of SPC alone plus a reasonably good enforcement program will result in satisfactory finished product counts. Such an arrangement appears to require no additional testing by LPC, and data are available which indicate that the finished product counts in a number of markets graded by the standard plate count would average well under 10,000 per milliliter on the basis of a logarithmic average. It likewise seems apparent that in markets graded by the direct microsopic count and/or reduction methods that a LPC test is a definite necessity, for the experience has been that finished product counts under a program of DMC and/or reduction tests alone were in many instances high enough to be degraded. Further data from Indiana milk sheds indicates that microscopic counts are low when compared to standard plate counts, in some instances in the ratio of 1:10. Again it is emphasized that finished product counts under a SPC program alone will average from less than 10,000 on all finished products down to less than 3,000.

From the data presented in this Sub-Committee report, it seems quite evident that the DMC is not nearly so rigorous as the SPC in detecting raw counts in excess of 200,000 per milliliter. Consequently, the equivalence of these two methods in a raw milk grading program is open to question. While to some people the data may appear meager, the opinions of many workers in the field should be honored; certainly further detailed studies should be planned in the very near future which would either confirm or refute the data herein presented.

TABLE 3 — RELATIVE AGREEMENT BETWEEN THREE GRADING METHODS IN THE DETECTION OF UNSATISFACTORY MILK SAMPLES (12 MONTHS, JUNE '54 THROUGH MAY '55)

Unsatisfactory by	Area	No. Unsatis.	Detected by: SPC No.	SPC %	LPC No.	LPC %
DMC	Mpls.-St. Paul	298	246	83.	59	20.
	Chicago	64	62	97.	23	36.
			DMC		LPC	
SPC	Mpls.-St. Paul	1080	246	23.	224	21.
	Chicago	156	62	40.	54	35.
			DMC		SPC	
LPC	Mpls.-St. Paul	426	59	14.	224	53.
	Chicago	67	23	34.	54	80.

Legend: See Table 1

From the data presented, the use of the LPC alone does not appear to be feasible—certainly at the 30,000 level. On the basis of preliminary analysis from the Twin Cities study at least, it seems quite evident that even drastically lowering the LPC standard will not provide for the detection of high count raw samples that present grading programs are predicated upon. It is realized, of course, that by lowering the LPC standard it might be possible to pick up a considerably larger portion of the unsatisfactory raw SPC samples but just how far the LPC standard would have to be reduced to pick up a very large majority of the unsatisfactory SPC samples is not definitely known at this time. All of the data from the Twin Cities study have not been analyzed in this regard and the Chicago study was not set up for

TABLE 1—CLASSIFICATION OF MILK SAMPLES BY THREE GRADING METHODS (12 MONTHS, JUNE '54 THROUGH MAY '55)

Area	Total Samples	DMC 200,000 and over No.	DMC %	SPC 200,000 and over No.	SPC %	LPC 30,000 and over No.	LPC %
Mpls. - St. Paul	7949	298	3.7	1080	14	426	5.4
Chicago	547	64	12.0	156	29	67	12.0

Total Unsatisfactory: Mpls. - St. Paul $\frac{1329}{7949} = 17\%$

Chicago $\frac{176}{547} = 32\%$

Legend: DMC = direct microscopic clump count; SPC = standard plate count; LPC = laboratory pasteurized count.

TABLE 2 - CLASSIFICATION OF UNSATISFACTORY MILK SAMPLES BY THREE GRADING METHODS

Area	Total Samples	DMC 200,000 and over No.	DMC %	SPC 200,000 and over No.	SPC %	LPC 30,000 and over No.	LPC %
Mpls. - St. Paul	1329	298	22.	1080	81.	426	32.
Chicago	176	64	36.	156	89.	67	38.

Legend: See Table 1

such an analysis. On the basis of the first three months in the Twin Cities study, June, July and August of 1954, if the LPC standard were reduced to 3,000 this would still pick up only 42 per cent of the SPC unsatisfactory samples and would increase the total number of unsatisfactory samples by about 60 per cent. This does not constitute the final figure in this study and more detailed information in this regard will be available at a later date.

Some people will not, of course, be willing to consider this approach but one must face the facts in the matter and consider that should the LPC standard be drastically reduced to such a point that we might pick up a majority of high count raw samples, the burden on enforcement programs and field calls by dairy inspectors to rectify the troubles on the farm would be increased many-fold. Also, from the standpoint of product keeping quality would such a grading program be worthwhile?

It is recognized that the amount of enforcement activity in a milk shed will have a significant effect on raw product bacteriology and these figures may change somewhat if one compares an unimproved milk supply with one that has been under a vigorous enforcement program for a considerable period of time. Likewise, the standards being used in the milk sheds in question appear to play a vital part in determining the relative efficiency of these tests. However, in spite of these other factors which possibly may influence results, the data herein discussed do indicate that serious consideration be given to the initiation of studies relative to the following:

1. The true worth of the DMC.
2. A comparison of the efficiency of the LPC when used in milk sheds in different areas.
3. The effect on product quality of a grading program based solely on the LPC.
4. Would a grading program based solely on the LPC be realistic with respect to the maintenance of good producer relationships, and would such a program be apt to impose unnecessary burdens on the producer?

DETECTION OF PROTEOLYTIC ORGANISMS IN DAIRY PRODUCTS

In view of current interest in methods for the detection of spoilage organisms in dairy products, especially butter, a Sub-Committee comprising R. N. Costilow, J. J. Jezeski, W. S. Mueller, R. B. Parker, Geo. W. Shadwick and H. B. Richie, *Chairman*, undertook to study the matter. A comprehensive review of the literature was compiled by the Chairman. This has been condensed for publication by R. B. Parker and the condensed form is as follows:

Bacteria involved

The importance of psychrophylic bacteria in deterioration of butter has been reviewed in a previous report of this committee (1) and by others, including Wagenaar (2). Most commonly, spoilages have been caused by various species of *Pseudomonas, Achromo-bacter* and *Flavolbacterium.* As these genera are gram-negative caseolytic forms capable of growing at reduced temperatures, various methods which will detect such organisms have been employed in predicting keeping characteristics of butter.

Reliability of method

There is, in general, reasonable correlation between levels of casein-digesting bacteria and spoilage rate of butter. However, certain instances of false positive caseolytic organisms have been reported by workers as early as Hastings (3) and later by Frazier and Rupp (4). It was pointed out that a clear zone around colonies on agar containing skim milk is not entirely reliable as an index of proteolysis by acid-forming bacteria. Also certain gram-positive species which are incapable of developing in the environment provided by butter, i. e., high salt concentration in the aqueous phase, may grow and produce true proteolysis on milk agar plates. False positive reactions caused by acid-forming bacteria can be detected by flooding the plate with dilute acid (3). Proteolysis on plates caused by gram-positive spore formers and certain micrococci is more difficult to eliminate. Fortunately such types are usually low in numbers in fresh butter and will frequently decrease as butter is aged. Various workers, including Nelson (5), have suggested the use of selective dyes such as crystal violet to eliminate gram-positive organisms.

Media

Numerous media have been proposed for enumerating caseolytic bacteria. Ayres and Mudge (6) proposed about 50 different formulations of milk agar. Of the media tested by these workers, three containing dry skim milk solids were reported as giving superior results. Zoller (7) has suggested a non-fat dry milk solids agar modified by the inclusion of sodium citrate. British Standard Methods (8) recommend the medium devised by Frazier and Rupp (4). After three days incubation at 30°C., the plates are flooded with a protein precipitant such as tannic acid. Jezeski (9) has suggested a medium in which 5 percent skim milk is added just before the agar is poured. Gelatin liquefaction has been considered, too often and erroneously, as an appropriate test for evaluating proteolysis. As stated in Manual of Meth-

ods, Society of American Bacteriologists (10), "Gelatin hydrolysis represents enzymatic action on an incomplete protein and positive action is not necessarily an indication that an organism can hydrolyze complex proteins". Casein is a conjugated protein. Hydrolysis of gelatin by an organism may or may not indicate its ability to hydrolyze casein.

Temperature

Numerous reports in the literature have emphasized that the temperature employed for total plate count may be too high for species important in butter deterioration (11, 12, 13). Both Nelson and Baker (14), and Van Der Zant and Moore (15) have recommended incubation at 25°C. for 3 days. Temperatures above 25°C. limited growth of certain psychrophilic types while temperatures below 25°C. required excessive incubation periods. Also proteolytic enzyme activity is severely retarded at the lower temperatures.

Surface taint

Special techniques are required in enumerating the organism responsible for surface taint. *Pseudomonas putrefaciens* is quite sensitive to heat and should not be exposed to temperatures in excess of 45°C. Wagenaar and Jezeski (16) report certain strains of *P. putrefaciens* to be inactivated by distilled water. Maximum counts were obtained with a gelatin-phosphate diluent and Long and Hammer's agar (17). The heat and diluent sensitivities of other psychrophilic organisms have not been studied extensively. However, it would not appear unreasonable to expect certain strains to have sensitivities similar to those of *P. putrefaciens.*

Other studies

In addition to the survey of the literature, experimental studies were initiated at Michigan State University. A progress report by L. G. Harmon and R. N. Costilow indicates that the following seven media were used for enumerating proteolytic bacteria in 18 butter samples:

1. Tryptone glucose extract agar (Difco) plus 10 ml. of 10 per cent reconstituted non-fat dry milk solids per 100 ml.
2. As 1, except that demineralized nonfat dry milk solids were used.
3. As 1, except that only 5 ml. of the 10 per cent reconstituted nonfat dry milk solids were used per 100 ml., and 0.1 per cent Calgon was added.
4. Frazier and Rupp casein medium.
5. TGE agar plus 5 per cent sterile skimmilk.
6. Medium devised by L. G. Harmon, Michigan State University, as follows: 0.3 per cent beef extract, 0.5 per cent peptone, 1.5 per cent agar, 5 per cent sterile skimmilk.
7. Medium used in the Dairy Bacteriology Laboratory, Michigan State University was made of the following indgredients: 0.5 per cent peptone, 1.5 per cent agar and 3 per cent skimmilk.

