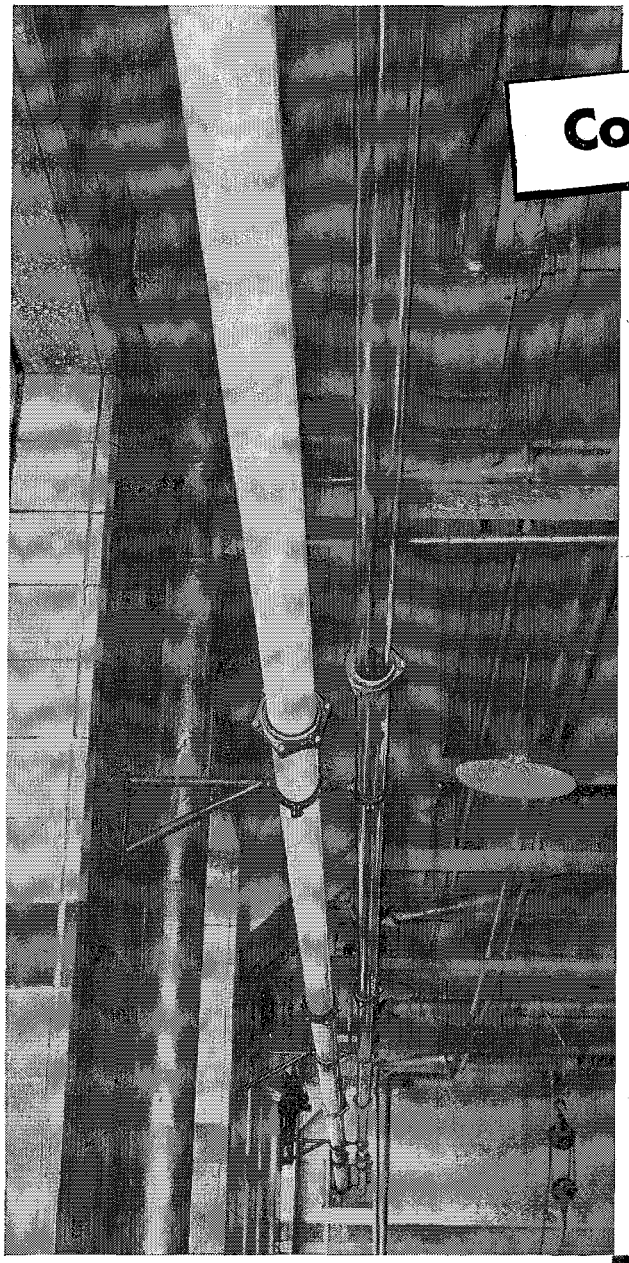
VOLUME 15 NO. 6
Nov. - Dec. 1952

Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.



Corrosion no problem

with *cleaned-in-place* PYREX® brand "DOUBLE-TOUGH" Glass Pipe

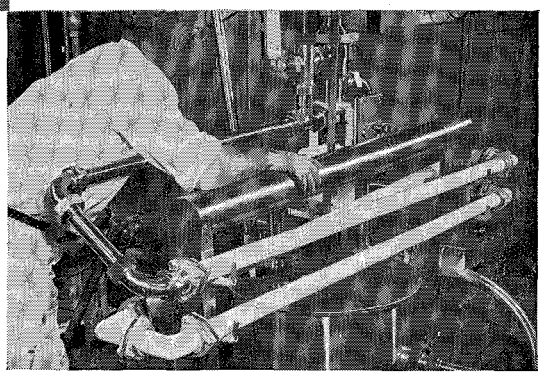
Eliminates corrosion problems—No sanitary piping material has the corrosion resistance of PYREX brand glass No. 7740. Cleaning with acid, alkaline or chlorine solutions *cannot* corrode this glass pipe, discolor or impart off-flavors to the milk. In fact, this is the *recommended* method of cleaning glass pipe.

Cuts cleaning time in half—Dairies using PYREX pipe find that it cuts cleaning time by at least 50%. That's because you can *clean it in place* . . . requires no costly takedown and hand scrubbing. Bacterial counts consistently run lower than with takedown pipe.

Lets you see that the lines are clean—The transparency of glass enables you to visually inspect the lines—see for yourself that they are clean. You can also keep an eye on milk flow. And transparent glass pipe dresses up your plant—impresses visitors.

What's more, PYREX brand "Double-Tough" glass pipe is exceptionally resistant to both physical and thermal shock. Easy to install and requiring no maintenance other than cleaning, PYREX pipe and PYREX holding tubes are available in sizes from 1½" to 6". For full information, contact your nearest Cherry-Burrell or Creamery Package representative.

PYREX BRAND "DOUBLE-TOUGH" GLASS PIPE IS DISTRIBUTED COAST-TO-COAST BY CREAMERY PACKAGE MFG. CO. AND CHERRY-BURRELL CORPORATION



TRANSPARENT PYREX brand glass holding tubes let you *visually* check for underholding . . . and see the results of timing adjustments while they are being made. Now approved by milk sanitarians.

PYREX TM REG. U.S. PAT. OFF.

CORNING GLASS WORKS, CORNING, N.Y.

Corning means research in Glass

Visit the new Corning Glass Center

FIRST AID TO QUALITY MILK PRODUCTION

RAPID-FLO

TRADE MARK OF JOHNSON & JOHNSON

Fibre-Bonded

FILTER DISKS

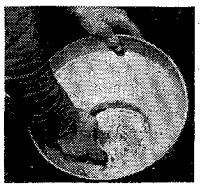
The safest, most retentive single-service milk filter disks obtainable, preferred by most dairy farmers coast-to-coast.

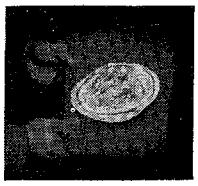
Available either without gauze or gauze-faced (to fit the needs of strainers in general use).

All Rapid-Flo Filter Disks are FIBRE-BONDED, the exclusive Johnson & Johnson process that makes Rapid-Flo Filter Disks safer, more retentive and efficient, providing an even more reliable Farm Sediment Check-Up.

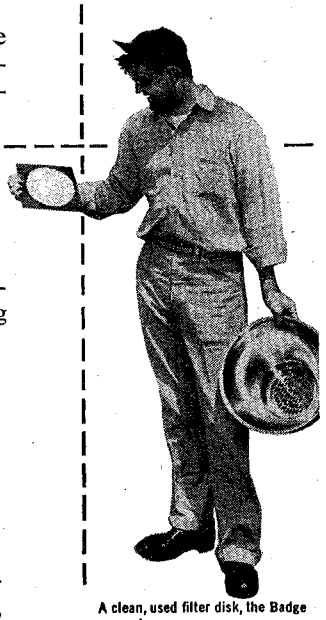
THE *RAPID-FLO* FARM SEDIMENT CHECK-UP

Your daily safeguard for Better Milk Quality and protection against possible loss of milk, endorsed by leading dairy authorities.





1. After filtering each can of milk (10 gallons or less) carefully remove the used filter disk from the strainer and place it on a cardboard to dry.
2. When it is dry, examine the disk closely. Identify the sediment or extraneous matter, in order to determine where it came from, so you can prevent any more getting into milk in the future.



A clean, used filter disk, the Badge of Merit of a good dairy farmer.

FILTER PRODUCTS DIVISION

Johnson & Johnson

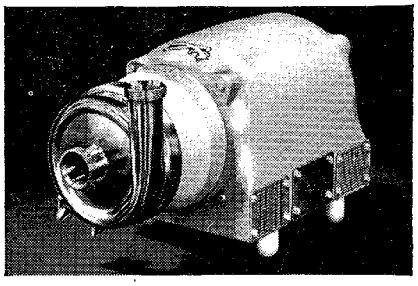
4949 WEST 65TH STREET CHICAGO 38, ILLINOIS

WHEN YOUR BUSINESS IS IN *Good Taste . . .*

. . . why not let Cherry-Burrell help you keep it that way? With Cherry-Burrell sanitary pumps, tubing, valves and fittings handling your product, there's *no chance* to pick up undesirable flavors . . . *all the chance* in the world to protect your product's purity; your customers; your business.

CHECK CHERRY-BURRELL. FOR SANITARY PUMPS

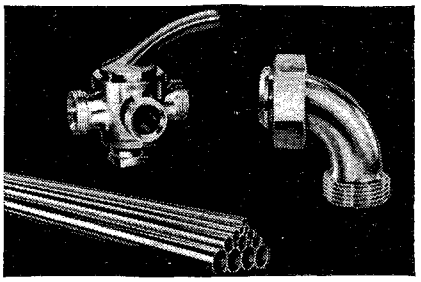
- Meet 3A Sanitary Standards
- Flexible design—discharge can be set at any angle
- Full suction and discharge size
- Easy to dismantle and clean
- Totally enclosed motors
- Removable sanitary rotary carbon Seal
- Available in portable models
- Blowout-proof gasketing



Flexflo Pump—*six sizes to 240 G.P.M.—Motor sizes—1/4 h.p. to 10 h.p.*

FOR SANITARY TUBING, VALVES AND FITTINGS

- Complete Line—Available in stainless steel or famous DiaMonD Metal (Nickel-Alloy)
- Maximum Interchangeability
- Designed to meet National 3A Standards for Sanitary Fittings



Ask your Cherry-Burrell Representative for complete information about sanitary stainless pumps, fittings and tubing. Or write your Cherry-Burrell Branch or Associate Distributor for free bulletins.

CHERRY-BURRELL CORPORATION

427 W. Randolph Street, Chicago 6, Ill.

Equipment and Supplies for Industrial and Food Processing

FACTORIES, WAREHOUSES, BRANCHES, OFFICES OR DISTRIBUTORS AT YOUR SERVICE IN 56 CITIES

The Journal of Milk and Food Technology (including Milk and Food Sanitation) is issued bimonthly beginning with the January number. Each volume comprises six numbers. Published by the International Association of Milk and Food Sanitarians, Inc., with executive offices of the Association at Ritz Building, 12½ East Broadway, P. O. Box 286, Shelbyville, Ind.

Entered as second class matter at the Post Office at Shelbyville, Ind., March 1952, under the Act of March 3, 1879.

EDITORIAL OFFICES: J. H. Shrader, *Editor*, 23 E. Elm Ave., Wollaston 70, Mass; H. L. Thomasson, *Managing Editor*, P. O. Box 286, Shelbyville, Ind.

Manuscripts: Correspondence regarding manuscripts and other reading material should be addressed to the Editor, J. H. Shrader (address above).

Booklet entitled "JMFT Style-book" can be obtained from the Editor for the use of contributors of papers.

Business Matters: Correspondence regarding business matters, advertising, subscriptions, orders for single copies, etc., should be addressed to H. L. Thomasson (address above).

Subscription Rates: One Volume per year
Individual non-members, Governmental and Commercial Organization subscription, 1 yr.....$5.50
Public, Educational and Institutional Libraries, 1 yr. $3.00
Single Copy 1.00

Orders for Reprints: All orders for reprints should be sent to the executive office of the Association, P. O. Box 286, Shelbyville, Ind.

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 286, Shelbyville, Indiana.

Journal of

MILK and FOOD TECHNOLOGY

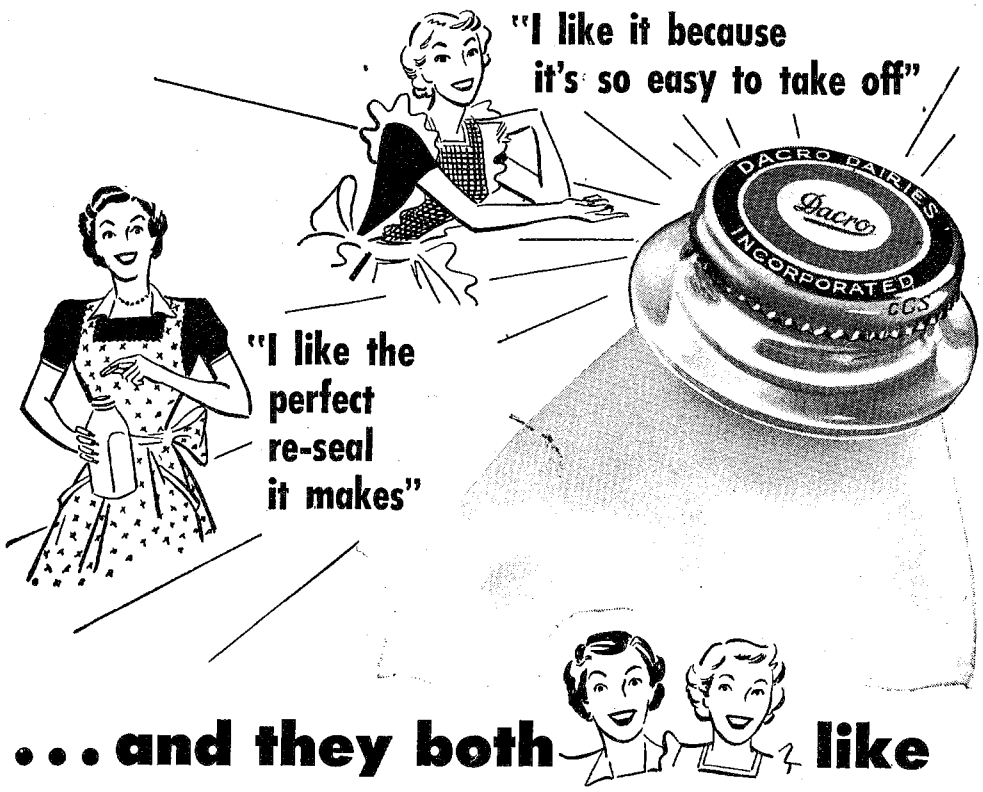
INCLUDING MILK AND FOOD SANITATION

Official Publication

International Association of Milk and Food Sanitarians, Inc.

VOL. 15 — NOV.-DEC. — NO. 6

Editorials — CONTENTS — *Page*



...and they both like the way DACRO P-38 protects the milk they buy!

Housewives all over the country like the many advantages of *Dacro Protected* milk. Dairy operators, too, find that the Dacro P-38 Capping System gives them many important savings . . .

a more profitable operation.