Poured plates were incubated at 10°, 21°, and 32°C. They were counted after 2 days at 32°C., after 3 and 5 days at 21°C. and after 5 days at 10°C.

Media numbers 2 and 4 were found to be unsatisfactory. No proteolytic organisms were detected with medium No. 2 due to inability to sterilize the demineralized casein without denaturing it. When 10 per cent demineralized casein was autoclaved at 15 lbs. for 20 minutes, coagulation occurred. One batch in which much of the casein was removed during filtering was satisfactory, However, the concentration of casein was too low and no proteolytic organisms were detected. Medium No. 4 was used throughout but many of the samples showing significant proteolytic counts on other media were negative on the Frazier and Rupp medium. When they did appear, the hydrolysis was not clearly indicated. This, combined with the difficulty in preparing the medium, made it unsuitable for use.

There were no significant differences in the counts obtained with the other five media used.

The highest populations of proteolytics were found when the plates were incubated at 32°C for 48 hours. The next highest was at 21°C for 5 days, the third at 21°C for 3 days, and the lowest at 10°C for 5 days. In fact, the bulk of the samples were negative when an incubation temperature of 10°C was used. It is realized that incubation at the higher temperatures may enumerate organisms which would be unimportant from the standpoint of butter storage. Over 100 isolations were made from the various media and are being screened as to type. These will eventually be tested for their action in butter.

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FAT TESTS FOR MILK AND DAIRY PRODUCTS

In view of the increased interest in simpler fat tests, a Sub-Committee composed of T. R. Freeman, G. W. Shadwick and Earl F. McFarren, *Chairman* undertook to survey the literature on this subject. Their report is as follows:

Detergent methods for determining the butterfat content of milk have for years attracted the attention of a number of investigators, primarily because of the hope for a simplified procedure and the elimination of difficulty with charred milk encountered in the Babcock Test. In an unpublished report[1] it is reported that with a new modified BDI detergent test (designated as a DPS detergent test) the average values obtained on 44 samples of fresh whole milk were identical with the Babcock test results. The modified test differs from the original test primarily in that 2.0 g. of sodium bicarbonate is added to the detergent mixture. It is stated that the purpose of the sodium carbonate is to act as a neutralizer and to prevent gel formation encountered in some chocolate ice cream.

Fat values obtained with the modified test on milk and on ice cream checked closely, within experimental error, with those obtained with the Babcock and Roese-Gottlieb tests. Detergent test results on cream averaged approximately 0.75 per cent higher than Babcock results and 1.0 percent higher than Roese-Gottlieb results. The curved bottom meniscus in the detergent test on cream was found to account for the increase in reading obtained by this test over that of the Babcock test results and averaged 0.25 per cent higher than Roese-Gottlieb results. The detergent test, regular or modified, was not affected by the presence of small amounts of mercuric chloride or potassium dichromate used as preservative.

While work has been progressing on the detergent test, studies also have been continued on the Babcock test, and detailed directions for conducting the Babcock test have been submitted to the A.O.A.C. Action on these revisions[2] has been deferred pending the outcome of the detergent test studies. Among the suggested revisions was one major change, namely, that the milk pipette be constructed to deliver on the average 18.36 grams[4] of milk. An 18.05-ml. pipette was found to deliver this amount. It was recommended that the Babcock test be standardized so as to obtain results as closely as possible in statistical agreement with the other extraction method. This seems desirable since the Babcock test has been reported to yield results from 0.05 to 0.07 per cent higher than the generally accepted ether extraction Mojonnier method. Presumably, those using the new modified detergent test also should use such a pipette if it is desired to make that test agree with the ether extraction method.

Other studies on the standardization of the Babcock test have included procedures specifying centrifuge speed and time, specific gravity, amount of sulfuric acid, and method of mixing milk prior to pipetting[4,5]. For those using the Babcock method the procedures recommended should be followed. These should be applied where applicable to the detergent test.

Other methods which have received study are the Schain[6] and the Gerber Tests[7]. The Schain Test in its present form does not appear suitable for the quantitative[8] determination of butterfat in milk.

The Gerber Test appears to be accurate, but apparently a correction needs to be applied or a 10.77 ml[9] pipette should be used instead of a 11.0 ml pipette if results agreeing with the Roese-Gottlieb test are to be obtained.

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COLIFORM STANDARDS FOR PASTEURIZED MILK AND MILK PRODUCTS

To increase the coverage this year, all members of the main Committee were made members of this Sub-Committee, with F. W. Barber again acting as Chairman.

The preliminary survey of coliform standards reported last year included the official and unofficial standards in force in eight states, ten cities and three provinces of Canada. The efforts of the committee this year were concentrated on a complete survey of the standards in force in all states. Consequently, a questionnaire was sent regulatory officials in each of the 48 states requesting the following information on milk, cream, flavored milks, frozen desserts, and cottage cheese:

1. Legally established coliform standards.
2. Unofficial standards used if not legally established.
3. Frequency of tests.
4. General compliance with standards.
5. Are there any specific problems which require special consideration in the interpretation of the tests or the establishment of a coliform standard?

Replies were received from all states although in some instances the desired information had to be obtained from sources other than regulatory officials. Not all replies were as complete as might be desired but in general the information was adequate for this survey. The results can be summarized in the following statements:

Milk: Of the 46 replies, 19 states have legal standards; 19 have unofficial standards; 8 have no standards. Legal standards were as follows: one state with 1 per ml., one with 3 per ml., one with 5 per ml. 15 with 10 or <10 per ml., and one state did not give a standard. Unofficial standards included one state with 0 per ml; one with 5 per ml; and 17 with 10 or <10 per ml. The majority of replies (36) indicated routine testing with good compliance.

Cream: Of the 46 replies, 16 states have legal standards; 22 have unofficial standards; 8 have no standards. Legal standards were as follows: one with 5 per ml., 13 with 10 per ml., and two states did not give a standard. Unofficial standards included one with 0 per ml., one with 30 per ml., one with 100 per ml., and 19 with 10 or <10 per ml. The majority of replies (36) indicated routine testing with 25 reporting good compliance, 11 fair compliance and 10 not reporting.

Flavored Milk: Of the 45 replies, 13 states have legal standards; 20 have unofficial standards and 12 have no standards. Legal standards were as follows: one with 5 per ml., one with 100 per ml., 10 with 10 or <10 per ml., and one state did not report a standard. Unofficial standards included one state with 0 per ml., and 19 with 10 or <10 per ml. The majority of replies (30) indicated routine testing with 24 reporting good, 8 fair and 1 poor compliance. Twelve states did not report.

Frozen Desserts: Of the 48 replies, 5 states now have legal standards; 21 have unofficial standards; and 22 have no standards. Legal standards included one state requiring freedom from coliforms, one with none in a 0.1 gram sample and 3 with 10 or<10 per gm. Unofficial standards included one with 1 per gm., one with 30 per gm., one with 200 per gm., 17 with 10 or <10 per gm., and one state did not give a standard. Twenty-three states reported routine testing, 9 occasional testing and 16 did not report. Compliance was good to fair.

Cottage Cheese: Of the 48 replies, 3 states have legal standards; 14 have unofficial standards; and 31 have no standards. All three legal standards were 10 per gram while unofficial standards included 12 states with 10 or <10 per gm., one with 50 per gm., and one state did not give a standard. Only 15 states reported routine testing with 13 indicating good and 2 poor compliance.

Comments were received from 18 states and several individuals interested in the committee

Continued on Page 17

OBSERVATIONS ON THE DETERMINATION OF ANTIBIOTICS IN MILK[1]

C. K. JOHNS AND I. BERZINS

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(Received for publication October 14, 1955)

A so-called "2 hour" test for the detection of penicillin in milk showed no advantage over the regular disc assay procedure. Sensitivity of the latter test was increased by (1) reducing to 4 ml. the volume of seeded agar per plate, (2) refrigerating "planted" plates for 2—6 hours, (3) avoiding overnight incubation at 37°C, and (4) using the larger (0.5 in.) paper discs.

Dornbush's disc assay procedure using B. cereus **for detecting aureomycin was also found to be less sensitive than claimed. Zones of inhibition were less sharply defined than with penicillin. A spore suspension was successfully substituted for a broth culture here.**

The methylene blue reduction type of test showed good sensitivity in detecting aureomycin. B. cereus **was more sensitive than** B. mesentericus, **and broth cultures more than spore suspensions.**

Dr. C. K. Johns has been a member of the Bacteriology Division, Canada Department of Agriculture, Ottawa, Ontario, since 1927. In 1953 he was appointed Officer-in-Charge of the new Dairy Technology Research Unit there. A graduate of the University of Alberta, he obtained his M.Sc. from McGill University and his Ph.D. from Wisconsin. He served as President of the I.A.M.F.S. in 1934-35, and was honored with the Citation Award in 1954.