Dacro P-38

- Covers the pouring lip of bottle
- Forms an air-tight seal
- Makes a perfect re-seal
- Lessens the danger of seepage
- Eliminates cap seat

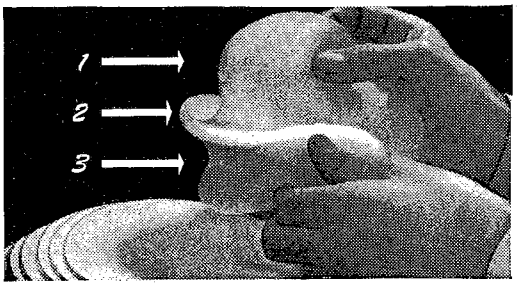
CROWN CORK & SEAL COMPANY

DACRO DIVISION • BALTIMORE 3, MD.

PROTECT MILK QUALITY THREE WAYS
SAVE MONEY, TIME AND LABOR

WITH *Perfection* DUBL-CHEM-FACED MILK FILTER DISCS

"Tripl-Filtring"®



1—THE TOP SURFACE *Filters*
2—THE CENTER AREA *Filters*
3—THE BOTTOM SURFACE *Filters*

Only DUBL-CHEM-FACED Filter Discs provide this "Tripl-Filtring" action . . . fast and thorough . . . at less cost . . . fewer filters required . . . dependable protection of milk quality is assured three ways!

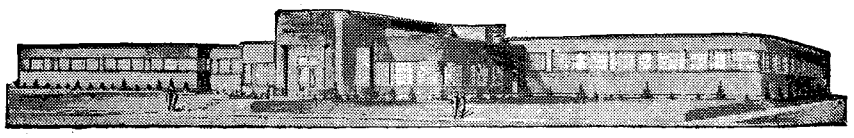
NO OTHER FILTER DISCS CAN CLAIM TO FILTER MILK BETTER

Milk filters generally depend solely on a single thickness of filtering cotton to catch sediment as milk passes through. In DUBL-CHEM-FACED "Tripl-Filtring" construction, however, two important "extras" are provided, because in addition to the super-thick center area of specially carded cotton, the toughened TOP and BOTTOM surfaces both act as filters, too! Highest quality, low in cost, easy to use, popular with top grade milk producers . . . worthy of your endorsement.

Write for samples

SCHWARTZ MANUFACTURING CO., Two Rivers, Wisconsin

Manufacturers of Perfection, Blue Streak, Elgrade, and DUBL-CHEM-FACED Filter Discs, Rolls, Bags and Tubes . . . Fray-Seal Cheese Bandages and Circles . . . and a complete line of cotton goods for the Dairy Industry.



Roccal SANITIZING AGENT

Reg U S Pat Off and Canada
BRAND

Measures up in every way as the quaternary of choice

In the Dairy Industry, more than any other industry, the importance of using only the best in sanitizing methods cannot be over-emphasized.

In Roccal, the *original* quaternary ammonium germicide, the dairy industry is offered a product that is laboratory controlled and tested. The uniform quality of Roccal means uniformly good results in doing a proper sanitizing job.

Roccal is a powerful germicide. In recommended dilutions, it is non-poisonous, non-irritating to the skin, virtually odorless and tasteless.

In the dairy, Roccal can be used for every sanitizing job. For tank trucks, weigh tanks, pasteurizers, separators, bottle filling and capping machines, to keep walls and floors sanitary.

Try Roccal for just one week and watch your bacteria counts go down . . . down . . . down! Write us for new booklet describing Roccal's uses in the dairy plant and on the producing farm.

USES IN DAIRY INDUSTRY

To Sanitize:

- MILKING MACHINES
- TEAT CUPS
- COOLING TANKS
- TANK TRUCKS
- MILK CANS
- WEIGH TANKS
- PASTEURIZERS
- SEPARATORS
- BOTTLE FILLING MACHINES and AS HAND and TEAT WASH

In recommended dilutions Roccal is:

- ☑ POTENT
- ☑ NON-POISONOUS
- ☑ TASTELESS
- ☑ ODORLESS
- ☑ STAINLESS
- ☑ NON-IRRITATING
- ☑ NON-CORROSIVE
- ☑ STABLE

Insist on Genuine Roccal SANITIZING AGENT

Reg U S Pat Off and Canada
BRAND

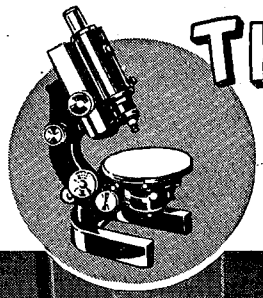
Offices in principal cities throughout the United States.

Sterwin Chemicals INC. 1450 Broadway, New York 18, N. Y.

SUBSIDIARY OF STERLING DRUG INC.

Distributed in the Dairy Field by Cherry-Burrell Corp. and other leading dairy supply houses.

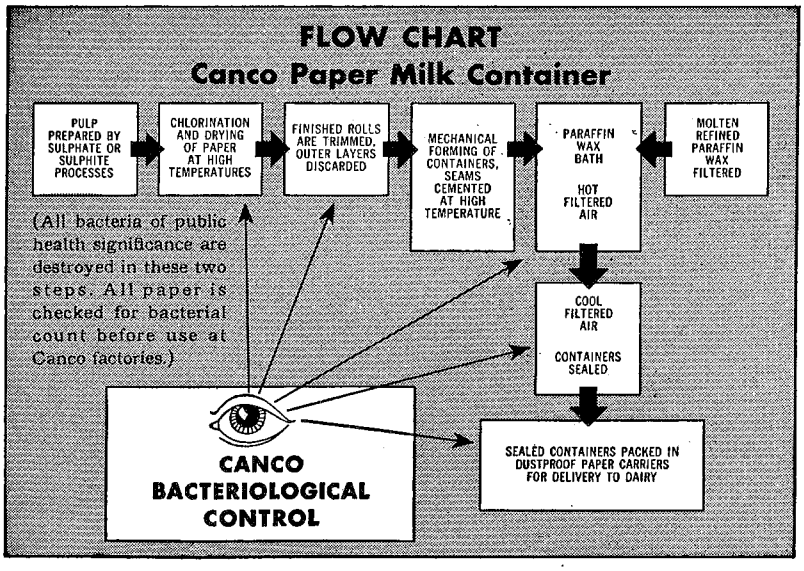
FORTIFY ALL YOUR MILK WITH DELTAXIN® THE PUREST KNOWN FORM OF VITAMIN D_2



THROUGH THE EYEPIECE

(Crucial Points in Bacterial Control of Canco Milk Containers)

A bath in continuously filtered molten paraffin waterproofs every Canco paper milk container, and is one of the factors contributing to its sterility.[1] (See Flow Chart below.) Each container is immersed in the bath, and then drained in an atmosphere of hot filtered air. The entire operation is mechanical.



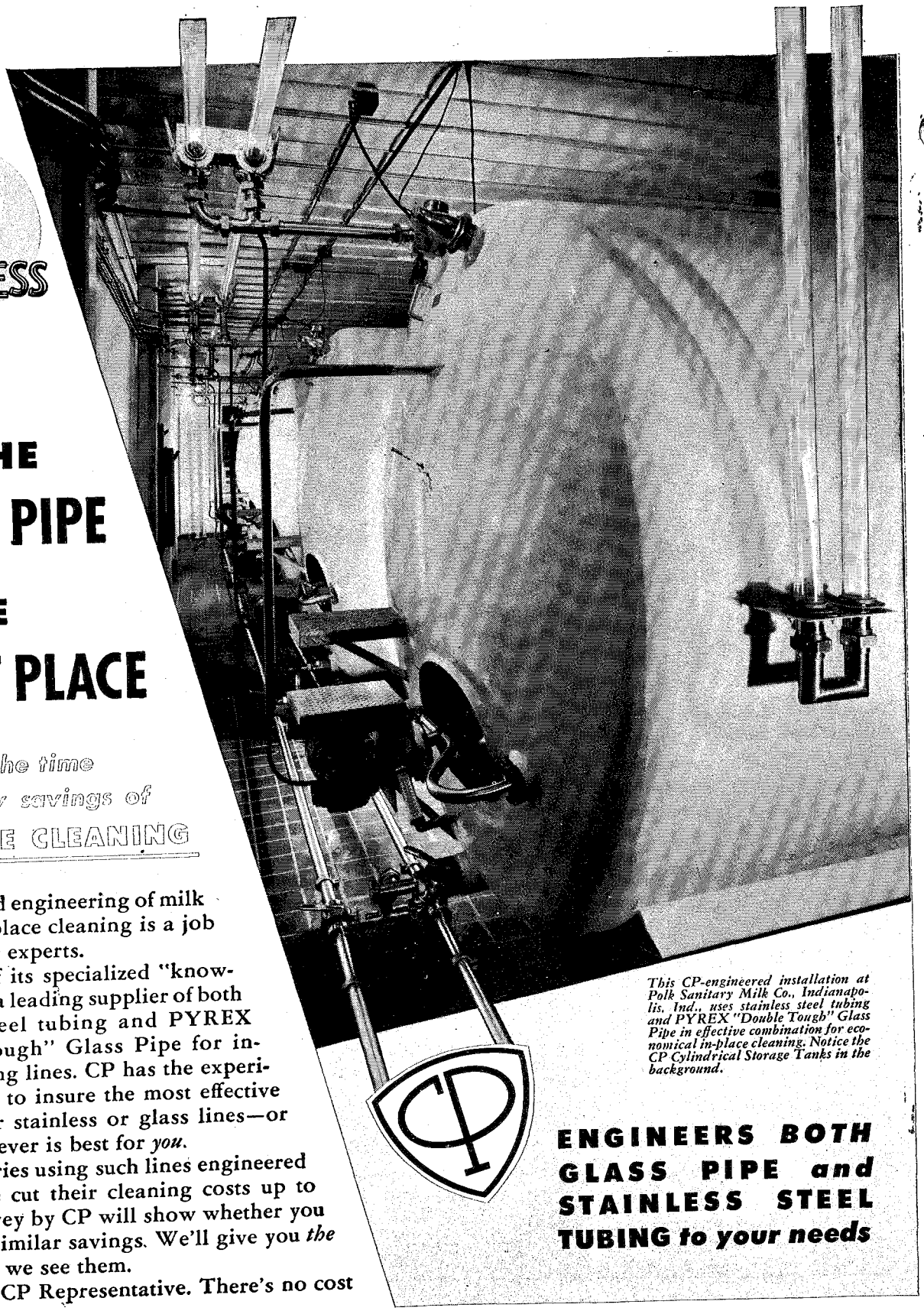
CANCO PAPER MILK CONTAINERS are made on automatic machinery, operating in rooms which meet rigid sanitary requirements. Machines print the paper, then fabricate it into blanks from which the containers are shaped. If the paper must wait between operations, it is kept *in dustproof steel cabinets*. The finished containers are made on machines designed by Canco engineers . . . men with years of experience in designing food-packaging and handling equipment. These are some of the reasons why rinse tests reveal *no bacteria at all* in 80% of the finished Canco paper milk containers.[2] The remaining 20% show an average of .007 organisms per cc.

1. Bulletin 495, University of Illinois, 2-43
2. The Journal of the Texas Public Health Association, 2-50

GLASS
or
STAINLESS

PUT THE RIGHT PIPE IN THE RIGHT PLACE

to get all the time and money savings of
IN-PLACE CLEANING



This CP-engineered installation at Polk Sanitary Milk Co., Indianapolis, Ind., uses stainless steel tubing and PYREX "Double Tough" Glass Pipe in effective combination for economical in-place cleaning. Notice the CP Cylindrical Storage Tanks in the background.

Planning and engineering of milk lines for in-place cleaning is a job best done by experts.

Because of its specialized "know-how," CP is a leading supplier of both stainless steel tubing and PYREX "Double Tough" Glass Pipe for in-place cleaning lines. CP has the experience needed to insure the most effective use of either stainless or glass lines—or *both*—whichever is best for *you*.

Many dairies using such lines engineered by CP have cut their cleaning costs up to 50%. A survey by CP will show whether you can realize similar savings. We'll give you *the facts,* just as we see them.

Ask your CP Representative. There's no cost or obligation.

ENGINEERS *BOTH* GLASS PIPE *and* STAINLESS STEEL TUBING *to your needs*

THE *Creamery Package* MFG. COMPANY

General and Export Offices: **1243 W. Washington Blvd., Chicago 7, Illinois**

Branches: Atlanta • Boston • Buffalo • Chicago • Dallas • Denver • Houston • Kansas City, Mo. • Los Angeles • Minneapolis • Nashville New York • Omaha • Philadelphia • Portland, Ore. • St. Louis • Salt Lake City • San Francisco • Seattle • Toledo • Waterloo, Ia.

CREAMERY PACKAGE MFG. CO. of CANADA, LTD.
267 King St., West, Toronto 2, Ontario

THE CREAMERY PACKAGE MFG. COMPANY, LTD.
Mill Green Road, Mitcham Junction, Surrey, England

Editorial Notes

STATUS OF OUR ASSOCIATION PAST, PRESENT, FUTURE*

Forty years, nine months, and two days ago our thirty-five founders met in Milwaukee, Wisconsin, representing the United States, Canada, and Australia. At this meeting an organization was formed which was called the International Association of Milk Inspectors. The name was changed later to the International Association of Milk Sanitarians, and in 1947 this was changed again to the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.

The high ideals and noble purpose of these men has continued to be our guiding light down through the years. Our steady growth and the recognition we have attained throughout the world is indisputable evidence of the value of our beginning. We have never forsaken those principles.

In 1937 the *Journal of Milk and Food Technology* was born and became our official publication. It is now world wide in circulation and second to none in the field of milk and food sanitation—a publication which is a living monument to the foresight and devotion of Bill Palmer, Dr. Shrader, Paul Brooks, and many others who worked so hard to establish the answer to a great need.

Today we have over three thousand, two hundred members who represent every state in the United States and fifty-six foreign countries, and nineteen Affiliate associations representing twenty-three states. Our Journal has an average circulation of over 4500 copies per issue.

In July a central office was established in Shelbyville, Indiana, with a full time Executive Secretary, Managing Editor, and clerical help. It is my great privilege to be your first full time executive. The record of the first year of this operation, which will be reported to you at this meeting, is one that I can point to with justifiable pride. Let me hasten to add however, that it is a record which could never have been attained without the phenomenal support of your officers, Executive Board, and all of our members. It is your record.

Today the world waits upon the findings of our committees with regard to all the various problems in sanitation. Nowhere are there better, harder working committees than ours. With this position in the field of milk and food sanitation comes a great responsibility to maintain, to improve, to continue to grow.

Let us not rest on our laurels, let us not believe that we are perfect, let us not delude ourselves into believing that we have all the answers. Rather let us plan and work always toward the future. Many milestones have been passed, but many, many more beckon to us in the distance. Allow me to enumerate some future objectives toward which we should bend our efforts.