The urgent need for a rapid test for residual antibiotics in milk is widely recognized. Most published tests are too time-consuming to be of much value in the dairy plant. Recently (3), a modified agar diffusion method was claimed to reduce to 2 hours or less the time required for detection of penicillin in milk. In this procedure, plates were poured with 15 ml. of penassay seed agar (Difco) seeded with a spore suspension of *Bacillus subtilis*, inverted and incubated for 2½ hours, then stored in a refrigerator until needed. To test for penicillin, sterile ½ inch filter paper discs were moistened with the milk by capillary action and then placed on the surface of the seeded agar. It is claimed that in 2 hours or less at 37°C, a zone of inhibition can be observed. When this procedure was tried out in our laboratory, results were disappointing. Only where freshly prepared plates were used was it possible to detect a zone of inhibition in 2 hours. When previously incubated plates were refrigerated overnight, it was not possible to make out zones of inhibition in less than 5 hours on subsequent incubation with milk-saturated discs. Furthermore, with longer refrigeration the value of the plates decreased steadily, and after 6 days so few colonies developed that concentrations of penicillin less than 0.2 units per ml. could not be detected with certainty, even after overnight incubation. Known concentrations of penicillin in milk were detected much more speedily by the regular technique (9), employing freshly poured plates and incubating for 4 hours.

Since the Gogas and Bicknell procedure (3) calls for 15 ml. of seeded agar medium per plate, while Dornbush (1), with a similar technique for detecting aureomycin, recommends only 4 ml., studies were conducted using varying amounts of seeded agar with both penicillin and aureomycin. For penicillin, the penassay seed agar of Gogas and Bicknell was also compared against Bacto whey agar using Bacto Subtilis spore suspension B453. A marked decrease in zone diameter was noted when 15 ml. quantities of medium were used (Table 1), while on overnight incubation large surface colonies frequently obscured the zones on penassay seed agar. This was noted only with the 0.25 in. discs. Growth on whey agar was slower, and no zones could be made out even after 7 hours incubation. After 18 hours, however, definitely wider zones were found on whey agar in this experiment; in others, results were closely comparable. (Kosikowsky (6) believes whey agar is unquestion-

[1]Contribution No. 399, Journal Series, from the Bacteriology Division, Science Service, Canada Department of Agriculture, Ottawa.

TABLE 1 — THE EFFECT OF VARIOUS FACTORS ON ZONE OF INHIBITION OF GROWTH OF *B. Subtilis* BY PENICILLIN (PRELIMINARY INCUBATION FOR 2.5 HOURS AT 37°C, THEN REFRIGERATION FOR 21 HOURS BEFORE "PLANTING" WITH 0.5 IN. DISCS AND INCUBATING AT 37°C.)

Medium	Volume per plate (ml.)	Incubation period (hrs.)	Zone of inhibition of growth (mm.) caused by concentration of penicillin (I.U. per ml.) in milk as indicated 0.5	0.25	0.1	0.05
P.S.A.[a]	4	7	27[c]	23[c]	20[c]	18[c]
	15	7	22[c]	20.5[c]	18	Tr.
	4	18	23	21	17[c]	16[c]
	15	18	20[c]	18[c]	14[c]	0
W. A.[b]	4	18	35[c]	33[c]	30[c]	25[c]
	15	18	29[c]	26[c]	23[c]	19[c]

[a]Penassay seed agar (Bacto)

[b]Whey agar (Bacto) — no visible growth after 7 hours

[c]Estimate — zone not sharply defined

ably preferable to penassay seed agar). Wider zones were also noted with both media where, after spotting with the discs, plates were refrigerated before incubation to permit greater diffusion of the penicillin before growth commenced. This procedure was recommended by Dornbush (2). As a result of these findings, 4 ml. portions of seeded agar medium per plate were used in all future studies.

In our studies on inhibitory substances in milk (4) it was frequently suspected that aureomycin was responsible for decreased starter activity. This was difficult to prove by the agar diffusion method, however, since *B. subtilis,* the test organism employed for detecting penicillin, is much less sensitive to aureomycin. Towards the end of our studies in 1952 we learned of a similar technique (1) which, it was claimed, would detect 0.04 gamma per ml. of aureomycin. Plates were prepared with brain heart infusion agar seeded with a fresh broth culture of a special strain of *Bacillus cereus* No. 5. After the 0.25 in. discs had been planted, plates were incubated at 24° and 37°C, usually overnight. With this technique, too, we were disappointed; in our hands it was much less sensitive than was claimed. On six separate occasions, tests were run on milks containing 0.2 gamma per ml.; the average zone diameter was only 10.8 mm., as against 13.6 mm. obtained by Dornbush (1). In subsequent studies, by refrigerating 4 hours at 4°C, then incubating at 37°C for 14 hours, Dornbush (2) increased the zone to 16.5 mm. Our zones of inhibition with aureomycin were also less sharply defined than were those for penicillin with *B. subtilis,* making precise measurement difficult. Incidentally, the strain of *B. cereus* used to test for aureomycin is much less sensitive than *B. subtilis* to penicillin. To dihydrostreptomycin it is even less sensitive, no zone of inhibition being obtained with 2 gamma per ml.

Seeking a more sensitive indicator organism for aureomycin, which we had found to inhibit lactic starter organisms much more severely than did penicillin (5), tests were run by Mr. G. B. Landerkin of this Division on 13 selected strains of bacteria he had isolated. Unfortunately, not one was appreciably better than Dornbush's *B. cereus* No. 5.

In the hope of increasing the sensitivity of Dornbush's method, we recently tested several modifications. Extending the refrigeration of poured plates, after planting the discs, from 2 to 6 hours before incubating, gave no advantage. Heavier saturation of the disc, obtained by holding it for 20 seconds against the tip of a pipette charged with milk, increased the zone diameter as much as 3 mm. in some instances; the average weight of milk absorbed by ten 0.25 in. discs increased from 13.9 mg. to 16.0 mg. Increasing the incubation period beyond 4 hours re-

TABLE 2 — EFFECT OF VARIOUS FACTORS ON ZONE OF INHIBITION OF GROWTH OF *B. Cereus* BY AUREOMYCIN, 0.25 IN. DISCS — 3 HOURS REFRIGERATION BEFORE INCUBATION AT 37°C. AND PLATES POURED WITH 4 ML. OF SEEDED AGAR

Concentration of Aureomycin (gamma per ml.)	Zone of Inhibition (mm)a after 3 hrs	4 hrs	5 hrs	6 hrs	7 hrs
0.5	—	16	15.75	15.5	11[b]
0.25	—	13	13	12.5	±
0.125	—	11.5	11.25	10.25	?
0.05	—	±	±	—	—
0.025	—	—	—	—	—

[a]Average of duplicate plates

[b]Estimate — zone not sharply defined

TABLE 3 — COMPARISON OF 0.5 IN. AND 0.25 IN. DISCS IN THE DETECTION OF AUREOMYCIN IN MILK. (PLATES REFRIGERATED FOR 2 HOURS AFTER "PLANTING", THEN INCUBATED AT 37°C. FOR 4 HOURS. 4 ML. AGAR/PLATE.)

Aureomycin concentration (gamma per ml.)	Zone of inhibition of growth (mm.) 0.25 in. discs		0.5 in. discs	
0.5	13	14		
0.25	12	12	23	23
0.125	10	10	20	20
0.05	±	±	18	18
0.025	—	—	14	15
Control	—	—	—	—

duced the zone diameter (Table 2) and decreased clarity of the zone. After overnight incubation zone size was also sharply reduced. Substitution of the 0.5 in. disc for the 0.25 in. greatly increased the sensitivity. Under optimum conditions (Table 3) concentrations as low as 0.025 gamma per ml. were detected with the larger disc as against 0.125 gamma per ml. with the smaller.

One drawback to the use of Dornbush's test is that it requires a fresh broth culture of the test organism. Unless such a culture is available, there is a delay of at least one day before the test can be made. To avoid this, a spore suspension was prepared from a culture grown on nutrient agar at 30°C for 5 days. The growth was washed off with physiological saline, centrifuged at 1500–2000 r.p.m. for 5 minutes, and the supernatant drawn off. Washing and centrifuging were repeated 3 times. The spores were then suspended in *ca* 15 ml. of saline, heated to 75°C for 10 minutes, cooled to room temperature and further diluted with physiological saline to give a turbidity reading of 0.310 by a Klett-Sommerson photoelectric colorimeter, using a No. 54 filter. This represents *ca* 70,000,000 spores per ml. The suspension was held at approximately 4°C and one ml. used to inoculate 100 ml. of assay medium. This yielded very satisfactory plates.

Schipper and Petersen (7) described a methylene blue reduction type of test for detecting aureomycin. The suspected sample was serially diluted with sterile milk, the test organism (*B. cereus* No. 5) and methylene blue solution added, and the tubes incubated at 37°C for 4 hours. By means of this technique, we were able to detect with few exceptions the presence of 0.03 gamma per ml., as shown by absence of reduction. This test, however, suffers from the same handicap as Dornbush's original disc assay method in that it requires an overnight broth culture of the test organism as inoculum. By substituting a spore suspension here, too, we were able to retain the sensitivity of the test, although it was necessary to prolong the incubation period to 5 or 5½ hours. In a more recent paper, Schipper and Petersen (8) have modified their technique slightly, substituting a strain of *Bacillus mesentericus* and using reconstituted dried non-fat milk solids. When broth cultures of *B. cereus* and *B. mesentericus* were compared by us, however, the former proved more sensitive and also gave a much sharper end-point (Table 4). In similar tests comparing spore suspensions of each organism, (Table 5) *B. cereus* again showed more active reduction, although the difference in sensitivity became less apparent as incubation was prolonged beyond 5 hours. Replicate tests with spore suspensions also varied more than those with broth cultures, and the end-points were far from sharp.

TABLE 4 — COMPARISON OF BROTH CULTURES OF *B. Mesentericus* AND *B. Cereus* IN THE SCHIPPER AND PETERSEN TEST (JUNE 7, 1955)

Concentration of aureomycin in milk (gamma per ml.)	B. mesentericus[a]			B. cereus[b]		
	4c	5c	5½c	4c	5c	5½c
0.05	—	90%R[d]	95%R	—	—	—
0.04	75%R	98%R	98%R	—	—	—
0.03	75%R	98%R	98%R	—	—	—
0.02	75%R	98%R	98%R	—	90%R	98%R
00.01	95%R	98%R	98%R	90%R	99%	R
0.0	98%R	98%R	98%R	98%R	99%R	R

[a]40 x 10^6/ml.
[b]42 x 10^6/ml.
[c]Hours incubated at 37°C
[d]%R = percent reduction of methylene blue

TABLE 5 — COMPARISON OF SPORE SUSPENSIONS OF *B. Mesentericus* AND *B. Cereus* IN SCHIPPER AND PETERSEN TEST (JUNE 15, 1955)

Aureomycin concentration (gamma per ml.)	B. mesentericus[a]			B. cereus[b]		
	5c	5½c	6c	5c	5½c	6c
0.05	50%R[d]	50%R	50%R	70%R	70%R	70%R
0.04	50%R	50%R	50%R	70%R	70%R	70%R
0.03	50%R	50%R	50%R	70%R	70%R	80%R
0.02	50%R	50%R	80%R	90%R	96%R	99%R
0.01	50%R	50%R	90%R	96%R	98%R	99%R
0.0	60%R	60%R	95%R	98%R	98%R	99%R

[a]460 x 10^6/ml.
[b]360 x 10^6/ml.
[c]Hours incubated with methylene blue at 37°C.
[d]%R = percent reduction of methylene blue

COMMENT

While it is possible to detect the presence of small concentrations of penicillin or aureomycin by the biological tests described, the time required is too great. Nor is it likely that the time can be reduced appreciably. What is needed is a platform test which will instantly reveal the presence an antibiotic. This suggests the need for incorporating some compound in the antibiotic which, when present in the milk, could be instantly detected by physical or chemical means. Either a suitable dyestuff, or a harmless radioactive compound, would appear to answer the purpose here. For plants making products (cheese, fermented milks, etc.) dependent upon lactic fermentation, a means of instantly detecting milk containing a significant concentration of an antibiotic would be

eagerly accepted. Some support for such a proposal might be looked for from the medical profession, in view of the danger of sensitization of human consumers of milk by small concentrations of antibiotics.

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The authors are indebted to Dr. A. C. Dornbush, Lederle Laboratories, Pearl River, N. Y., for the description of his method of assaying aureomycin, as well as for a culture of *B. cereus* No. 5 and a supply of aureomycin, and to Dr. I. A. Schipper, North Dakota Agricultural College, Fargo, N. D., for a culture of *B. mesentericus* No. 118.

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REPORT OF THE COMMITTEE ON APPLIED LABORATORY METHODS—1955

Continued from Page 13

survey. These comments will require further study by the committee before they are summarized.

The results of this survey indicate that legal standards for coliform organisms are being considered and established by a number of states. Numerous cities have adopted the U. S. Public Health Service Milk Ordinance and Code. Progress is being made but there is still considerable variation in both legal and unofficial standards.

It would appear that the studies of this Sub-Committee should be continued to consider the comments received, especially in the area of testing methods and uniformity of standards.

ACKNOWLEDGEMENT

Particularly since he is relinquishing the Chairmanship, the Chairman wishes to convey his warmest thanks to all on the Committee who have done the work which this report represents.

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Alfred Ratzlaff .....Rochester

Missouri Association of Milk and Food Sanitarians

Pres., Marvin Campbell, Cape Girardeau
Vice-Pres., Bernie Hartman, Kansas City
Sec.-Treas., John H. McCutcher, Mo. State Health Dept., Jefferson, City, Mo.
Auditors:
Calvin B. Ages ..... St. Louis
Paul W. Klusmeyer ....Jefferson City

New York State Association of Milk Sanitarians

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Pres.-Elect, George H. Hopson .... Poughkeepsie
Sec.-Treas., C. W. Weber, 18 Dove St., Albany 6, New York.
Members of the Board:
Fred E. Uetz ..... Brooklyn
William O. Skinner .... White Plains
Robert W. Metzger .....Sycracuse
Walter H. Grunge .... New York City

Oregon Association of Milk Sanitarians

Pres., Ross Coleman .....Salem
Vice-Pres., Roy Stein .....Corvallis
Sec.-Treas., Archie Miner, 568 Olive Street, Eugene, Oregon, Eugene Farmers Creamery
Directors
Spencer George .....Tillamook
Kenneth Carl .....Salem

Pennsylvania Dairy Sanitarians Association

Pres., Clarence Moss .....Philadelphia
Vice-Pres., Walter E. Arnold ..Vanderbilt
Sec., William H. Boyd, P. O. Box 80, Huntingdon, Pa.
Treas., Clark D. Herbster, ..Selinsgrove

RHODE ISLAND ASSOCIATION OF DAIRY AND FOOD SANITARIANS

Pres., Dr. T. J. Grennan, Jr. ..Providence
Vice-Pres., V. P. Boylan .....Providence
Sec.-Treas., Dr. R. M. Parry, R. I. Quality Milk Association, 158 Greenwich Avenue, Warwick

ROCKY MOUNTAIN ASSOCIATION OF MILK AND FOOD SANITARIANS

Pres., Ray Iiams .....Casper, Wyo.
Pres.-Elect, Dr. Wiliam A. Hoskisson ..... Salt Lake City, Utah
1st Vice-Pres., Wayne W. Stell .....Albuquerque, New Mexico
2nd Vice-Pres., William E. Polzen ..... Denver, Colorado
Sec.-Treas., Peter G. Stevenson, 3298 South Holly Street, Denver, Colo.
Auditors:
Carl B. Rasmussen .....Sheridan, Wyo.
Hugh F. Templeton ..... Omaha, Neb.

SANITATION SECTION TEXAS PUBLIC HEALTH ASSOCIATION

Chairman, Loreta Gaillard .....Corsicana
Vice-Chairman, Joe Lewis .....Longview
Secretary, Henry C. Williams.....Dallas
Section Council:
Three years; W. W. Clarkson ..... Abilene
Two years; Lige M. Fox..Big Springs
One year; D. H. Evans .....Austin

SOUTH CAROLINA ASSOCIATION OF SANITARIANS, INC.

Pres., C. E. Corley ..... Columbia
Vice-Pres., T. P. Anderson.....Columbia
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Directors:
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R. L. McCormack ..... Ridgeland
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SOUTH DAKOTA ASSOCIATION OF SANITARIANS

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Sec.-Treas., T. A. Evans, State Dept. of Health, Pierre
Executive Board
Past Pres., Ira DeHaai .....Spearfish
Elected member, Ray Kallemeyn .....Sioux Falls

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Pres., W. J. Oldenburg .....Seattle
Pres.-Elect, C. R. Mike O'Connor ..... Bellingham
Sec.-Treas., George Andrews, Room 125 Ferry Terminal, Pier 52, Seattle 4, Washington.

WISCONSIN MILK SANITARIANS ASSOCIATION

Pres., Robert M. Keown .....Elkhorn
Vice-Pres.,, and Pres. Elect Burdette L. Fisher .....Kiel
Sec. Treas., L. Wayne Brown, 421 Chemistry Bldg., Univ. of Wisconsin, Madison, Wisconsin.
Directors
James T. Judd .....Shawano
Alvin Noth .....Reedsburg
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NEWS AND EVENTS

NINTH ANNUAL MEETING DAIRY PRODUCTS IMPROVEMENT INSTITUTE

The Ninth Annual Meeting of the Dairy Products Improvement Institute, Inc. will be held on Thursday, February 16, 1956 in the West Ballroom of the Hotel Commodore, New York City, New York. The meeting this year is of particular significance as it features the work of the Institute and the introduction of its quality control publication, "Requirements for the Sanitary Production of Sweet Cream, and Milk for Manufacturing". This is a logical sequel to the Institute's last two annual meetings when regulatory officials from the northeast and mid-west presented the regulations under which they operate, particularly as they applied to milk and cream for manufacturing.