1. Unquestioned recognition of the milk and food sanitarian as a professional public health worker. This can only be accomplished through merit, public acceptance, and a job done better than anyone else can do it. Make no mistake, that you can legislate yourself into professionalism. Such an approach will retard acceptance, on a professional level, many years.

2. Continued growth in membership both in number and quality.

3. An organized effort to bring about education in milk and food sanitation on the secondary and elementary level. The lack of education on these levels, concerning a matter so vital to the public health, is criminal negligence. We must inform the public who we are and what we do. So far, we have done this job poorly. Secondary and elementary education is the place to begin.

4. Monthly publication of the Journal. This can only be brought about by increases in membership, subscriptions, and advertising. Each of you can help, each of you will gain by this.

5. A travel expense budget for each of our committees. Committee work could be improved a thousand percent if we could become somewhat independent of requests for out of state travel. The objectives enumerated are by no means all, but certainly you will agree that they are worthwhile. So long as I have anything to do with this Association I pledge myself to support all well established endeavors and work toword the accomplishment of all others that you may deem worthy of our labors.

H. L. THOMASSON, *President*

*Presidential address of Mr. H. L. Thomasson, delivered at the Thirty-ninth Annual Meeting, INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., held at Minneapolis, Minn., Sept. 18-20, 1952.

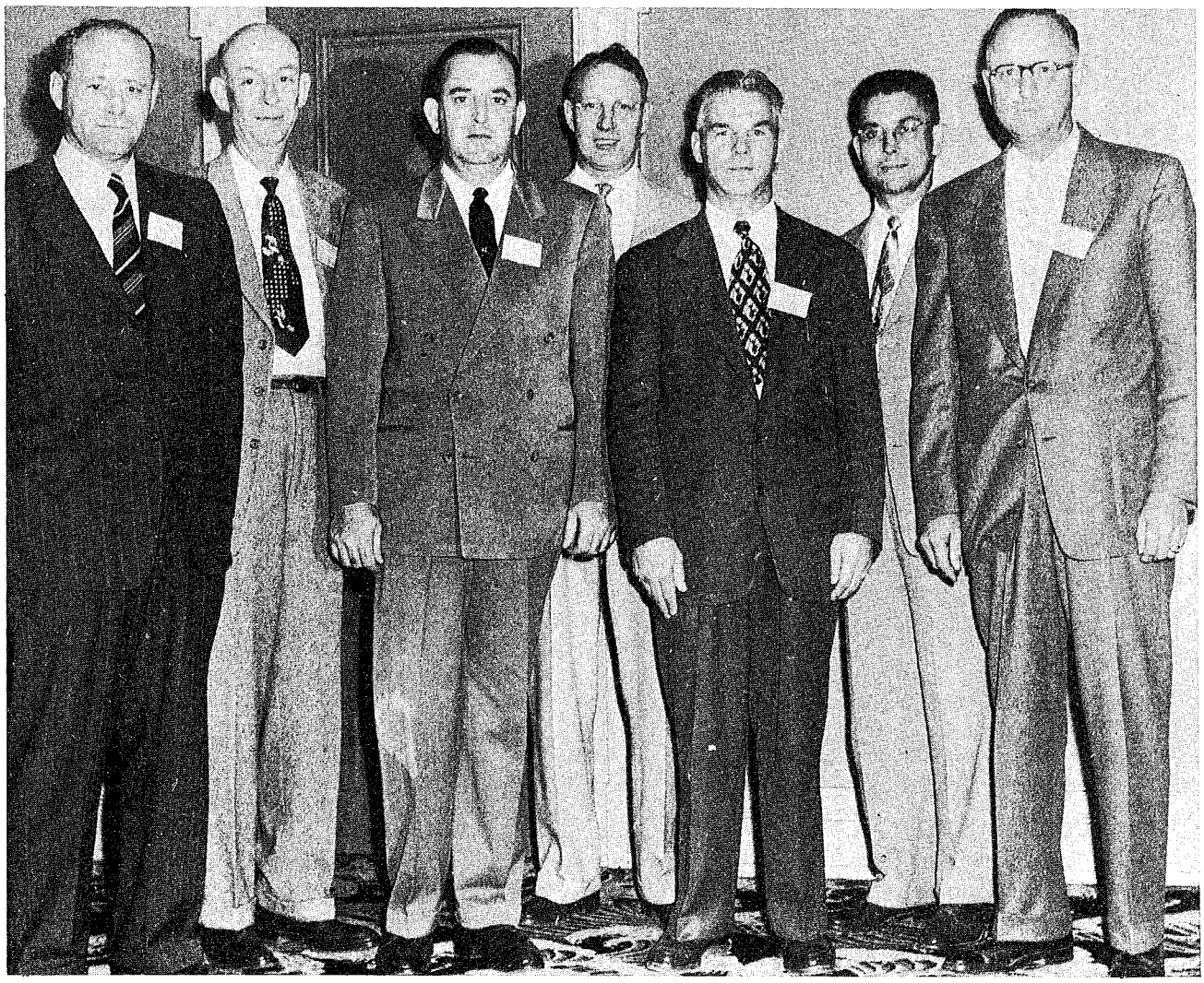
RECOGNITION AND AWARD

At long last, the Association went into action on the bestowal of recognition to colleagues who have achieved well-deserved fame in the profession of milk and food sanitation (see page 251 this issue). Originally adopted at the Jacksonville meeting of the Association in 1939, the bestowal of recognition has had to wait until vision and executive ability in Association management could connect up with adequate sources of revenue. This was accomplished during this past year through the public-spirited generosity of the following firms:

The Diversey Corporation
Klenzade Products, Inc.
Mathieson Chemical Corporation
Oakite Products, Inc.
Pennsylvania Salt Manufacturing Company

These companies have the satisfaction of expressing thanks and appreciation for work well done in the public interest. "Peace hath her victories no less than war." Abele and Corash have made major contributions to the war against disease and confusion, and have added to our armamentoria in advancing orderliness and sound food sanitary practise. Best of all, both recipients stand high as men of character and impeccable personal integrity. Here is professional attainment at its best—personnel, performance, recognition. We salute them, we thank the sponsors, and we commend the action of the Committee on Recognition and Awards, through its energetic and efficient chairman, Dr. K. G. Weckel.

J. H. SHRADER



Newly elected officers and Executive Board. *Left to right*—President: Harold J. Barnum; Immediate Past President and Executive Secretary: H. L. Thomasson; President-Elect: John D. Faulkner; Senior Past President: K. G. Weckel; 1st Vice-President: I. E. Parkin; Secretary-Treasurer: H. H. Wilkowske; 2nd Vice-President: Ivan Van Nortwick

THE SANITARIANS AWARD

The 1952 Sanitarians Award, the citation presented annually in recognition of professional achievement as a Sanitarian by the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, was presented to Paul Corash, Chief of the Milk Division, Bureau of Food and Drugs, New York City Department of Health, at its meeting on Friday, September 19, 1952, at Minneapolis, Minnesota. The Award, consisting of a Certificate of Citation and $1000, was presented on behalf of the Association by Dr. K. G. Weckel, Chairman of the Association's Committee on Recognition and Awards.

Paul Corash has been in the service of the New York City Department of Health for 25 years, having served successively as inspector, Assistant Chief of Milk Inspection, and as Chief Milk Inspector since 1944.

The recipient of the Award was selected because of his leadership and influence in developing and applying sanitary standards in the handling of milk and foods in the sanitation service. Mr. Corash is responsible for the safety and quality of milk and all milk products sold to over 10 million residents and visitors in the greater New York area. The development and application of the sanitary standards under his supervision involve some 43,000 dairy farms and several hundred dairy processing plants. The procurement of milk in this work involves some quarter of a million dairy farm people.

Through the efforts of Mr. Corash, development of long term plans was brought about for self improvement and control by industry of the milk supplies and processing methods. Through his efforts consumer groups have been appraised of the service of the Sanitarian in providing quality milk and related foods at modest cost. Among the leading contributions of Mr. Corash in the milk and food sanitation service have been the early application of concepts of sanitation as employed for milk to frozen desserts, in the utilization of thermoduric tests for quality evaluation of pre-pasteurized milk, in the application and general adoption of the phosphatase test, and in application of cryoscopic procedure. He has pioneered standards for bulk milk dispensers and washers for bulk milk tanks. In the field of professional relations he has served on committees in the development of sanitary standards and design of food-handling equipment, advisory committees on ordinances and regulations, and has acted on consultant and lecturer to various public health agencies and consumer groups.

The certificate accompanying the Award presented to Mr. Corash reads as follows: "For distinguished service in contributing to the public health welfare of the community he serves; for personalizing the ideals of the Sanitarian; for his contribution toward public recognition of the profession of the Sanitarian."

THE CITATION AWARD

The Citation Award, for distinguished service to the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, was presented to Charles A. Abele at its Annual Meeting, Friday, September 19, at Minneapolis, Minnesota. The Citation was presented to Mr. Abele on behalf of the Association by Dr. K. G. Weckel, Chairman, Committee to Citation and Awards.

Mr. Abele, who has been engaged as sanitarian in civic, industrial, military, and public health service, has participated as a member and chairman of various committees of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, and in correlating work with other public health organizations. He is a past president of the Association, and for 10 years has served as chairman of its Committee on Sanitary Procedure, which participates in the development of the 3A Sanitary Standards for dairy equipment with the Dairy Industry Committee and the U. S. Public Health Service. The development of the 3A Sanitary Standards and their widespread adoption by industry throughout the country is heralded as one of the major contributions in the history of food industry sanitation regulations and procedures.

The Certificate of Citation as presented to Mr. Abele is as follows: *"Able worker, overseer, and observer in many phases of public health activities; who has graciously given of his knowledge, experiences, and abilities to fellow sanitarians; wisely counselled a long line of officers of the organization; outstanding leader as chairman of various committees; and as an officer, successful coordinator on behalf of the Association in the development of sanitary standards for dairy equipment which has benefitted everyone; through whose affable disposition and exemplary behavior all became friends, this Citation is presented for Distinguished Service to the* INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS."

THIRTY-NINTH ANNUAL MEETING A GREAT SUCCESS

The Thirty-ninth Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., held at Minneapolis, Minnesota, September 18-20, 1952, made sanitation history. The registration ran up to 486, with 311 present at the banquet. Registrants came from 33 states, England and Canada. Fifty-three ladies registered, but many more were in attendance and participated in the tours.

The Minnesota Milk Sanitarians Association held a special luncheon with attendance of 250.

The program was arranged so that general sessions were followed by divisional meetings devoted to the discussion of problems in sanitation technology related to milk and food respectively. This gave variety, and served the special interests of the members, and yet left the whole in unity. New features were the joint meetings of committee chairman with the Executive Board, the television broadcast over KSTV-TV by Ken Weckel, the citations and honor awards, and the contagious spirit of optimism and progress.

This note set the tone of the meeting. President "Red" Thomasson (who also serves as our genial and efficient Executive Secretary) briefed us on the new developments in the operation of the Association (see address on page 249, this issue). The number of affiliate members is 2451 and the direct membership is 793, making a total of 3244. The Journal circulation averages a little over 4500 copies.

Presentation of the Sanitarians Award for outstanding achievement as a Sanitarian to Paul Corash

Ken Weckel broadcast a television program arranged by the Minnesota Milk Sanitarians, on the program of Beatrice Baxter, directed to women televiewers. He informed them what the Association is and does, how milk is protected by covered caps and pouring lip design (actually shown on the screen), and exhibited sanitary pipe, smooth welding jobs. sanitation guide books, and paper containers. The emphasis was on show, not on talk.

General Group at Rostrum

At the banquet, the Committee on Recognition and Awards inaugerated its program of recognition for distinguished service. The Citation Award went to C. A. Abele for distinguished service to the Association (see page 252) and the Sanitarians Award, a citation and purse of $1000, was presented to Paul Corash (see page 251). This Award was made possible by the generosity of the Diversey Corporation, Klenzade Products, Inc., Mathieson Chemical Corporation, Oakite Products, Inc., and the Pennsylvania Salt Manufacturing Co.—administered by Ken Weckel, Chairman of the Committee of Recognition and Awards.

The many papers presented appear in this and in forthcoming issues of this Journal.

Fifteen door prizes were awarded to the holders of the successful numbers given for attendance at the openings of the respective sessions.

PRIZES (DOOR) AWARDED AT MEETING

1. Desk Set of Thermometer & Humiguide
Donor—N. Y. State Assn.
Winner—W. R. Johnson, Lubock, Texas

2. One 10 lb. Washington Salmon
Donor—Washington Assn.
Winner—Dr. J. C. Olson, Dairy Div. Univ. of Minn. Union Farm St. Paul, Minnesota

3. Case of Phillips 66 Motor Oil
Donor—Oklahoma Assn.
Winner—Ben Arnold, Minneapolis Health Dept., Minneapolis, Minn.

4. Choice Kansas City Steaks
Donor—Missouri Assn.
Winner—Lee Hill, Twin City Milk Producers Assn., St. Paul, Minn.

5. Choice of 2 box seats Indiana 500 mile auto races or Desk Set.
Donor—Indiana Assn.
Winner—Tom Bauer, Rochester Dairy, Arkansaw, Wisconsin

6. Carrom Game Board
Donor—Michigan Assn.
Winner—Dr. Harold Richie, Swift & Co., Chicago, Illinois

7. Traffic View & Cigarette Lighter.
Donor—Michigan Assn.
Winner— W. U. Andrist, Minn. Dept. Agriculture, Brainerd, Minn..

8. Duplicate of #7
Donor—Michigan Assn.
Winner—A. P. Hove, Des Moines, Iowa

9. Box Citrus Fruits, Marmalade
Donor—Florida Assn.
Winner—C. H. Holcombe, Minn. Dept. Agriculture, St. Paul, Minn.

10. 2 yr. Subscription to Connecticut Circle
Donor—Connecticut Assn.
Winner—Clarence Luchterhand, Dept. of Health, Madison, Wisconsin

11. 6 (10 oz.) boneless, Prime Cut, Top Butt steaks
Donor—Illinois Assn.
Winner—Raymond Pruchaska, Minneapolis, Minn.