The first speaker of the main session in the afternoon will be the Institute's president, W. A. Wentworth of The Borden Company, New York City, New York who will review the history, objectives, and work of the Institute. Then Mr. E. J. Roberts of the Breyer Ice Cream Corporation, Philadelphia, Pennsylvania will discuss the principles and policies underlying the "Requirements for the Sanitary Production of Sweet Cream, and Milk for Manufacturing" and Dr. A. C. Fay of H. P. Hood & Sons, Boston, Massachusetts will follow with a discussion of the details of the procedures, standards, and operating requirements presented in the publication.

Mr. James A. Stalbird, Chief of Milk and Restaurant Sanitation Section, New York State Department of Health will be the final speaker for the afternoon and will present a most important critical review of the "Requirements for the Sanitary Production of Sweet Cream, and Milk for Manufacturing".

Copies of the publication which is in two parts; the General Statement, and the Operating Manual, should be available for distribution at the meeting.

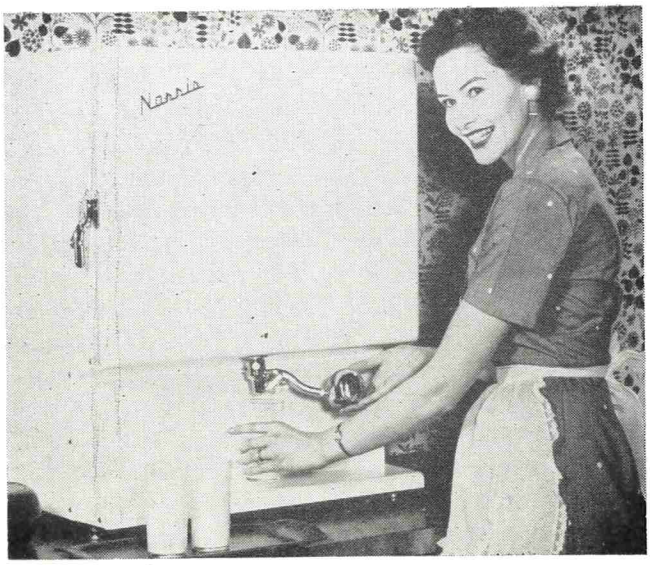
The morning session will be devoted to committee meetings and a general business meeting for members. The afternoon session, which will be particularly interesting to regulatory officials, industry representatives, and people from the educational field, will begin with a social period and luncheon followed by the presentation of the speakers with President Wentworth presiding.

PROFESSOR H. G. LINDQUIST, UNIVERSITY OF MASSACHUSETTS, DIES SUDDENLY

Friends will be saddened to learn of the death of Professor Harry G. Lindquist on Thursday, December 1, 1955, following a heart attack. Professor Lindquist was born in Holden, Mass., July 30, 1895, son of the late Olaf and Mary (Skribelius) Lindquist.

Professor Lindquist entered the University of Massachusetts in September, 1916. His college education was interrupted by World War I, after which he completed his requirements for his B.S. degree in 1922. His Master of Science degree was earned in 1924 at the University of Maryland, where he was full-time staff member during the following year. Prior to coming to the University of Massachusetts in 1927, he spent two years at Ohio State University as graduate assistant.

Because of his keen interest in teaching and research, he leaves a host of friends among his former students and professional associates in the United States, as well as among the dairy plant operators in New England. He was active in the affairs of the Massachusetts Milk Inspectors' Association and has served as their president and program chairman. He was past high priest of Amherst Chapter, Royal Arch Masons a member of the American Dairy Science Association, and International Association Milk and Food Sanitarians, Inc.



NEW HOME KITCHEN MILK DISPENSER

A milk dispenser for use in the home kitchen has been announced by Norris Dispensers, Inc., Minneapolis, pioneers in the development of the commercial models that have become so popular in restaurants, schools and other public eating places.

The new home dispenser will be welcomed by housewives, driver-salesmen, dairy operators and dairy farmers alike. Mrs. Housewife will like it because it will make colder, more refreshing milk more easily available without messy empty bottles and cartons. And she'll have more room in her refrigerator, too.

Routemen will build business with less work and the resultant increased sales will please both the dairies and the producers.

The newest addition to the kitchen is an attractive, compact unit 30¼ inches high, 25¼ inches wide and 15½ inches deep. It can be placed on a counter top, set on any table or it can be built into the wall.

The dispenser is finished in a white baked enamel exterior and stainless steel interior. The unit is completely sanitary and built according to accepted sanitarians' specifications.

A standard 110 volt electrical outlet will operate the dispenser. A silent refrigeration unit keeps milk at a constant 35 degree temperature.

The dispenser holds two standard 12 quart containers and milk can be kept fresh for longer periods than in smaller containers. A single valve and pouring spout aerates the milk as it is dispensed.

According to L. F. Norris, president of Norris Dispensers, Inc., the new home dispenser unit will enable families who consume just a little more than an average amount of milk to enjoy colder, more refreshing milk at a flip of the wrist.

The home milk dispenser will be serviced by routemen who will merely place a full sanitary dispenser can into the unit on each delivery date. The housewife won't have to touch the machine except for switching a simple mechanism that transfers the flow from one can to another when empty.

Some dairies have already expressed interest in the machine by tentatively planning to place them in homes of regular customers and eliminating regular delivery of smaller packaged units. The unit will soon be placed in mass production and offered to the dairy industry for supplying to regular customers.

PENNSALT ADVANCES STONOGA

Benjamin Stonoga, sales representative of the Pennsylvania Salt Manufacturing Company's B-K department has been named sales supervisor of the company's southwest territory, sales manager C. E. Brooker has announced.

Mr. Stonoga is a graduate of the University of Massachusetts where he majored in chemistry and received specialized training in bacteriology and food technology.

Prior to joining the Pennsalt organization in 1954, Mr. Stonoga was associated with the Utility Chemical Company, Paterson, N. J., as sales manager. He has

also had extensive experience as a consultant to the food and dairy industries in problem areas concerned with sanitation and quality control.

Governor Arthur B. Langlie of the State of Washington being introduced by Estel R. Beck, outgoing president of the Washington State Dairy Foundation, at the annual convention held at the Chinook Hotel in Yakima, November 9th to 11th.

WASHINGTON STATE DAIRY FOUNDATION HOLDS ANNUAL MEETING IN YAKIMA

The 16th annual convention of the Washington State Dairy Foundation was held November 9th to 11th at the ultra-modern Chinook Hotel in Yakima. Estel R. Beck, outgoing President of the Foundation and Manager of the Yakima City Creamery, presided at the business sessions.

The featured luncheon speaker was Arthur B. Langlie, Governor of the State of Washington whose message was "Putting Purpose in our Planning."

Phil Cornelius, Manager of the Skagit County Dairymen's Association, Burlington, was elected as president of the Foundation for the coming year and has announced that Vancouver, B. C. will be the convention city next year.

WASHINGTON STATE LABORATORY METHODS ADVISORY COMMITTEE MEETING HELD

The Laboratory Methods Advisory Committee of the Washington Milk Sanitarian's Ass'n met on October 20th in Seattle with Chairman Dr. Frank Crews presiding. The committee reviewed the laboratory certification program, which they have been carrrying on with dairy labs throughout the State and discussed problems dealing with the approving of the labs. An extensive check-testing program involving the standard plate counts and direct microscopic counts of quick-frozen raw milk samples is in progress with industry labs participating in the Laboratory Certification Program. In attendance for the meeting were: Mr. Dahlberg, Consolidated Milk Products, who sat in for Dr. Arrigoni, Dr. Giedt, Washington State Health Department, Miss Marie Mulhern, Seattle-King County Department of Health, Ira Collins, Consulting Microbiologist, Washington State Department of Health, C. C. Prouty, Washington State College, and Bill Oldenburg, Universal Lab.

WASHINGTON STATE MILK SANITARIAN'S SECTIONAL MEETINGS HELD IN DECEMBER

Quarterly sectional meetings of the Washington Milk Sanitarians Association were held during the month of December with some highly interesting and timely subjects being discussed.

The Southeast sectional meeting was held in Richland, December 8th with Dr. R. G. MacKintosh, Private Veterinarian of Yakima speaking on mastitis.

Spokane was the scene of the Northeast sectional meeting on December 9th with Dr. T. L. Forster, Dairy Department, State College of Washington in Pullman delivering a talk on "The Rancidity Problem of our Raw Milk Supply."

Dr. O. L. Bailey, Washington State Department of Agriculture, Olympia spoke on the subject of "Mastitis isn't always to blame", at the Southwest sectional meeting in Centralia on December 12th. Dr. Bailey also spoke on the same subject at the Northwest sectional meeting in Seattle on December 13th.

President H. S. Adams in earnest discussion with G. H. Steele, Sec.-Treas. of the Minnesota Association.

AMERICAN DAIRY ASSOCIATION PRINCESS CHOSEN

Ruth Marie Peterson, 20-year-old Minnesota dairy farm girl, has been chosen as the 1956 American Dairy Princess.

Miss Peterson, from Austin, Minnesota, was selected from among 13 candidates from as many states. Crowning of the new Princess, official representative of the American Dairy Association, was made at the International Amphitheater, scene of the 1955 International Dairy Show.

Awards to the new Princess include $1,000 for further schooling, a complete wardrobe from Lytton's stores in Chicago, and a year's reign as Princess.