12. 1 canned Boneless Ham
Donor—Iowa Assn.
Winner—C. Barfknecht, Winthrop, Minnesota

13. Rocky Mt. Trout
Donor—Colorado Assn. (Rocky Mt.)
Winner—Ken Weckel, Madison, Wisconsin

14. Cheese Assortment
Donor—Wisconsin Assn.
Winner—Jerome H. Mueller, Sheboygan Health Dept., Sheboygan, Wis.

15. Tie Clasp
Donor—South Dakota Assn.
Winner—F. E. Seyfried, Creamery Package, Chicago, Illinois

The Land O' Lakes Creameries, Inc., treated us royally. A tour of their great plant revealed that they did an eighteen million dollar business in supplying machinery and equipment, and handled approximately 276 million units of milk products to an amount of $115,000-000. Then came an excellent beef dinner, served to about 500 guests. Ben Zakariason was the genial master of ceremonies. In the accompanying picture, we see how he got up a fine set of "choir boys" —and how they did sing! Dr. W. E. Petersen delivered a thought-provoking address (see excerpts on page 256). Harris Nelson — that "dumb Swede"—put on a good clean show. The picture shows him ready to play three trumpets at once— a one-man trio.

The annual meeting of the Association next year will be held at the Michigan State College, at East Lansing, at the end of August or the first week in September.

The ladies' entertainment was particularly successful. Under the chairmanship of Henry Healy, the Women's Entertainment Committee consisted of:

Mr. Walter A. Carlson, General Mills, Inc.

Mrs. Ben Zakariason, wife of chief chemist at Land O'Lakes.

Mrs. Carl Mattson, wife of quality control supervisor of Land O'Lakes.

Mrs. Ruth Brand, director of Twin City Dairy Council.

Mr. and Mrs. Harold Richie, Chicago, Illinois, and Mr. and Mrs. Mills Garrison, Ada, Oklahoma, show typical expressions of enjoyment at festivities.

Splendid hospitality in lavish "Western" (I write this from Boston!) style provided by

The Hamm Brewing Company

The Gluck Brewing Company

Kraft Foods, Inc.

Land O'Lakes Creameries

Minneapolis Brewing Company

Schmidt's Brewing Company

Norris Dispensers

The Dairy Industry of Minnesota

General Mills

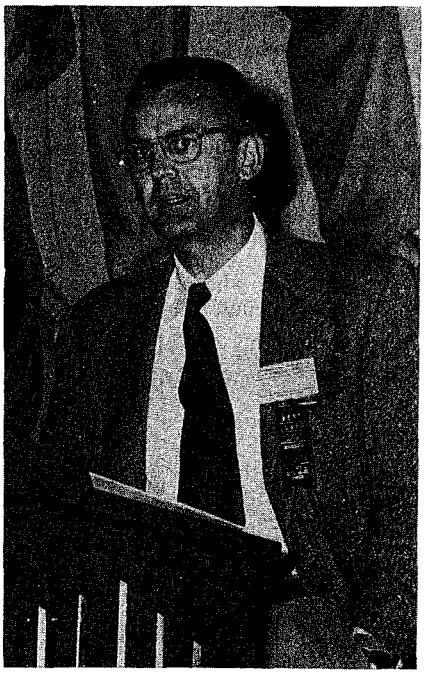
Harris Nelson

Fifty-five ladies attended the luncheon at the White Pine Inn, sponsored by Monarch Cleaning Chemicals, and sixty-five lunched at the Radisson Hotel as guests of St. Paul Ice Cream Manufacturers. Then there were the bus tour over the surrounding countryside and the twin cities, the famous St. Anthony Falls, the colored slides at the University of Minnesota Museum, and souvenir plates from the Red Wing pottery factories. There were many complimentary expressions and one lady from Vermont expressed her feelings thus: "When I go back and tell my friends what I saw and did without costing me a cent, they won't believe me."

Joe Olson and his associates did a splendid job in handling the local entertainment features.

Governor Anderson of Minnesota, welcomes members and guests to Minneapolis.

Owen Owens, President, Minnesota Milk Sanitarians Association, extends greetings and welcome.



Joe Olsen, Jr., Secretary-Treasurer, Minnesota Association and Chairman of the Local Arrangements Committee.

EXCERPTS OF ADDRESS AT LAND O'LAKES

W. E. PETERSEN

Everyone interested in the dairy business should register some concern for its future. Comparing it to other enterprises, the dairy business has not fared so well in recent years. Since 1946 there have been big retreats in cow numbers, largely because many have found it relatively unprofitable to milk cows compared to other agricultural enterprises. The total per capita consumption of dairy products has declined largely because of the loss of the large part of the butter markets to substitutes, and substitutes for other parts of milk are being developed and in some places promoted in direct competition to dairy products.

In order to meet these problems it is necessary that we face facts. One of the first fundamentals that one must consider, if he is genuinely interested in maintaining the healthiest dairy industry, is that the consumer is price-conscious. Everyone knows that the decrease in the consumption of butter is a mere question of price. No one would consume butter substitutes if good butter were obtainable at the same price . . . The composition of this product is vastly different from a chemical standpoint than any of the so-called substitutes. Here, I think, the stimulating of competent people in the research field to investigate more thoroughly the profitable nutritional advantages of butterfat over other fat should pay big dividends to the dairy industry. .

I should like to emphasize the need for improved efficiency all along the line that milk and other dairy products . . may be delivered to the consumer in the highest possible quality and at the lowest possible price that is consistent with reasonable returns for the labors extended all along the line. To attain this end it is going to require concerted effort by all in all of the various branches of this great industry.

The producer, who is the key to this whole industry, must constantly be kept in mind. Cows must be milked and fed at least twice daily every day of the week. With all the advances that are being made in the field of agriculture there is nothing on the horizon to give the dairy farmer any hope that he can escape long days and seven day weeks. While the producer has achieved a lot in getting better cows that produce more efficiently, growing crops that would yield more milk per acre of land, and arranging the set-up so that less labor will be required per unit of milk produced, he still has a long way to go before his end will be brought up to the highest efficiency. Cows that have the inheritance for higher and more efficient production must be bred and here the recent introduction of artificial insemination bids well to speed up the attainment of this desirable objective. . .

The potentiality of lowering costs by having better cows that are better fed and managed is well illustrated by what has happened in Minnesota during the last several years; during which the milking cow population decreased by 300,000 yet the total milk production was unaltered. That meant for the same production there were 300,000 less cows to milk, feed, and house.

. . . It has been widely demonstrated that rough feeds can be made of such a quality that they will supply all of the nutrient requirements for even the highest producing cows. In this particular area, by introducing simple pasture management procedures, pounds of milk per acre of land that is pastured can easily be doubled.

The cost of producing milk on the farm is only part of the cost of milk and dairy products to the consumer. Many are the producers, that have claimed that they are getting entirely too small a proportion of the consumer's dollar. It is equally important that efficiency along the line from the time that the milk is picked up at the farm until it is delivered to the consumer in the cities and towns be cut down to the very minimum that is necessary. Any time that new inventions give promise of improving efficiency anywhere along the entire line present themselves, they should be given every encouragement for the fullest development.

I want to just call attention to one very important cost item—that of housing dairy cattle. It has recently been shown that when the cow was asked the question, she did not want the warm barn and she has no appreciation for the art that goes into it and she does not appreciate the alleged comforts that such conventional structures afford. There are certain other things that she appreciates far more, one of them is the freedom that she may have in structures where she may go in and out as she sees fit. The low temperature maintained in this climate is not at all disliked by the cows . . . All that the cow cares for in the way of housing is a dry bed . . . and then to be protected against direct draft, dampness. In other words loose housing with infinitely less expenditure in the building structure than is required by the conventional barn, is more satisfactory for the performance of the cows than is the conventional expensive barn.

The same unbiased inquiry should be made all along the line to ascertain whether or not requirements that have been considered as essential are necessary . . . We must be careful that we do not encumber the cows with unnecessary requirements that will make it impossible for her to do this job as efficiently as is necessary. . . Remember, too, that it makes little difference in what part or phase of the great industry in which we may be interested, our welfare is dependent upon the welfare of the dairy industry as a whole, and therefore, it is to the interest of each one of us to see that every effort is made to improve this efficiency all along the line, and to have no hesitancy in asking questions about the necessity for the existence of any requirement that increases cost.

ANNOUNCEMENT OF CONTINUATION OF THE SANITARIANS AWARD

It is a real pleasure to be able to announce that The Sanitarians Award, consisting of a Certificate of Citation and a cash award of $1000, will again be offered at the next annual meeting of the Association, at East Lansing, Michigan, in September, 1953. The Award is administered by the Committee on Recognition and Awards. It is sponsored jointly by The Diversey Corporation, Klenzade Products, Inc., Oakite Products, Inc., Pennsylvania Salt Manufacturing Company, and The Mathieson Chemical Corporation.

Complete information on the rules of selection of the candidate for The Sanitarians Award is available from the Executive Secretary of The International Association of Milk and Food Sanitarians. Every member of the Association is requested to give consideration to serving as a nominator for that individual whose service and contribution as a milk and food sanitarian have been outstanding. In brief, the essential points in the procedure and rules for selection of a nominee as a candidate for the Award are as follows:

Eligibility

To be eligible for The Sanitarians Award, a nominee shall have made meritorious contribution in the field of milk and food sanitation to the public welfare of a county or municipality, in the United States or Canada, and shall be currently employed by a county or municipality as a professional Dairy or Food Sanitarian or both. The work 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, a consideration may be given to related work accomplished by a nominee during a period not to exceed seven years previous to the time the Award is to be made.

In judging the contribution of the nominee, special consideration shall be given to originality of thought, mode of planning, and techniques employed in carrying out the work, its comprehensive nature, and its relative value to the community. Consideration shall be given to the efforts of the nominee in establishing professional recognition in the community in which he served, to research and development, administration, and educational achievements.

Anyone is considered eligible who is a living citizen of the United States or Canada and who at the time of nomination is actively engaged in the line of work for which the Award is made. There are to be no restrictions as to race, sex, or age. The Award may be made to co-workers when deemed advisable. Membership in The International Association of Milk and Food Sanitarians is not a requisite of eligibility. No individual shall receive the Award more than once.

A nomination for the Award may be sent to the Executive Secretary of the Association by any member of the International Association of Milk and Food Sanitarians, except members of the Committee on Recognition and Awards. Nominations must be accompanied by:

1. A brief biographical sketch of the nominee
2. A resume of the work and achievement for which recognition is proposed
3. Supporting evidence of the activities of the nominee
4. Where possible, reprints of any publication relating to these efforts.

No member may offer more than one nomination in any given year. Solicitation on the part of any individual or institution on behalf of any nominee will be looked upon with disfavor by the Committee. All nominations and supporting evidence must be in the hands of the Executive Secretary on or before May 15. The Executive Secretary will transmit all nominations as received to the Chairman of the Committee on Recognition and Awards.

H. L. Thomasson, *Chairman*
Committee on Recognition
and Awards

The banquet and entertainment will be long remembered by all those in attendance.

NEW DEVELOPMENTS IN 3A SANITARY STANDARDS

ANNUAL REPORT COMMITTEE ON SANITARY PROCEDURE

1952

The Committee on Sanitary Procedure met in joint session with the U. S. Public Health Service Milk and Food Branch, and the Sub Committee on Sanitary Standards of the Dairy Industry Committee, in Evanston, Illinois, on April 29 and 30, 1952. Three members of the Committee also took part in a discussion of tentative sanitary standards for C.I.P. sanitary pipeline installations, and for farm bulk milk holding and for cooling tanks, at Davis, California, on June 26. And the Committtee has reviewed the most recent tentative drafts of these latter two sanitary standards during the current meeting.

Since the 1951 Annual Meeting of the Association, those 3-A Sanitary Standards have been published in the Journal.

These are:

3-A Sanitary Standards for Plate-Type Heat Exchanger for Milk and Milk Products, in the January-February, 1952, number, page 14;

3-A Sanitary Standards for Pumps for Milk and Milk Products (Revised to include the design for shaft threads where necessary), in the May - June number, page 115; and

Supplement No. 2 to the 3-A Sanitary Standards for Fittings Used on Milk and Milk Products Equipment, and Used on Sanitary Lines Conducting Milk and Milk Products (13 SH Hex Nut), in the July-August number, page 173.

The 3-A Sanitary Standards for Return Tubular Heat Exchangers will be published in an early number of the Journal (Ed. note—this issue page 277).

Some progress has been made in the formulation of sanitary standards for can washers, and agreement on sanitary standards for conventional type milking machines has been advanced. Most of the time at joint meetings, however, has been devoted to discussion of the details of sanitary standards for C.I.P. pipeline installations, and for farm tanks. Task committees have under consideration initial or early drafts of sanitary standards for clarifiers, separators, fillers, for the installation and operation of HTST pasteurizers, batch pasteurizers, evaporators, heat exchangers (cabinet and surface type), leak-protectors plug valves, hose and gasket materials, and a code governing the minimum radii of plane junctions under various conditions.

Committee Reports of recent years have made reference to the desirability for the organization of the Committees in Affiliate Associations, to keep their memberships abreast of developments, and to provide the Committee on Sanitary Procedure with current experience in the field. Thirteen such committees have been organized prior to the 1951 Annual Meeting of the Association.

It has not been difficult to make available information and reprints of 3-A Sanitary Standards for the use of these committees but the mechanics for providing them with advance knowledge of the potential or probable form of tentative sanitary standards has failed completely mainly because of the time element. The interval between receipt of tentative sanitary standards and joint-meetings is usually too short to permit their distribution, consideration, and receipt of replies from Committees of Affiliate Associations.

In order to maintain the much-to-be-desired liaison between the Committee on Sanitary Procedure and Parallel Affiliate Association Committees, it has been proposed to the Association Council that a representative of each Affiliate Association be accorded the privilege of attending meetings of this Committee, as an observor and consultant. Since successive joint-meetings of the three participating agencies are held in different sections of the country, and usually at Annual Meetings of the Association, it should be possible for every Affiliate representative to participate in Committee deliberations from time to time.

The Council approved this proposal, and invitations to Affiliate Association to appoint such a representative will in due course, be forthcoming.

Every Annual Report of this Committee, since and including the one presented at the Milwaukee Meeting, in 1947, has made reference to plans or efforts to register with the U. S. Patent Office the 3-A symbol which has been employed in connection with this project of the development of sanitary standards. It is, therefore, with a sense of accomplishment and a feeling of pride that the announcement is made that *on August 26, 1952 the symbol in question was registered on the Principal Register of the United States Patent Office, in the name of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, Inc.,* and that we have a signed and sealed document to that effect. This certificate remains in force for twenty years, and is being transmitted to the Executive Board for safe keeping. This symbol may be used on *Receptacles,* which includes weigh cans, receiving tanks and storage tanks, automotive transportation tanks which conform to 3-A Sanitary Standards.