A former 4-H girl and active in YMCA groups, Miss Peterson is the oldest daughter of Mr. and Mrs. Carl E. Peterson. Peterson farms 117 acres with 32 head of dairy cattle near Austin, a city of 25,000 in Southern Minnesota.

Dairy princesses from Iowa, Michigan, Utah, Wisconsin, Washington, South Dakota, Vermont, Oklahoma, Colorado, North Dakota, Missouri and Illinois participated in the contest.

Chosen as alternate to Miss Peterson for the new title was Pat Obray, 18-year-old Dairy Princess from Utah. Miss Obray, also a dairy farm girl, lives in Paradise, Utah. She, too, has been active in 4-H club work and has been secretary of her Future Homemakers of America chapter.

Reigning as Princess of the dairy industry will mean a full year's schedule of appearances throughout the country at dairy industry events. As the new representative of dairying, Miss Peterson's first assignment will be to serve as the official hostess of the dairy association at joint meetings of the milk and ice cream industries to be held in St. Louis, Missouri, October 24-29.

Gardening, cooking and outdoor sports are among the favorite activities of Miss Peterson. She also is an accomplished pianist. She has had one year of schooling at Austin Junior College where she was president of joint-YWCA-YMCA activities. She was selected "Princess Kay of the Milky Way" at this year's Minnesota State Fair. She then became an employee of the Minnesota Dairy Industry Committee, state unit of the American Dairy Association.

Miss Peterson plans to continue her schooling following serving as American Dairy Princess for the coming year.

Miss Obray is the daughter of Mr. and Mrs. Clifford Obray. She has six brothers and sisters ranging in age from 12 to 26. The Obray farm at Paradise, a town of several hundred, is 55 miles north of Salt Lake City. They have 10 Holstein dairy cows on their farm.

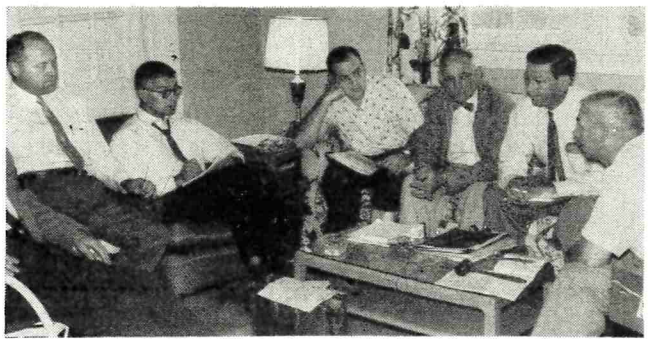
ANNUAL STUDENT-FACULTY MIXER UNIVERSITY OF KENTUCKY

Over 80 students and faculty members ate steak and scalloped potatoes at the Annual Student-Faculty mixer arranged by the Dairy Section of the University of Kentucky.

All students interested in any phase of dairying were invited to attend the evening "bean" feed. Beans were on the menu with side orders of steak sandwiches, scalloped potatoes, cottage cheese, pickles, olives, ice cream, cake and all the milk the boys could drink.

Dr. T. R. Freeman headed the committee on arrangements and served as toastmaster. He welcomed the returning Dairy Cattle Judging Team by informing the gathering that the team had placed sixth at the contest at the National Dairy Cattle Congress at Waterloo, Iowa. The students also were kept laughing for over half an hour by Dr. Freeman's revelations of various faculty foibles.

E. C. Scheidenhelm, field agent in dairying, entertained the group with a demonstration of how to place a class of "bulls". Further amusement was furnished by Lee Dean, high school freshman from Harrodsburg, who presented a ventriloquist act superior in technique to that of many adult artists.



Executive Board in one of many long sessions held during the annual meeting. From left to right: H. A. Barnum, H. H. Wilkowske, J. D. Faulkner, Paul Corash, H. S. Adams and I. E. Parkin.

Mrs. H. L. Thomasson enjoys refreshment provided through courtesy of Georgia Dairy Queen, Inc.

REPORT OF IAMFS COUNCIL MEETING

The meeting of the Council was called to order by John D. Faulkner, Chairman, at 3:30 P.M., October 3, 1955, in the Bon Air Hotel, Augusta, Georgia. Representatives of fourteen affiliate associations were present at the meeting. Mr. Faulkner explained the procedures followed in preparing the agenda for the meeting. He stated that all major items submitted to him during the past year were included on the agenda for the meeting.

The minutes of the last meeting were read and amended to show the terms of appointment of the Steering Committee. The 1954 appointments and terms being as follows: J. J. Sheuring, 3 years; H. C. Goslee, 3 years; Karl Jones, 2 years; George Andrews, 2 years; Wayne Brown, 1 year; and Loreta Gaillard, 1 year.

Dr. Sheuring, Chairman of the Steering Committee, reported that the main activity for the past year was to contribute items for the agenda. The need for additional help in bringing out problems of interest for Council discussion was emphasized. Methods of creating more interest were discussed. A discussion took place regarding the correct procedure for submitting matters for Council consideration. It was suggested that various Secretaries in their respective regional areas might get together to develop ideas. After considerable discussion, it was agreed that the Steering Committee, by direction of the Chairman, should prepare the agenda for future Council meetings.

A discussion took place regarding the Model Registration Act. It was reiterated that the Council had previously endorsed the principle of registration of sanitarians by legislative act. Upon motion duly made, seconded and carried, the Council endorsed the current report of the Committee on Education and Professional Development containing the revised Model Registration Act.

A Student Membership plan was proposed which would create interest among students, After lengthy discussion of this proposal it was agreed that the Council recommend that the Executive Board of IAMFS establish some kind of Student Membership plan for university and college students interested in Sanitary Science.

A discussion took place regarding the matter of whether contributions from industry should be accepted by affiliate associations and by IAMFS. The discussion brought out the fact that direct contributions are not accepted. IAMFS, however, does sponsor the Sanitarian Award which is financed by industry, and various affiliate associations apparently do permit industry sponsorship of some of the state association activities.

A proposed Scholarship Plan was discussed in detail by members of the Council. The Council formally endorsed the plan contained in the report of the Committee on Education and Professional Development which authorizes the Executive Board of IAMFS to establish a scholarship of $350.00 using IAMFS funds. Additional funds obtained through contributions from affiliate associations will be used to establish additional scholarships as funds received permit.

It was suggested that a Council committee was needed to find out more about the various affiliate association committees and programs. Such information would be published when obtained for the information of all members of the IAMFS. Chairman Faulkner appointed the following on the Council "Committee on Committees": Clarence Weber (New York), chairman; Karl Jones (Indiana), John McCutchen (Missouri), and H. L. Thomasson, *ex officio*.

Mr. Faulkner discussed the need for creating greater interest in making nominations for the Sanitarians Award. A discussion took place regarding whether state affiliate associations should appoint committees on awards to make nominations or whether

such nominations should originate with individual members. Experience has shown that better prepared brochures have been submitted by committees than by individual members. For the information of all members of IAMFS, it was emphasized that nominations may be re-submitted each year.

A discussion took place regarding the budgeting of IAMFS funds. It was pointed out that the annual budgeting is the responsibility of the Executive Board and is based upon careful review of the past years' expenditures. An annual Financial Report is presented to the membership at the annual meeting and a financial statement is published in the Journal of Milk and Food Technology.

The Council meeting adjourned at 6:00 P. M.

H. H. Wilkowske, Secretary

MEMORIAL

God in His wisdom has chosen the following from among us:

Harold S. Spencer	New York
Gordon W. Molyneaux	New York
F. Leonard Kenyon	New York
Frank U. Thatcher	Connecticut
Donald E. Joy	Connecticut
Raymond G. Davis	Connecticut
Vincent Harrick	Connecticut
Dr. Frank W. Tarnow	Pennsylvania
Dr. James D. Garrigan	California
C. C. Deal	Oregon
Frank M. Greenlow	Rhode Island
P. R. York	Tennessee
Dr. George A. Frank	Missouri
S. T. Chalker	Florida
Albert Gust	Illinois
Gerald F. Smith	Illinois

IAMFS EXPRESS APPRECIATION

WHEREAS

The members of the Georgia Chapter and the members of the individual committees contributed so generously of their time and energy to make the 42nd annual meeting of the association a success. BE IT RESOLVED that the thanks of the association be extended to each and every person participating in the arrangements.

WHEREAS, The Sanitarians Award has so successfully achieved the aim of recognizing professional achievement and of bringing recognition of the work of sanitarians to the public, therefore, be it resolved that the International Association of Milk and Food Sanitarians thank the sponsors listed below for their participation and continuation of support:

Diversey Corporation
Oakite Products, Inc.
Klenzade Products, Inc.
Olin Mathieson Chemical Corp.
Pennsylvania Salt Company

WHEREAS, The presentation of the fine program at the 42nd meeting involved hard work and personal sacrifice on the part of each and every speaker.

BE IT RESOLVED, that the sincere thanks of the Association be extended to each speaker for their generous and valuable contribution.

MICHIGAN STATE TO HOLD ENGINEERING CONFERENCE

On March 13 and 14, 1956 Michigan State University will be host to the Forth Annual National Dairy Engineering Conference which will be held in the new Kellogg Center. The theme of the meeting, "More Profits Through Better Engineering", will cover the following four general areas:

(1) Answers to Your Refrigeration Problems
(2) Answers to Your Processing Problems
(3) Dairy Plant Automation
(4) Efficiency of Energy Use and Product Use in Dairy Plant Operations.