Proprietorship of this 3-A symbol presents the Association with a a Pandora's box of problems. We own it. Those who wish to use it, if any, must obtain our permission to do so. We must, therefore, formulate the conditions prerequisite to the granting of such permission. This involves questions not answerable in a twinkling, and it must

PROPOSAL FOR AN EPIDEMIOLOGICAL PROCEDURAL HANDBOOK*

REPORT OF THE COMMITTEE ON COMMUNICABLE DISEASES AFFECTING MAN

REALIZING the importance of epidemiological investigation in a well-balanced milk and food sanitation program and realizing that many of the states and municipalities do not have a manual of epidemiological procedures for the investigation of milk-borne and food-borne disease outbreaks, your Committee on Communicable Diseases Affecting Man has undertaken the sizable task of formulating for adoption by the Association such a procedure. The three principal objectives in undertaking this project are as follows:

1. To provide sanitarians with a procedure to guide them when confronted with milk-borne or food-borne disease outbreaks;

2. To stimulate an active interest on the part of all sanitarians in the epidemiological aspects of their programs;

3. To improve reporting of such outbreaks in order that sufficient data will be available for use by local, state, and federal agencies and industry in milk and food sanitation program planning.

To date the Committee has prepared an outline for this proposed procedure and has reviewed material pertaining to this project as prepared by several state and local agencies. It is the plan of the Committee to present to this Association at its 1953 Annual Meeting a draft of the proposed procedure for the purpose of obtaining the comments and recommendations of the Executive Board and the members of the Association. The final phase in the development of this procedure will be to present it in completed form to the Association in 1954 with the recommendation that it be adopted as the standard procedure for the investigation of milk-borne and food-borne disease outbreaks as sponsored by the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.

By means of this report, we wish to request the members of this Association to send to either the Chairman or a member of this Committee, or the Secretary of this Association, material considered pertinent to this project. Due acknowledgment will, of course, be given to the sources of material used.

R. J. HELVIG, *Chairman*

L. E. BURNEY	S. L. HENDRICKS
RAYMOND FAGAN	C. H. MADER
R. G. FLOOD	I. A. MERCHANT
JOHN H. FRITZ	E. R. PRICE

*Presented at the 39th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Minneapolis, Minnesota, September 18, 1952.

---

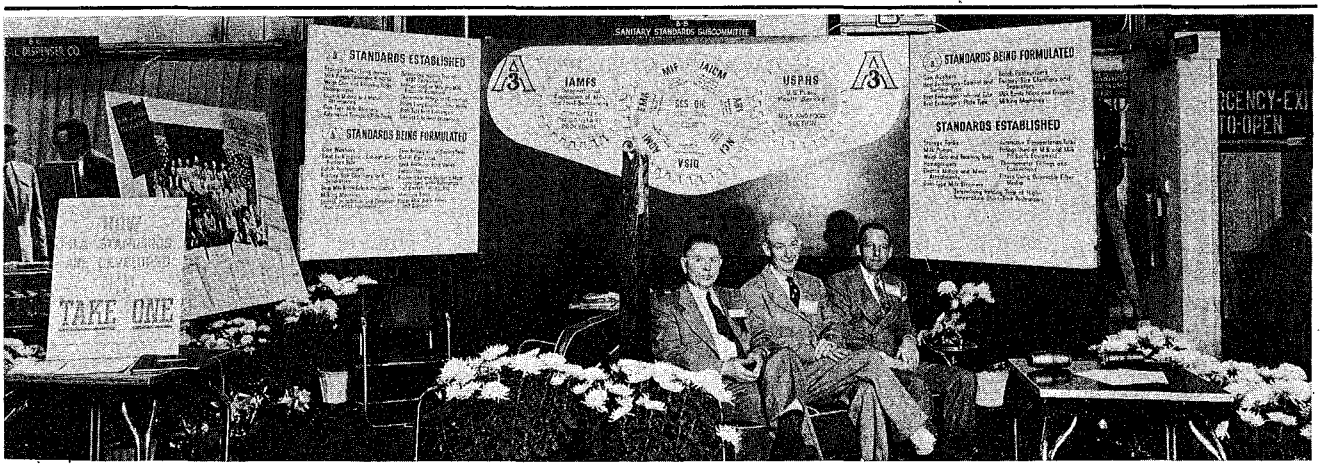
be recognized that we are faced with a grave responsibility.

It is not here inferred that the Association was precipitate in applying for registration of the symbol. Action was taken, approximately five years ago, to forestall acquirement of this symbol—very appropriate for our use—by other interests, before we could attain position to make use of it. Its use has now been assured to us.

There is basis for the assumption that manufacturers of equipment which conforms to 3-A Sanitary Standards will, sooner or later, wish to make use of the registered 3-A symbol to identify such equipment. In anticipation of that development, discussions concerning the mechanism of licensing and control have already been held with manufacturers of equipment. The Committee is hopeful that a complete organization for control of the use of 3-A symbol can be presented to the Association in its next Annual Report.

C. A. ABELE, *Chairman*

H. E. BREMER	M. D. HOWLETT, JR.
PAUL CORASH	H. L. THOMASSON
M. R. FISHER	IVAN VAN NORTWICK
I. E. PARKIN	HAROLD WAINESS
J. A. MEANY	C. W. WEBER



3A Sanitary Standards Booth at the Chicago Dairy Show September 22-27, 1952

SANITARY CONTROL OF FROZEN FOODS*

(REPORT OF COMMITTEE ON FROZEN FOOD SANITATION)

THIS past year your committee continued its investigations dealing with regulations for frozen fruits, flavors, etc. for use in ice cream. This was a continuation of the survey reported on last year which dealt with the processing treatment given to fruits for use in ice cream.

A new phase of study has dealt with regulations governing sanitation or roadside stands dispensing frozen desserts. There has been considerable feeling that regulations concerning this aspect of public health have been neglected. Such legislation effective in Canada is reported herewith and it would be desirable to have such information for the United States. Mr. Ghiggoile's report from California and Mr. Howe's report from Canada give some suggestions for regulations whereby the sanitation of roadside stands can be controlled more effectively.

No further report is being made at this time concerning regulations effective in the various states dealing with frozen foods. Mr. King's work with this phase has not been discontinued, however, and possibly further information on this study will be available in the next committee report.

The detailed reports on the above subjects are submitted to the Association for its consideration.

REPORT ON A SURVEY OF ICE CREAM MANUFACTURERS REGARDING STANDARDS FOR FRUITS AND NUTS

RAYMOND N. DOETSCH

In an effort to determine somewhat the attitude of ice cream manufacturers regarding possible sanitary standards for certain ingredients added terminally to pasteurized ice cream mix, 47 ice cream manufacturers were asked the following: What sanitary (chemical and bacteriological) specifications would you like to see the state and local health departments establish for fruits and/or nuts to be used in the manufacture of ice cream and other frozen desserts? The following returns are reported:

Undeliverable for various reasons	5
Detailed replies	7
No answer	35
	47

It is obvious that the manufacturer of ice cream in the United States is extremely reticent on this subject. The alternative, of course, is to believe that the letter was not properly framed for good response. Of the seven replies, we may summarize as follows:

Mold counts on fruits	1
Ultra-violet irradiation	1
No standards	1
F. D. A. standards	2
U. S. P. H. S. standards	2

It seems that there is little or no worry over standards here. The average plant manager feels that if these ingredients are added after pasteurization they cannot be highly contaminated. In view of the equivocation existing on just what significance molds, coliforms, etc. in fruits is, perhaps this view is not too extreme. One thing is certain: most of the manufacturers seem to be satisfied with the *status quo*.

It is the opinion of this member that further activities of the committee be directed into other channels.

SHALL MICROBIOLOGICAL STANDARDS BE DEVELOPED FOR FRUITS FOR FROZEN DESSERTS?

DAVID LEVOWITZ

Examination of frozen desserts sampled in markets where maximal permissible total bacterial and coliform levels per gram are not defined or enforced, has generally demonstrated much higher concentrations of microorganisms in the fruit-flavored than in the concentrate-flavored varieties. This has raised the question as to whether it might be desirable for the Desserts Sanitation Committee of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS to develop micro-biological standards for fruits for frozen desserts, and to recommend them to those who market fruits to the ice cream industry.

Dr. M. L. Speck, Chairman of the Frozen Desserts Sanitation Committee, appointed Dr. Raymond N. Doetsch to investigate this matter further. At Dr. Doetsch's suggestion, many fruit suppliers and ice cream manufacturers have been solicited for their opinions. This memorandum summarizes observations from a cross section of New Jersey ice cream manufacturers.

1. *Microbiological Quality a Function of Code Definition and Enforcement*: Practical, clearly defined, regularly and impartially enforced regulations can be met by the fruit-flavored ice creams of manufacturers desirous of obtaining and keeping a market. Example: the federal requirements of "not more than 50,000 colonies per gram, by standard agar plate method, and not more than 10 coliforms per gram, which levels shall not be exceeded by more than one of four samples taken on different days" have not caused hardship from fruit ice creams even when successive batches are sampled daily. They have promoted intelligent, efficient, aseptic processing plant practices.

2. *Blanket Specifications Could Not Obtain*:

Fruits are available in so many different styles (unripe; ripe; fresh; frozen; cold-packed; hot-packed; sterilized; preserved; dried; candied; etc.), and so many different varieties of fruits must be considered that applicable standards would have to be extremely cumbersome if they were to begin to specify any thing other than "wholesome .

*Presented at the 39th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Minneapolis, Minn., Sept. 18-20, 1952.

3. *Costs Would Be Unnecessarily Increased*:

Fruits are presently graded. Adoption of microbiological standards for "Fruits for ice cream and other frozen desserts" would multiply the number of grades already existing, and could only increase prices.

4. *Plant Handling Still a Prime Factor*:

Fruits supplied in heat-sterilized, hermetically-sealed containers are not going to remain sound, if the freshly opened contents of the container are contaminated by careless handling, and the storage period between contamination and ultimate utilization entails temperatures which encourage microorganism metabolism.

5. *How Could Standards Be Enforced?*

The short fresh-fruit season and the short supply of harvesting labor forces some ice cream manufacturers to purchase certain fruits "on the vine". Fresh fruit purchased at the market by frozen desserts processors must be screened, and culls must be removed before the balance is to be considered a "batch." A fair standard should be applied equally, to all; why should those who purchase fruits for processing and resale be given either extra penalties or extra privileges?

6. *Who Would Enforce The Standards?*

Standards, without enforcement, would be meaningless. Who would be in a position to enforce the standards on the various types and varieties? Consider the perishable nature of many regularly employed, commercial forms of fruit; where would qualified inspectional personnel be obtained?

SUMMARY

The majority of ice cream manufacturers solicted for opinions feel that present laws which require the utilization of wholesome fruits need not be strengthened by defining microbiological concentration levels. There was unanimity in the sentiment that it would be most beneficial if the requirements for frozen desserts themselves, in all adjacent markets and ultimately nationally, be made uniform. The present regulations, changing as they do at every municipal boundary, do not expedite efficient processing and distribution.

LEGISLATION IN CANADA GOVERNING SANITATION OF ROADSIDE STANDS DISPENSING FROZEN DESSERTS

S. R. HOWE

In order to secure up-to-date information regarding the subject under review, the Dairy Commissioner for each province in Canada was asked to supply information as to the legislation now in force in his respective province covering the operation of roadside stands particularly from a sanitary standpoint. He was also asked whether such legislation was enforced by provincial or municipal authorities.

Replies received from nine commissioners indicated the following:

1. Only one province has regulations which have been written specifically to control the operation of counter freezers.

2. In six provinces, sanitary control of roadside stands serving frozen desserts is undertaken by the provincial department of health, although in the case of larger cities, the inspection and enforcement are controlled by municipal authorities.

3. In one province, there is no provincial legislation governing roadside stands from the standpoint of sanitation, cleanliness, or equipment. The inspection is entirely the responsibility of the municipal departments of health under their own local by-laws.

4. In one of the smaller provinces, there is no inspection of such stands, due to the fact that there are very few operating there at the present time.

In looking over copies of public health regulations enforced by the six provinces mentioned in paragraph (2) above, it was found that "counter freezers", "frozen desserts", and terms of a similar nature were not specifically mentioned. In other words, it would appear that places where ice cream and allied products are made and sold are considered in the general category of restaurants and are required to meet regulations prescribed for such places. Many of these regulations are, of course, quite suitable for restaurants, but not restrictive enough for highly perishable products such as frozen desserts.

The dairy commissioners referred to above were also asked to outline their views concerning the pros and cons of legislation under review. Their comments can be summarized as follows:

1. There should be very definite sanitary standards for roadside stands or any place where ice cream and other frozen or semi-frozen products are made and sold.

2. The sale of pre-packaged products should be encouraged, due to unsatisfactory conditions which are often prevalent in the dispensing of bulk ice cream.

3. All mix should be pasteurized. Particular attention should be given to persons who make their own mix. These operators are usually located at country points.

4. Regulations should be written in language that is concise and can be readily understood by operators. They should be printed together and not inserted or intermingled with regulations dealing with other foods, in order that reprints can be easily made for distribution by inspectors.

5. Provisions should be made for licensing stands where ice cream, sherbet, etc. are actually made, and it should be mandatory that such places cannot operate without a license. It is felt that this provision would be of assistance to inspectors in the enforcement of legislation.

REGULATIONS GOVERNING SANITATION OF ROADSIDE STANDS DISPENSING FROZEN DESSERTS

O. A. GHIGGOILE

Roadside stands dispensing frozen desserts, particularly stands where products are manufactured and dispensed in the form of packaged goods, milk drinks, and cones, should be controlled in the same manner as other milk products plants. They should be subjected to the same regulations and standards. From both a public health and an economic viewpoint, there is no difference between a small plant and a large plant.

Before these so-called roadside stands, now commonly referred to in many sections as counter-freezer installations, were brought under control, there was much to be desired. They were installed and operated in places of questionable sanitary surroundings. They were installed at resorts and at roadsides with no consideration being given to proper care and sanitation. The machines were often constructed in such a manner that they could not be properly washed and sanitized, and in some instances were so crude that the equipment could not be taken apart.

Facilities for washing and sanitizing equipment were not provided. Washing and sanitizing consisted of running some warm water through the machine. Where kitchens were maintained, the equipment was washed in the kitchen and stored on shelves, subjecting it to contamination by dust and grease. Rooms were often so small and crowded that proper working space was not available which made it almost impossible to clean the floors and walls.

Poorly constructed wooden floors were found in some of the processing rooms allowing water and other liquid to seep through. Drainage was not provided, and it consisted of letting the water through a door or through a pipe in the wall to the outside where it was allowed to stand, thereby creating a hazard.

The frozen product which contained from 2 to 8 percent of milk fat was of inferior quality, and high bacteria counts were the rule rather than the exception.

A survey of these establishments clearly indicated the necessity for proper control and supervision.

Today, in many sections of the country, the small installations are under the same control and supervision as any other milk products plant and are so classified by law. If existing legislation is inadequate for the proper control of these roadside stands, amendment to effect the desired results should be made.

The products should be manufactured in a separate room which is not used for any other purpose. The floor must be constructed of concrete or other impervious material and be watertight and sloped. All drainage will flow to drains which are properly trapped and connected to a sewer line that will convey refuse water and milk to a point at least 100 feet from the plant. Walls and ceilings should be tight, sound, and cleanable, and walls constructed of non-absorbent material sufficiently above the floor to take care of any splash and to prevent the flowing or seepage of water or other fluids underneath or between the walls and floor and supporting members.

Suitable toilet with self-closing doors and lavatory facilities, including soap and clean towels, must be provided for employees. The toilet is not to communicate directly with any room used for handling products or with any room used for the washing, sanitizing, and storage of containers and supplies. Proper hand washing facilities are to be provided in the processing room.

Two rooms, in addition to toilet facilities, should be required for proper operations. One room used exclusively, for processing and the other for washing, sanitizing, and handling of equipment and for the storage of supplies. All outside openings should be properly screened, including outward self-closing doors.

Sufficient light to be provided in each room equivalent to not less than one 50-watt electric light per 100 square feet of floor area reasonably and efficiently distributed. Each room must be adequately ventilated. This can be accomplished by the installation of wall ventilators near the floor giving one square foot of floor space and by ceiling vents leading to roof ventilators. Hot and cold water to be made available in the processing room; such water to be properly located and easily accessible.

Most of the operators of roadside stands purchase prepared ice cream mix which is perishable. Provision must, therefore, be made on the premises for the proper storage of the mix.

A common practice at these roadside stands is to serve direct from the freezer a soft frozen product similar to an ice cream cone as well as milk drinks. To guard against possible contamination from flies and dust, the pass-out or service window should be of a size large enough to meet the need. An opening of 180 square inches as a maximum is sufficient for this purpose. When not in use, it must be kept closed at all times.

All equipment should be elevated off the floor and installed far enough from walls to permit proper cleaning of all walls and floors.

One great problem concerning these stands is when they are located in areas where they do not have access to a city sewer system. Provisions must be made for a septic tank large enough to accommodate the plant waste. This problem is aggravated where the refrigeration system is water cooled and the condenser water is allowed to go down the drain. In many cases, the septic tank has proved inadequate to handle the volume of water involved. Careful consideration should be given to this problem when installations are made under this circumstance.

To avoid extensive alterations or rebuilding, each person, before engaging in the manufacture of products, should be required to file an application and fee and to submit detailed plans or blueprints showing the nature of the construction or alterations and receive approval in writing. This will give regulatory agencies an opportunity to make corrections before construction begins and to inspect the site or location for possible contaminating surroundings, proper drainage, and sewage disposal.

With the rapid increase of roadside stands for the manufacture and dispensing of frozen desserts, it is apparent that proper supervision and control should be maintained in the interest of public health.

There should also be a fairly uniform set of requirements recommended to all state authorities so the requirements from one state to another do not vary too greatly. In this way, an operator moving from one state to another will be familiar with what is to be expected if he goes into the business in another state.

SUMMARY AND RECOMMENDATIONS

(a) There must be at least two rooms.

(b) Processing room to be used for no other purpose.

(c) All doors and openings to be properly screened.

(d) All doors to outside to open outward and be self-closing.

(e) Floors to be constructed of concrete or other approved impervious material.

(f) Floors to be watertight and sloped so that all drainage flows to trapped drains connected to sewer line.

(g) Walls and ceilings to be sound, tight, and cleanable.

(h) Walls for a distance of at least 18 inches from the floor to be constructed of concrete or other approved impervious material.

(i) Meeting point of walls and floors to be properly coved with two inch radius.

(j) Buildings to be located free from any contaminating surroundings.

(k) Adequate light efficiently distributed in each room.

(l) Adequate high and low ventilation in each room.

(m) Facilities for the proper washing and sanitizing of equipment.

(n) Hot and cold running water in processing room.

(o) Storage space for mix and supplies.

(p) Equipment elevated off the floor.

(q) Clean clothing for employees.

(r) Adequate toilet and lavatory facilities.

(s) Hand wash basin in processing room.

(t) Employees to be free of communicable diseases and not in condition to disseminate the germs of any communicable disease.

(u) Adequate water supply properly located, easily accessible, and protected. Bacteria quality standards to conform to standard for public supply of drinking water.

(v) License or permit system.

(w) Satisfactory inspection report before issuance of license or permit.

(x) Blueprints or plans submitted for approval.

Any comments on this report and suggestions whereby our future activities may be made more effective will be welcomed by your Committee.

MARVIN L. SPECK, *Chairman*
RAYMOND N. DOETSCH
O. A. GHIGGOILE
S. R. HOWE
JAMES A. KING
DAVID LEVOWITZ
H. D. MCAULIFF

U.S.P.H.S. WEEKLY COMMUNICABLE DISEASE SUMMARIES

DR. PAUL BROOKS

This sketchy comment is based on review of summaries for a six-weeks period, starting with the week ending August 30. In that period there were reports covering approximately 18 food-borne or presumably food-borne outbreaks. In 7 of these, investigations were inconclusive: not too bad an average. Again no milk-borne outbreaks were reported. That could mean, an increase in pasteurization or decline in investigations.

The most spectacular outbreak, reported from Oregon, ran into large numbers. There were about 400 cases of gastroenteritis among from 10 to 15 thousand persons attending a picnic. Ham in ham sandwiches, appeared to be the vehicle and *Staphylococcus aureus* the organism. The latter was found, in large numbers, in the ham and, in smaller numbers, in other things, including mayonnaise. 2 food handlers were found to have staphylococci in their noses and throats.

Running second in numbers was an outbreak in gastroenteritis reported from Minnesota. Two hundred cases occurred among 535 persons who ate lunch at a high-school. The evidence pointed to staphylococcus poisoning, and potato salad was suspected. Of 3 wommen who prepared the salad, one gave a history of recent upper respiratory infection.

While staphylococcus enterotoxin predominated as the cause of the outbreaks reported, one of 7 cases of gastroenteritis (salmonellosis) reported from Maryland was of interest. The victims drank eggnog and became ill from 7 to 22 hours later. *Salmonella* (type to be determined) were found in the eggnog. The probable source: the eggs.

Persons having colds or other "upper respiratory infections" not infrequently have hemolytic staphylococci in their nose and throat secretions. These may be transmitted to food by talking, coughing, sneezing, dripping, or via their hands.

FOOD EQUIPMENT STANDARDS*

(REPORT OF COMMITTEE ON FOOD EQUIPMENT FOR THE YEAR ENDING SEPTEMBER 17, 1952)

Your Committee on Food Equipment Standards is pleased to report some real and tangible progress during the year. This progress is particularly gratifying as it was accomplished under exceedingly difficult working conditions. With the membership scattered throughout the country, not a single meeting was held and all work, recommendations, and exchange of ideas had to be carried on by correspondence. Undoubtedly your committee could more effectively service the Association if some means could be worked out whereby the members could meet collectively in several sessions during the year.

COOPERATION WITH THE NATIONAL SANITATION FOUNDATION

Your Committee has continued to cooperate with the National Sanitation Foundation through its Joint Committee on Food Equipment Standards.

Standard Number 1, Soda Fountain and Luncheonette Equipment, was published and released in July 1952. All participating committees have approved this standard. Copies can be purchased from the National Sanitation Foundation, Ann Arbor, Mich., for fifty cents per copy.

Standard Number 2, Food Service Equipment, has been approved and is being prepared for the printer and will be available in the near future.

Considerable difficulty has been encountered in the standard for Spray Type Dishwashing Machines. It is far more difficult to write a standard for equipment which is required to perform a sanitary functional operation upon other equipment or utensils than to write a sanitary design standard for containers. A sound standard must be predicated upon established performance data. The performance studies on dishwashing machines being carried on at Michigan State College are being continued and should supply the information needed to conclude this standard. A design standard alone may not be adequate. It may have to be supplemented by a performance standard and tests. The Foundation is proceeding with plans for a testing laboratory and one of its many potential services would be to test and approve dishwashing machines.

COOPERATION WITH THE BAKING INDUSTRY SANITATION STANDARDS COMMITTEE

The Baking Industry Sanitation Standards Committee is diligently and enthusiastically promoting their program of improvements in sanitary design of all equipment used by that industry through the development of sanitary standards. Your committee has been pleased to continue to serve as a consultant to this sanitation committee of the Baking Industry. Your chairman attended two meetings of this committee during the year, one at Chicago and one at New York City. The next meeting is scheduled for October 17 and 18 at Chicago.

Early in July of this year the approved sanitation standard on flour handling equipment was printed and released. This is the first approval of a series of standards under development. The standards for dough troughs and mechanical proofers were approved, printed, and released on August 1, 1952. The standard for pan, rack, utensil washers, and industrial sinks has been approved subject to editing and will be ready for release in the near future.

The standard for cake depositors, fillers, and icing machines was approved on September 9. In accordance with established policy these two standards will not be published for 60 days or longer, during which period each committee member and consultant will have an opportunity for review and final comment.

Standards in task committee are to be considered at the October 17-18, 1952, meeting and are as follows:

Ingredient water coolers
Ingredient containers
Mixers, vertical
Mixers, horizontal
Dividers and rounders
Pans
Proof box, bread coolers, and fermentation room
Pan greasers
Spindle mixers

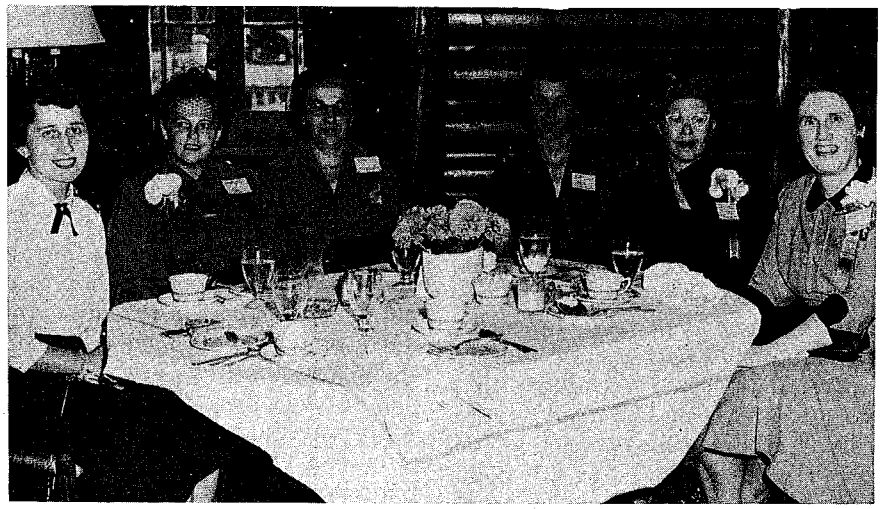
From this imposing list of equipment sanitation standards it should be obvious that a tremendous amount of time and effort must be devoted by each committee member if sound, practical sanitary standards are to be forthcoming which will result in marked improvement in the sanitary quality of the baking industry products.

The B.I.S.S.C. has offered to interested sanitarians a single complimentary copy of each published standard, and additional copies may be obtained for twenty-five cents. This may be obtained from Mr. Raymond J. Walter, Executive Secretary, B.I.S.S.C., 511 Fifth Avenue, New York-17, N. Y.

We wish to point out that the standards approved by the N.S.F. and the B.I.S.S.C. have not been endorsed by this Association. The standards adopted by the N.S.F. have been approved by your Committee on Food Equipment. The standards adopted by the B.I.S.S.C. have been acceptable to your committee but because they serve in the capacity of consultants, they have not been formally approved by your committee. The published B.I.S.S.C. standards state that the chairman of your committee has served as consultant. Your committee believes that they should be

*Presented at 39th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Minneapolis, Minn., Sept. 18, 1952.

Ladies attendance record was broken and the womens Activities Committee provided a grand time for all.



Womens Activities Committee:
Mary Specht, Mrs. Carl Mattson, Mrs. J. C. Olsen, Mrs. J. J. Jeseski, Mrs. Ben Zakarison, Mrs. Ruth Brand

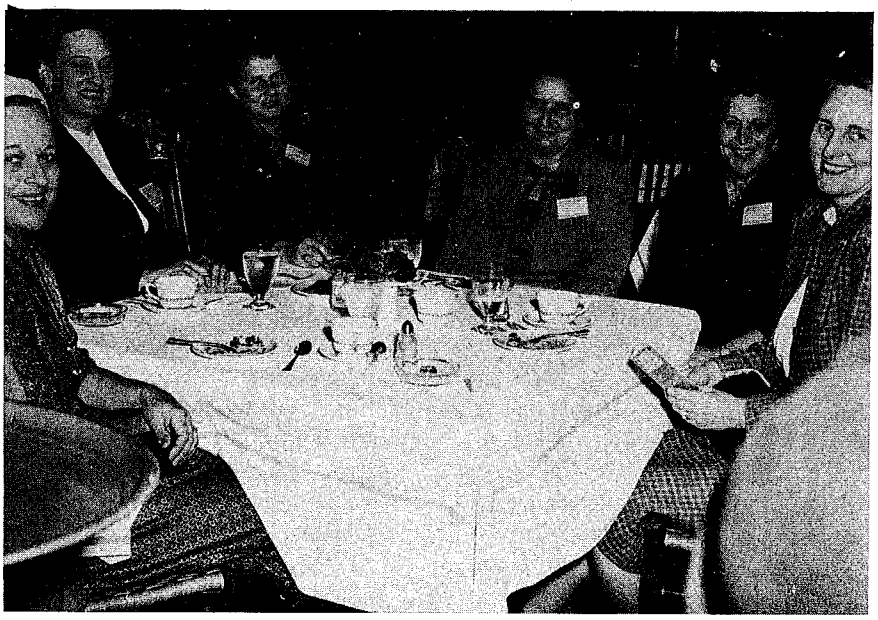
Its plain to see that the ladies were enjoying one of the swell luncheons provided them.

authorized to approve the B.I.S.S.C. standards if in their opinion they are acceptable.