The conference will cover the latest developments in design and operation of processing equipment in dairy plants. Authorities from their respective fields will discuss topics of interest to every dairy plant operator, equipment designer, plant engineer — all those connected with the dairy industry. The conference will stress new equipment, methods, and processes.

UNIVERSITY OF KENTUCKY NEWS ITEMS

Leonard D. Brown has been named Assistant in Dairying at the Kentucky Agricultural Experiment Station. Mr. Brown received his Bachelor's Degree at Western Kentucky State College and recently received his Master of Science Degree at the University of Kentucky. His work will deal primarily with nutrition of dairy cattle.

James P. Everett, Jack Knepp, and Gerald Brown have been appointed Research Assistants in Dairy Husbandry at the University of Kentucky. Mr. Everett received his B. S. degree from Alabama Poly-

technic Institute and Mr. Knepp and Mr. Brown obtained their B. S. degree from Martin Branch at the University of Tennessee.

The appointment of John Walton as a Research Assistant in Artificial Breeding has been announced by the Dairy Department of the University of Kentucky. Mr. Walton is a recent graduate of the University.

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following listing of subjects presented at meetings of Affiliate Associations is provided as a service to the Association membership. Anyone who may desire information on any subject is encouraged to write to the Secretary of the Affiliate Association concerned for the address of the speaker. Information desired then may be requested from the speaker (a copy of the paper presented may be available for the asking).

New York State Association of Milk Sanitarians

(32nd Annual Conference, Sept. 19-21, 1955)

C. W. Weber, *Sec.-Treas.*, 10 Dove St., Albany, N. Y.

The Prospects and Outlook for the Northeast Dairy Industry. Dr. Herrell DeGraff

Changing New York Dairy Laws to Build New Markets for Milk. Willard C. Drumm

Milk Merchandising. Joseph F. Metz

Improving Milk Flavor by Examination of Each Producer's Milk. Dr. E. S. Guthrie

Psychrophilic Bacteria — Their Importance in Dairy Products. Carroll P. Burke, Harvey Fram and Dr. Franklin W. Barber

New Developments in Cleaning Compounds. W. J. Dixon

Why Do Dairy Cattle Have Mastitis? Ivan Parkin

New Developments in Design and Operation of High-temperature, Short-time Pasteurizers for Milk and Milk Products. Harold B. Robinson

Progress Report on AOAC Determinations of Freezing Point of Milk. Dr. A. H. Robertson

Selling Sanitation to the Milk Producer. Dr. George H. Hopson

Surface Stability of Metals in Dairy Equipment. Edgar O. Dixon

Sanitation Aspects of Take Out Type Foods. A. E. Abrahamson

Problems of Sanitation and Adulteration in Diabetic and Dietic Foods. J. G. Leeder

Sanitation Aspects of Egg Solids. A. C. Keith

Foodborne Outbreaks in Westchester County. William Scoralick

Preliminary Investigation of the Bacterial Quality of Bulk Raw Milk. Dr. Norman W. Bartz, and Dr. Robert H. Volgenau

Future Program for Bovine Brucellosis Control in New York State. Dr. George W. Snook

South Dakota Association of Sanitarians

(June 29-30 and July 1, 1955)

T. A. Evans, *Sec.-Treas.*, Pierre, So. Dakota

Formation of the Pennington County Health Department. Harlan Stricklett

Recent Trends in Environmental Sanitation. H. L. Thomasson

Panel Discussion: Is Brucellosis Control Working? Fred Jolly, *Moderator,* Fred Hansen, Dr. William F. Waddell, Kirk Mears, Howard Perkins, Walt Taylor

The Angostura Mosquito Control Program. Barron Nangle

The Operation of Sewage Lagoons in South Dakota. Marvin O. Allum

The In-Service Training Program of the U. S. Public Health Service. Herbert H. Rogers

The Milk and Food Inspection Program of the State Department of Agriculture. Charles E. Bruett

National Sanitation Foundation Standards for Food Equipment. Charles A. Farish

New Public Health Legislation in South Dakota. Charles E. Carl

Heating Equipment Requirements for Dishwashing Machines. Leigh B. Cornell

Chlorination of Farm Water Supplies. Don Kalda

The Dairy Industry in England. Alvin A. Shock

Some Problems Related to Bulk Milk Farm Tanks and Trucks. Lyle Bachman

Construction and Cleaning of Bulk Milk Handling Equipment. Milton E. Held

Detergents Used in Cleaning Bulk Milk Handling Equipment. Harry Jasper

The Handling of Surplus Milk in the Sioux Falls Milk Shed. Norman O. Nelson

Cleaned in Place Procedures in the Milk Processing Plant. Hugh Eagan

Missouri Association of Milk and Food Sanitarians

22nd Annual Conference, April 19-21, 1954

John H. McCutchen, *Sec.-Treas.*, State Health Dept., Jefferson, Mo.

Brucellosis Forum. L. C. Carpenter, Moderator; Dr. L. A. Rosner, Dr. R. E. Omohundro.

Milk Dispensers. Milton E. Held

Panel Discussions Bulk Tank Storage and Pickup of Milk. Milton E. Held, Moderator, R. K. Meade, Tom Burress, Bernard L. Durben

Field and Laboratory Tests of Milk and Milk Products. William J. Beck, J. E. Edmondson, R. J. Jensen

Farm Pond Water Supplies. Marion W. Clark, Dr. Warren A. Kramer

Cleaning-in-Place for Milk Plants. Dr. Milton R. Fisher

Effects of Antibiotics, Bacteriophage and Other Inhibitory Substances on Milk. R. J. Jensen

Sugar Substitutes in Food Products. John H. McCutchen

Installation of Garbage Disposal Units in Restaurants. Joe Bail

Sanitation in City Inspected Meat Processing Plants. Dr. Kenneth V. Shaskek

Panel Discussion: Machine Dishwashing. Walter Cameron, B. W. Hartman, Robert E. Larkin

Professional Development of the Sanitarian—Training and Curriculum. J. E. Edmondson

Insect Control — New Insecticides. Stuart Spradling, B. J. Whitmire

Floor Cleaning in Dairy and Food Establishments. Richard K. Brunk

WISCONSIN MILK SANITARIANS ASSOCIATION
(11th Annual Meeting, Sept. 13, 1955)
L. W. Brown, *Sec.-Treas.*, 421 Chemistry Bldg., Madison, Wisc.

Report on 3A Standards Committees. V. G. Rowley. C. K. Luchterhand

Legislation of Interest to Sanitarians. Don McDowell

Professional Developments of and for Sanitarians. H. L. Thomasson

What It Takes to be a Good Fieldman. Louis Zahradka

Economic Considerations in Converting to Bulk Handling. Prof. Karl Shoemaker

Topic to be Announced. Dr. Herrill DeGraff

Calibration of Farm Bulk Tanks, Panel Discussion. C. L. Jackson, H. H. Erdman, W. H. Mair, D. L. Bond

What Does the Farmer Expect of the Fieldman? L. L. Hunt

Developments in Milker Rubber Research. Gates Rubber Company, Crown Dairy Supply

Conservation of Water. Dr. W. J. Corbett

Milk Dispensing—Its Inherent Sanitation Problems. Harold Wainess

Psychrophiles in Final Products. Dr. W. K. Mosely

CONNECTICUT ASSOCIATION RECOMMENDS PRACTICES FOR OWNERS OF BULK MILK TANKS

Editorial Note: The following is a reprint of a report of the Farm Practice Committee, Connecticut Association of Milk Sanitarians. In view of the extensive development in bulk milk handling this report is reproduced as an example of how guidance in installation, construction details, and sanitary care of bulk tanks is being provided to owners of bulk tanks. Comments regarding these recommendations should be addressed to H. C. Goslee, Department of Agriculture, State Office Building, Hartford, Conn.

THE FIRST THING TO DO

1. Dealer and Producer have to apply for permit from the State Dept. of Agriculture, Hartford, Conn.

2. A preliminary inspection will be made of the farm by State and Industry men.

3. Before you can ship milk from a bulk tank, approval must be given by the State Dept. of Agriculture.

The following are recommendations on what to look for when installing bulk tanks.

MILK ROOM

1. The milk room must be located where it is accessible to bulk tank pickup.

2. It shall not be in close proximity to any manure disposal.

3. Foundations should be below frost line.

4. It must have a concrete floor properly drained and trapped with drain opening *not* underneath tank and valve.

5. Milk house walls and ceiling shall be sealed and painted.

6. Milk house shall have ample light and ventilation and it is recommended that the ceiling be insulated.

7. Milk house shall be properly screened and free from flies.

8. The door between the milk room and stable must be self closing. (Double doors with double acting hinges.) The outside entrance properly constructed, should accommodate a 36″ to 53″ width bulk tank.

9. Bulk milk farm cooling tanks must be located not less than 24″ from the wall.

10. Compressor end should be so located that it can be ventilated and serviced with a 12″ minimum from the wall.

11. A minimum of 36″ must be allowed on the side of tank from which the milk is strained and also where drawn off.

12. Added space is needed for wash sinks, hot water heater and ample storage space for pails, strainers, etc.

13. Size of milk house depends on the size of tank:
   (A) If new milk houses are built for a 10, 15 or 20 can tank the milk house should measure at least 12′ x 14′.
   (B) For tanks of the 30 can size or larger the milk house should measure at least 14′ x 18′.