Standards as written documents have no value. Their value lies in acceptance and application. We encourage every member of our Association to study each standard carefully, give it a fair trial, and if it proves to be sound, practical and progressive to recommend endorsement by the entire association.

C. W. WEBER, *Chairman*

LEWIS DODSON — MAJ. F. H. DOWNS
D. E. HARTLEY — E. B. CARROLL
W. R. MCLEAN — J. H. MILLAR
JEROME TRICHTER — DAROLD W. TAYLOR



REPORT OF THE COMMITTEE ON DAIRY FARM METHODS*

IT IS RECOGNIZED that specific dairy farm methods application and acceptance is considerably influenced by geographical location. This influence is more noticeable as we move from north to south than is the case in moving from east to west. Climate plays the important role. Certain methods are used to meet the conditions of one area yet must be varied in their application to some other area.

Barns and milk houses in the northern section must be of tight construction to protect from the cold while many barns in the milder climates are open on one or more sides in order that better ventilation may be obtained with resulting greater comfort to the cows and the workers. Pen type barns are being increasingly used in the north and have proven to be most practical; however, the more cheaply constructed shelter sheds, to protect animals from rain, very well supply the needs of the south.

Manure storage and disposal poses a much greater problem where long periods of sub-freezing temperatures prevail than in the warmer areas where the ordinance provisions can be met throughout the year. In some areas fly control is not necessary during the late fall and winter months; screens may be removed from the milk houses and stored manure is not a fly-breeding hazard. In other areas, however, fly-control measures must be practiced twelve months of the year.

Fortunately most methods can be standardized and be accepted almost universally. Tradition and individual practices play an important part in individual and area acceptance.

SANITIZING FARM DAIRY PIPELINES IN PLACE

Wide differences of opinion exist among sanitarians relative to accepting this method of cleaning and sterilization. Much research is being done to effect a procedure in plant pipelines which can be accepted but as yet conclusions have not warranted general official approval. The type of soil found on the hot lines in plants differs somewhat from that of the farm installations and for this reason may call for a different method of approach.

In the case of farm pipelines some factors affecting efficiency of cleaning are: (1) types of pipe: steel, glass or plastic; (2) joints: ground or gasket; (3) system of cleaning; (4) pressures and temperatures of solutions used together with recirculation; and, (5) perhaps the most important; the operator. Where the dairy has sufficient production to make it practical to provide ample facilities, the chance of obtaining successful cleaning results may be good, but until some more simple method is proven successful it is doubtful that the average farm operator will do the job in a satisfactory manner. One member reports, "I have seen a number of installations and have found that fittings are often offenders. I observed recirculation systems in use on the west coast and at this point I am inclined to believe that if in-place cleaning is to be generally satisfactory, this method will prevail. The amount of cleaning solution, the temperature, and the length of application are prime factors, and only recirculation in my opinion can fulfill these requirements." Some authorities recommend that sanitizing of the lines after cleaning should be accomplished by the circulating of hot water through the system until the temperature of the water at the outlet is found to be 200°F. This would require quite an outlay of heating facilities and would not be practical in the average operation.

*Submitted at the 38th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., Glenwood Springs, Colo., Sept. 26-29, 1951.

COLOSTRUM IN MARKET MILK

It is reported that the presence of colostrum in market milk is a problem in the east where the Jensen Dipper Test is used for the detection of flakiness but is not considered a serious problem in other sections of the country. The colostrum problem, while not serious, has increased in certain areas with the advent of the farm tank and tank truck hauling from farm to milk plant. The usual market milk inspection techniques do not detect the presence of colostrum. Some local inspection departments and plants make routine centrifuge examinations which give indication of colostrum as well as being helpful in locating bloody milk. If this condition becomes more of a problem the need for a field test to determine the presence of colostrum is indicated.

HOSING DOWN COWS

The washing of cows with water under pressure from a hose is a common practice in a number of states which enjoy a mild climate and where the cows are milked in the milking parlor type of barn. This procedure will not in itself produce a clean cow or clean milk. Experience has shown that water pressure should not exceed 30 to 35 pounds for an effective job and that the udder should receive hand washing and be wiped dry.

Theoretically it would seem that hosing the udder with cold water or water under high pressure might have an adverse effect on udder health. There seems to be little evidence in support of this. With reference to the managed milking technique, it is important that the udder be massaged with a warm bactericidal solution regardless of the temperature of the water used in hosing the cow.

The need for hosing cows is debatable in the minds of some authorities. Our group contends that, from a quality production viewpoint, the brushing of the flanks before washing the udder will be

of as great an aid as hosing. The opposite group support hosing procedures by contending that dust is eliminated to a greater degree by the use of water under pressure and that less effort is needed to get the job done.

REFRIGERATED TANKS FOR COLLECTION OF MILK AT PRODUCER FARMS

This subject was discussed briefly in last year's report of the committee. There is a very definite trend in some areas toward this type of transportation of milk from farm to plant. This is evidenced by the increasing number of experimental routes reported.

One area, where such routes are being initiated, reports some interesting data and observations: "Eighteen-hundred gallon tank trucks are being used and the size storage tanks used at the farm are 2, 3, and 400 hundred gallon. The farm installation of this unit including refrigeration is costing about $3,000.00 The trucks are costing from 10 to 12 thousand dollars. With large shippers this seems to be a practical arrangement. We will start using this method about September 1st with two trucks, however, from the interest shown we expect this to grow very fast. It will also be of benefit in unloading the milk at the dairy plant in which, due to the large gross of milk handled by the plant, we are having troublesome delays in getting canned milk dumped promptly when the farm truck arrives. We are hoping that this tank pick-up will aid materially in unloading as well as make for more efficient operation at the farm."

From the information at hand it would seem that the two most important factors to consider in the development of tank-collecting routes are the size of the producers and their accessibility. The influence of size is evidenced by the interest shown to date. California and some eastern states areas where dairy volumes are larger are establishing the greater number of such routes. In areas where small volumes per producer is the rule, this type of transportation is less practical or even impractical. The accessibility of producer farms to good highways is an important factor.

This type of farm storage and movement of farm supplies to processing plants eliminates many defects in the present system; however, it does add some new problems. Procedure of sampling* and sediment testing will have to be revised and in doing this the load on control personnel, no doubt, will become greater. Revision of cooling methods is a distinct possibility. In many areas much of the milk is now cooled by placing the cans in mechanically refrigerated wet storage. Where unrefrigerated storage tanks are used, surface coolers will be necessary. In this type of system one area reports the use of insulated storage after cooling over direct expansion surface coolers. This was because all farms were already equipped with surface coolers and was a matter of economy. This method may present problems in cooling, depending upon the capacity of the cooler. Where inadequate temperatures were obtained, this was solved by recirculating the milk over the cooler until the desired temperature was reached. Where refrigerated storage tanks are used the cooling procedure is quite simple. It seems reasonable that the refrigerated tank would prove to be the most economical type of cooling installation. The time and labor saved should be enough to offset the added initial cost.

Referring to the collection tanker, one member is concerned relative to the protection given the pump and piping between usage. He asked if it would be practical to maintain these in a dust-tight refrigerated compartment when not in use. He also asks whether the conventional type of sanitary piping should be used or would the so-called white dairy hose be acceptable. These and other questions, such as every other day delivery, can be answered only after enough experimental routes are maintained to furnish the necessary data.

(*Editor's note: since writing the above, Mr. N. E. Watson, Tulare, Cal., has published his method of using his new sediment pump for farm tanks. This Journal, January-February, 1952, page 43.)

FARM LABOR

The labor factor on farms and particularly labor on dairy farms is becoming more important each year. Labor cost and its influence on the economics of milk production has reached the point that more attention to all means of efficiency in the use of such labor is necessary.

The ability of the farm worker to produce food has changed to a great degree over a period of years. One source of information reveals that in 1830 it took 76 percent of the population to produce the food necessary for the needs of the nation. Today the nation's needs are adequately supplied by 18 percent of population. Another report indicates that today each farm worker in the United States on an average basis produces enough food to feed fourteen other Americans besides himself; in 1910 the average was less than eight besides himself In 1910 it took more than 12,000,000 farmers and helpers to feed the population of 92,000,000. In 1950, it took approximately 10,500,000 workers to feed a population of 151,500,000. The use of science and mechanization made possible this improvement in production per worker.

From the above it is apparent that the number of farm workers is on the decrease. The decrease is recognized in the case of dairy-farm labor and will become more acute in the immediate future as more young men are called upon to supply the needs of the Armed Services. We are not so far removed

from the experiences of World War II that we can fail to visualize the potential labor shortage.

In view of the fact that the supply of dairy labor is limited, it seems that the time is opportune to stress the importance of the efficient use of the labor that is available. Some items worthy of consideration are as follows:

Have walls and ceilings of the barn and milk house smooth as an aid in keeping them clean.

Have milk houses conveniently located to save time and effort in carrying milk from barn to milk house.

Have milk houses of ample size making it easier to handle milking equipment.

Have floors properly graded and drained so that they may be readily and easily cleaned.

Provide drains in gutters of barns as an aid in cleaning.

Have sufficient, both natural and artificial, light which facilitates all work and tends to save time.

Provide concrete runway entrance lanes to barns which will materially aid in keeping cows clean and aid in preventing dirt being carried into the barn on hoofs. These concrete lanes are labor savers.

Keep cows clipped. This saves time in cleaning flanks and udders. Experiments show cleaner milk is obtained with resulting lower bacterial counts.

The use of single service paper towels in washing udders saves the labor of washing udder cloths each day.

Keep ample supply of all types of brushes in good repair. This means a better job of cleaning and saves labor.

Have proper tools such as scrapers, shovels, push brooms and hand brooms which will encourage keeping buildings cleaner and saves time in cleaning.

Have hot and cold water in the milk house and water outlets in the barn.

Proper size equipment in the milk house and water outlets in the barn.

Proper size equipment in the milk house aids in the production of better quality milk and saves time in handling milk.

Have sufficient units of milking machines so that milking can be done in the shortest possible time.

One subject on the committee agenda this year was "Causes of Milkstone on Producer Dairy Utensils." Not enough data was obtained to render a report but we believe that the subject is of sufficient interest to warrant further study by next year's committee.

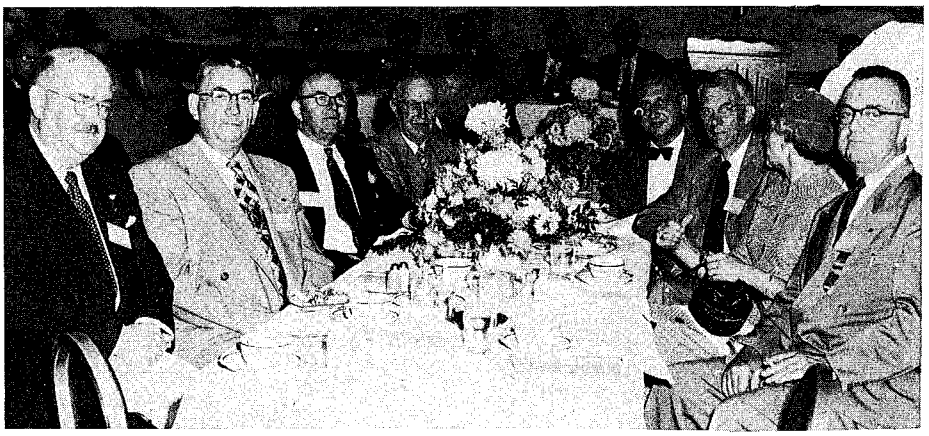
The subject of "Cleaning of Milking Machines" was a part of last year's report of the committee. In it we stated, "This problem has, no doubt, been discussed among milk control officials more than that of any other production equipment; yet, there still exists wide differences of opinion relative to the best method of procedure."

That interest in this subject continues to exist is indicated by a letter received by President Weckel from the Washington State Department of Health and forwarded to our committee: "The subject of cleaning milking machines has attracted considerable interest in the State of Washington recently. We have a need for uniform recommendations for procedure which can be recommended by such agencies as the Experiment Station, and the State Departments of Agriculture and Health. In searching for a method which would meet with general approval, we have met the problem of divergent opinions as regards a recommended standardized procedure. This apparent divergency of opinion is further borne out in material recently received from J. L. Foley, of the University of Massachusetts in a cleaning survey study, with which you are undoubtedly familiar.

"We are therefore of the opinion that this subject could well be a project for either the committee on dairy farm methods or the committee on sanitary procedure of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS. The recommendations of such a committee could then well serve as a basis for greater uniformity of recommended procedure than apparently exists at the present time."

DR. R. G. ROSS, *Chairman*

J. C. FLAKE — CHESTER F. BLETCH
MILTON E. HELD — DR. F. L. SCHACHT
J. E. DOLAN



Representatives of Companies sponsoring Sanitarians Award.

CHANGES IN MILK REGULATIONS*

REPORT OF ADVISORY COMMITTEE ON ORDINANCES AND REGULATIONS

At the Thirty-First Annual business meeting of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, October 31, 1942, the following motion was carried:

"That the president appoint a committee of from 5 to 7 members of the Association, to study milk ordinances and regulations which it considers fairly representative of those in effect throughout the U. S., and to formulate a set of standards and requirements covering production and handling of raw milk for sale and use in the raw state; raw milk for pasteurization and the process of pasteurization, including in such standards and requirements only those which the committee considers essential and necessary to insure a safe product of acceptable quality."

No attempt will be made to review the accomplishments that resulted from the above resolution. Conditions have changed since its passage. The need for regulations governing the sale of raw milk for use in the raw state have greatly diminished. The personnel of the committee changed several times. All members endeavored to fulfill the purpose of the resolution. This was not accomplished. Opinions as to what constitutes essential items in a milk ordinance are so varied that complete agreement, even among committee members, was never obtained. The final report of this committee was, therefore, made at the Annual Meeting in September 1951. The president of our Association, in cooperation with the committee members, instigated a change and reorganized the committee as the "Advisory Committee on Ordinances and Regulations." Its duties are to inform the Association members of changes made in ordinances and regulations and the effect and advisability of such changes. During the year, we therefore requested the state health departments to inform us of recent changes in their state regulations. The response was gratifying. Replies were received from 41 states and the District of Columbia. The replies are summarized as follows:

STATE MILK REGULATIONS

Delaware, Illinois, Indiana, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Montana, Missouri, New Jersey, North Dakota, Oklahoma, Kansas, Tennessee, Texas, West Virginia, and Wyoming indicated that no major changes had recently been made in their ordinances.