14. Width of 2nd level where farm milk tank would be located:
   (A) 3′ plus width of tank to a depth of 12″.
   (B) 3½′ plus width of tank if over 12″ deep.
   (C) The second level should also be properly drained and trapped with drain opening not underneath tank and valve.

15. Where tank is installed on an Island in a two level milk room:
   (A) 8″ between tank and wall of straining side.
   (B) Outlet valve of tank to be 6″ from floor.
   (C) A maximum of one half inch overhang of the tank when located on an Island.

16. A two level milk house floor is not preferred.

17. Equipment shall include:
   (A) Hotwater heater.
   (B) Double compartment sink.
   (C) Rack for storing pails, etc.
   (D) Hose with spray nozzle.
   (E) Cold water under pressure.
   (F) Plastic or rubber pail and rubber mat where needed.
   (G) Proper brushes and cleaners.

18. A self closing opening with a 6″ round or square hole should provide for hose and electric plug entrance to milk room.

19. 220 voltage electrical service should be available for milk house.

REFRIGERATION RECOMMENDATIONS

1. Farm cooling tank shall be of such structural design as to meet recognized National standards and shall be approved by both the Commissioner of Agriculture and Food and Drug.

2. Size of bulk tank compressor.
   (A) The bulk tank must have a refrigeration unit large enough to cool the capacity of the tank daily regardless of whether the milk be picked up every day or every other day.
   (B) Direct expansion tanks should be equipped with air and water combination or water compressor.

3. Industry requires that the milk in the farm tank be down to 40° or under one hour after completion of milking.

4. With the addition of warm milk to cold milk in the tank, at no time should the milk temperature rise in the tank to over 50° F.

5. Ample air inlet should be provided for compressor.

6. The application of refrigeration shall not be to such an extent as to cause freezing of the milk.

Farm Tank Construction

1. Fabrication of farm tanks to meet at a minimum 3A standards.
2. Outlet draining valve to be of 1½″ size.
3. Plug type valve is recommended.
4. Cap for outlet valve, metal preferred, rubber or plastic.
5. Cover for the tank to be fitted as tight as possible to make it insect proof.
6. Covers to be made so they can be raised in sufficient height for proper cleaning of the cover and under center of bridge on tank.
7. Measuring rod reading surface in a Sandblast or pickled finish.
8. Measuring rod to be so located as to not interfere with proper closing of the cover.
9. Measuring rod to be in 1/32″ graduations.
10. Gearhead motor to be so constructed to avoid oil leaks.
11. The agitator shall be so designed and operated to produce complete agitation within a maximum of 3 minutes.
12. Tank should be wired so agitator will run automatically whenever milk calls for refrigeration and also so wired to be operated manually.
13. Tank should drain completely when in approximate level position.

Installation of Tank

1. Tank should be a minimum of 6″ off the floor.
2. Where a tank is setting on a block or island the valve should be a minimum of 6″ from floor.
3. Check with power company to see if your over-all power and voltage is enough to run your new tank and other farm equipment.
4. Tank should be approximately level.
5. Where new floors are installed in milk house a steel plate is desired under each leg of tank.
6. All milk contact surfaces of tank should be thoroughly clean before calibration.
7. Fill tank with water before calibration.
8. After calibration cement legs to floor.
9. Tank locations should be in close proximity to tank truck loading point.
10. A standard 3 prong twist lock 10 amp plug and receptacle is recommended in the interest of uniformity from a transportation standpoint.
11. Compressor should not blow air on tank.

Note: Nothing in these recommendations and specifications shall be construed as preventing the use of new equipment and methods during a trial period having the sanction of the Commissioner of Agriculture.

Method For Washing And Sanitizing Bulk Tank

1. Truck driver to rinse tank with cold water after pumping milk out.
2. If milk is picked up in the A.M. the tank must be washed before noon. If afternoon pickup is made the tank must be washed before the afternoon milking.
3. All removable parts such as the agitator, valve and measuring rod should be removed from tank for washing.
4. A recommended soapless dairy cleaner is used for washing plus proper brushes.
5. Rinse tank with clear water under pressure.
6. Outside of tank and floor should be washed daily.
7. Tank and all removable parts should be sanitized just before *re-use*, preferably with a chlorine solution—drain tank completely.

GEORGE F. KIRCHOFF

George F. Kirchoff, 56, 849 Sixth Street, W., Director of the Food and Drug Division, County Health Department, Birmingham, Alabama, was killed when struck by a truck on December 15.

He had returned about three weeks ago from the Mayo Clinic in Rochester, Minnesota, after going there for an operation and was successfully recuperating when he was struck down by a truck within a block of his home, passing away within a short time after arrival at the hospital.

He had been employed by the Jefferson County Board of Health in Birmingham, Alabama for thirty years, first as a milk sanitarian and since 1943 as Director of the Bureau of Food and Dairy Inspection. Through the years he had an active part in developing the policy and efficiency of the Department to the high level that exists today.

He was a man of honesty and integrity and there probably is no one in public health milk and food sanitation work today with higher principles or more devoted to the cause of maintaining and bettering the standards of milk and food sanitation than was Mr. Kirchoff.

Mr. Kirchoff was a native of Iowa and a graduate of Iowa State College. He was a member of McCoy Methodist Church, the American Dairy Science Assn., the International Association of Milk and Food Sanitarians, and the American Association of Public Health.

Survivors include the widow, Mrs. Regina Moreno Kirchoff; one daughter, Miss Margaret Kirchoff; one son, En. George Kirchoff; Jr., stationed with the Naval Air Force at Milton, Fla; one sister, Mrs. Ray F. Hanson, Detroit, and one brother, Lawrence J. Kirchoff, Webster City, Iowa.

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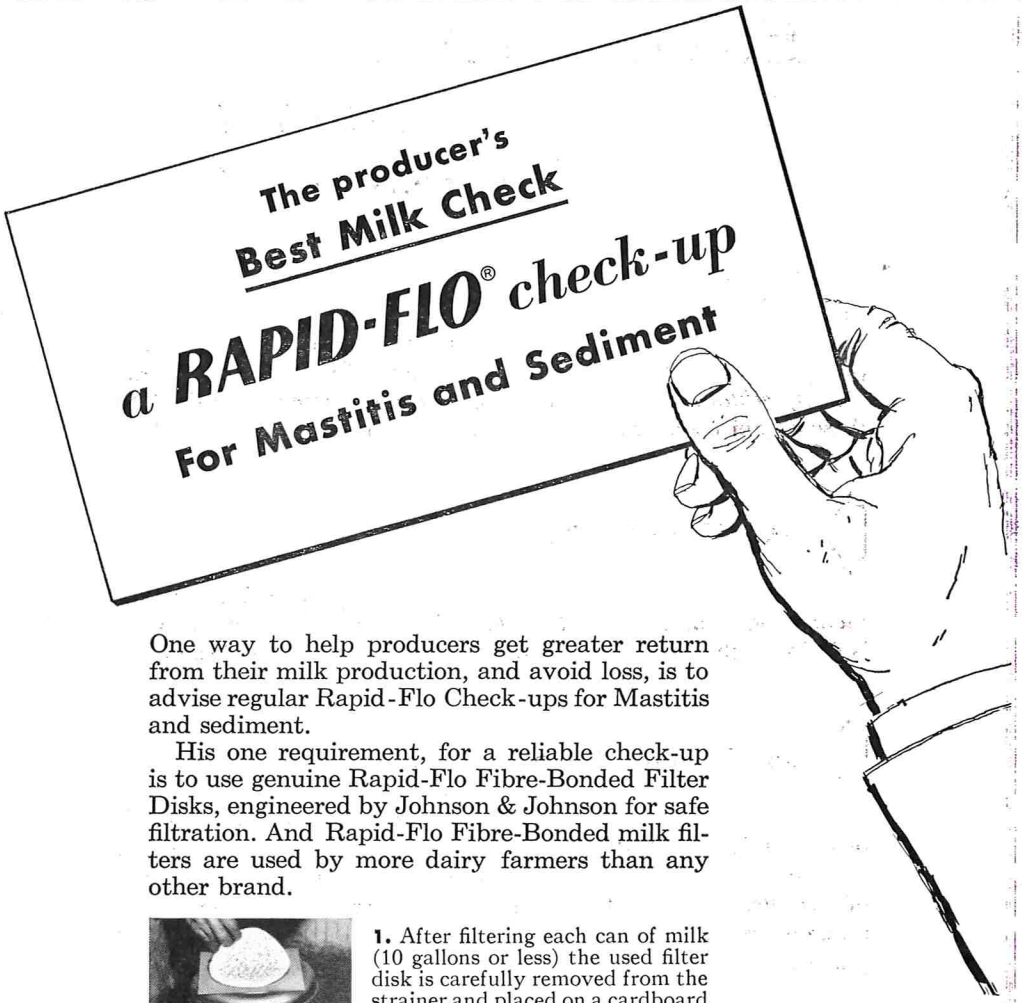

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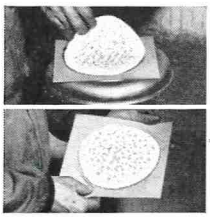

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