Colorado, Idaho, Minnesota, and Wisconsin have recently adopted ordinances closely patterned after the U. S. Public Health Service Ordinance and Code, and Nebraska has been authorized to use the Public Health Service Ordinance.

Arkansas is in the process of revising its ordinance, Washington is writing regulations relating to bulk milk handling by farm tanks, and the District of Columbia is making some changes dealing with farm sanitation and dairy plant regulations.

The Alabama regulations have been changed from a degrading type of ordinance to a permit suspension type. The dating and the placing of a time limit on retail milk, as well as placing the permit number on the bottle cap or carton, may be required. The bacterial requirement for Grade A milk for pasteurization has been lowered to 100,000 per ml, and that for Grade A pasteurized milk to 20,000 per ml. A program for the control of brucellosis in herds producing milk for pasteurization is included. The width of dairy barns, depth of gutters, etc. are specified. The cooling temperature of all milk has been changed to 50°F unless delivered within two hours after the completion of milking.

The Agricultural Code of California pertaining to milk and milk products has been amended to define Milk Inspection Service more adequately and to clarify the authority of the Director of Agriculture. Further amendments establish definitions for pasteurized concentrated milk, imitation milk products, and yogurt. Conditions are set forth under which colored oleomargarine may be used in charitable or penal institutions.

The State of Florida has added definitions for fresh milk concentrate, a blend of milk and cream, chocolate milk drink, and cottage cheese.

Idaho has made slight changes regarding health of cows, milking stables, floors, animals, and cooling. It now requires all milk delivered to the pasteurizing plant after 10 am and 8 pm to be cooled to 60°F or lower. After January 1, 1955, all milk and milk products for pasteurization shall be from herds acknowledged by the State Bureau of Animal Industry as following Plan A approved by the Federal Bureau of Animal Industry. (Brucellosis).

Iowa made changes pertaining to animal health, bacterial counts, transportation, and the coloring of reject milk. Grade A raw milk must be produced by brucellosis-free herds.

The principal change made in the Mississippi regulations is the inclusion of a definition for half-and half. Some changes were also made in the labeling requirements.

The Nevada regulations now state that raw milk shall not be sold or made available to the consumer as raw milk, cream, or milk. Changes have been made relating to the inspection of the dairy barn and milkhouse, and to milking and the handling of milk.

New Hampshire has promulgated sanitary regulations for milk dispensing units.

North Carolina has included a definition for skim milk with added

*Presented at the 39th Annual Meeting of the International Association of Milk and Food Sanitarians, Inc., Minneapolis, Minn., Sept. 18-20, 1952.

solids and amended its definitions for chocolate milk and chocolate drink. Ordinance also amended to require that all animals which are infected with brucellosis or Bang's disease, or which are officially classified by the state veterinarian or his authorized agents as Bang's reactors, shall be permanently removed from dairy herds, producing graded fluid milk for human consumption, either raw or pasteurized.

Changes have been made in the Oregon regulations to assure the free movement of milk in the state and to prevent duplication of inspection. Conditions under which the privilege of using grade designations may be suspended have been clarified. The Act now requires that all milk sold or offered for sale as Grade A shall be from brucellosis diseased-free herds. It permits a direct opening from the milking stable to the milkhouse in case of pipe line milker systems. Requirements for the farm tank method of handling milk have been added.

South Carolina has changed its ordinance to permit milk containing not less than 3 percent fat to be sold by producers to pasteurizing plants. The definition for milk or skim milk beverage has been changed to require it to contain not less than 8 percent milk solids-not-fat and not less than 2 percent fat. The definition for reconstituted or recombined milk and cream has been clarified. No milk or milk products may be sold to the final consumer or to restaurants, etc., except Grades A, B, and C raw, A and B pasteurized, and certified. The ordinance now provides for either a degrading or revocation type of permit.

Tennessee has added a regulation relating to fountain dairy drinks and a state law on cultured buttermilk, recombined and reconstituted milk, cottage cheese, and ice milk.

Utah has revised its ice cream regulations to comply with the regulations on modified and fortified skim milk that have been adopted.

Vermont now permits only one grade of pasteurized milk in addition to certified pasteurized.

Virginia has enacted a bill promoting the sale of Grade A skimmed milk with vitamins A and D added and Grade A skim milk with added solids and added vitamins A and D.

CITY MILK ORDINANCES AND REGULATIONS

No attempt was made to determine the recent changes in city milk ordinances and regulations. However, at the time we wrote the state health officers, we requested information concerning major changes that had come to their attention in city ordinances within their respective states. As a result, we report:

Montgomery, Alabama, changed its milk ordinance to conform with the State Board of Health.

The milk ordinance adopted by local communities in Georgia was revised in 1951 and is essentially the 1952 U. S. Public Health Service milk ordinance with minor revisions to comply with state regulations.

Moscow, Idaho, raised the butter fat standard for fluid milk from 3.25 percent to 3.5 percent.

Indiana cities are revising their ordinances to comply with the 1952 edition of the U. S. Public Health Service Ordinance.

Portland, Maine, no longer requires the dating of milk.

Some cities in Michigan because of court action, have eliminated the requirement that milk must be pasteurized within a specified distance from the city.

Three cities in Montana have adopted the state regulations with a few minor revisions. The state regulations are based on the U. S. Public Health Service Ordinance. Billings, Montana, has adopted compulsory pasteurization.

Charleston County and Columbia, South Carolina, have eliminated all grades of milk except Grade A pasteurized.

The section on definitions of the Salt Lake City, Utah, ordinance now defines: Milk fat or butterfat, cream, half-and-half, skim milk, modified skim milk, nonfat milk, modified nonfat milk, modified skim milk or modified nonfat (Vitamin A-2,000 USP units per quart, Vitamin D-400 USP units per quart), milk or skim milk beverage, buttermilk, cultured buttermilk, yogurt, and milk products. Permits are now required to operate pasteurizers. Cooling requirements are now 70°F or less, provided milk is delivered within 2 hours after completion of milking and 55°F or lower if not delivered within 2 hours. The section on fees has been revised to establish inspection fees and methods of collecting them, and reciprocal inspection with the state or local health departments is provided for plants located more than 20 miles from the corporate limits of Salt Lake City.

Wyoming legislature has made a provision whereby the city dairy inspection programs will be the same as the rules, regulations, and laws of the Wyoming Department of Agriculture.

★ ★ ★

Milk Ordinance and Code Recommended by the U. S. Public Health Service

Changed to:

MILK ORDINANCE AND CODE, 1952 RECOMMENDATIONS OF THE PUBLIC HEALTH SERVICE

The most significant changes are:

1. The 1952 edition is a compulsory pasteurization ordinance; however, for the benefit of those communities which still find it necessary to permit the sale of raw milk, there is presented at the end of the ordinance proper a list of changes to be made if the sale of "Grade A Raw Milk" is to be permitted under Section 8.

2. Both a "degrading" and a "permit suspension" form of the ordinance are presented.

3. The code portion of the 1952 edition has been simplified and clarified by the transfer to appendices of most of the detailed explanatory and instructional material. The code is now limited to material which relates only to "satisfactory compliance."

4. Definitions are included in Section 1 for such milk products as concentrated milk, concentrated milk products, half and half, whipped cream, nonfat milk, skim milk solids, nonfat dry milk solids, dry milk, flavored milk, flavored drink, cultured buttermilk, cultured milk, cottage cheese and creamed cottage cheese. Except for skim milk solids, nonfat dry milk solids and dry milk these products are now subject to grading. However, cottage cheese and creamed cottage cheese may be exempted from grading by those communities not in position to require grading of these products at this time.

5. Reconstituted milk or reconstituted skim may be used in the manufacture of cultured products, such as cultured buttermilk, cultured milk, cottage cheese, and creamed cottage cheese, without the labeling of these products as reconstituted.

6. Milk haulers are defined in Section 1, and are required under Section 3 to obtain permits.

7. Section 2 authorized the sale of ungraded pasteurized milk during an emergency.

8. Section 4 no longer requires that placards showing the grades of milk sold be displayed in restaurants, soda fountains, etc.

9. If adopted locally, a footnote to Section 5, permits official acceptance of industry inspection of producer dairies as a supplement to official inspection, provided such inspections are checked periodically and found satisfactory.

10. Section 6 provides that the results of industry laboratory examinations of raw milk for pasteurization may be accepted, provided such results are checked periodically and found satisfactory.

11. Only plate counts or direct microscopic counts are recognized by Section 6 of the new edition, but by adoption of footnotes the use of reduction tests is authorized. In this connection, the reduction test standards specified in the footnote have been changed somewhat from those contained in the 1939 edition.

12. Section 6 permits the use of a compliance standard of 3 out of 4 samples as an alternate to the logarithmic or arithmetic average methods. Communities wishing to use this method are required to make the necessary changes at the time of adoption by insertion of wording contained in a footnote.

13. Section 10 permits milk served at hospitals and institutions, as well as milk used for mixed milk drinks, to be poured from quart or 2-quart containers packaged at a milk plant.

14. Under Section 11, milk and milk products from distant points may be accepted if the sources rate 90 percent or more, or if the sanitation compliance rating is equal to or above that of the local supply.

Changes have also been made in requirements governing Grade A raw milk for pasteurization and in requirements for Grade A pasteurized milk.

The committee has been advised that this ordinance will not be available for distribution prior to January 1953.

Time has not permitted the committee to prepare comments on the advisability of any of the changes reported. It is recommended that this be done during the coming year. An appendix to this report is available. It gives the reported changes in greater detail. Members of the Association are urged to study the changes set forth in the appendix and to submit their comments to the chairman of this committee. It is also recommended that the Committee continue to report changes in ordinances and regulations. Your cooperation in bringing such changes to the attention of the committee will be appreciated. our Committee thanks the members of the Association for their cooperation in making this report possible.

Respectfully submitted,

C. J. BABCOCK, *Chairman*

H. S. ADAMS — JOHN D. FAULKNER
JOHN ANDREWS — N. O. GUNDERSON
O. A. GHIGGOILE — STEVEN J. WOLF

PURDUE OFFERS FOUR TEN-DAY COURSES IN DAIRY MANUFACTURING

Purdue University is offering an optional plan of short course training in dairy manufactures in 1953.

Four separate and complete ten-day courses are offered during the eight weeks period January 5 to February 27, 1953, as follows:

COURSE	DATE
1. Market Milk	Jan. 5-16
2. Cottage Cheese & Buttermilk	Jan. 19-30
3. Tech. Control of Dairy Products	Feb. 2-13
4. Ice Cream & Sherberts	Feb. 16-27

The students may come to Purdue for any one of the four ten-day courses. They may also enroll for any combination of the courses offered. Thus, the prospective short course student can decide upon a minimum of ten days for one course up to a maximum of forty days for four courses.

Many dairy plant operators need the specific training offered in these courses. Those who cannot leave their job for an extended one or more of the short courses offered.

Students who successfully complete the entire Dairy Manufacturers Program from January 5 to February 27 will receive a certificate.

The registration fee for each of the four dairy manufactures short course will be $3, including a medical fee of fifty cents. There will be an additional charge of $12.50 for each course for out-of-state students.

For further information regarding the above courses, write to Professor H. W. Gregory, Head of Dairy Department, Purdue University, West Lafayette, Indiana.

NEW DEVELOPMENTS IN LABORATORY METHODS *

REPORT OF THE APPLIED LABORATORY METHODS COMMITTEE

YOUR COMMITTEE again has reviewed progress made or studies under way during the past year in various phases of laboratory methods that should be of interest to milk or food sanitarians.

STANDARD METHODS FOR THE EXAMINATION OF DAIRY PRODUCTS

The manuscript for the 10th edition of Standard Methods is now being reviewed, and it is anticipated this will be published during 1953. A summary of the changes included in the 10th edition, prepared by members of the Joint Editorial Committee[1] appears in the September *American Journal of Public Health.* The directions for sampling milk and cream have been revised and will include directions for sampling from large portable or stationary tanks or vats. Material has been included on the detection of bacterial growth inhibitors including chemicals and antibiotics. Milk-free plating media will become standard for the agar plate count. For the Direct Microscopic Count directions will be given for use of a mechanical transfer syringe equal in accuracy to the present 0.01 ml pipette, and the use of delineated round sq. cm. areas will be encouraged. Procedures for the determination of thermoduric bacteria have been clarified. Those interested are referred to the *American Journal of Public Health* for a record of the proposed changes.

BACTERIAL PLATE COUNTS

In last year's Committee report reference was made to a manuscript reporting the results of an APHA comparative study of six plating media. This was published by Pessin and Robertson[2] in the May-June 1952 *Journal of Milk and Food Technology.* As indicated therein "Plans are to make additional comparisons using modified formulas of the two milk-free plating media, the objective being first to obtain on each, essentially identical productivities with that obtained on the currently approved media and then to recommend at the proper time their substitution for the two milk-containing media identified above."

The studies referred to one milk-free plating media are scheduled to be reported by Leon Buchbinder[3] at the 80th Annual Meeting of the APHA in Cleveland, Ohio.

At the 79th Annual Meeting of the APHA, L. A. Black[4] reported on "Determining the pH of Culture Media." This report discussed errors in pH readings partially due to failure to adjust the pH meter each time with suitable buffers at the temperatures of use, some possibly due to dilution in various proportions with distilled waters of unknown pH, and some obviously due to inaccuracies in the temperature compensator of some pH meters. The wide variations of pH determinations of the laboratories cooperating in the study of plating agars sponsored by the APHA in 1950[2], ranging up to 0.9 pH, has emphasized the need to standardize procedures for pH determination of plating agar, particularly where the theoretically more accurate electrometric methods are used. Accordingly the 10th edition of Standard Methods will include directions for standardizing this procedure.

DIRECT MICROSCOPIC EXAMINATION

Our Committee report last year made reference to an APHA comparative study then under way of six staining procedures. The results of this study have been subjected to a statistical analysis which is also scheduled for presentation at the annual meeting of the APHA by Nathan Mantel[5]. It is proposed[1] that three staining procedures which gave maximum counts replace in the 10th edition of Standard Methods those staining procedures now in the current edition.

A sequential procedure for grading milk by microscopic count[6] was published in the *Journal of Milk and Food Technology,* January-February 1952. This publication gave tables developed for three grades of raw milk which would permit decisions to accept or reject milk or to continue the examination as each microscopic field is counted. Where numerical reporting of counts is not required and grading limits per milliliter are 100,000, 200,000, 300,000 or 400,000, it is understood that the next edition of Standard Methods will permit the optional use of the sequential analysis procedure for assigning samples to grades.

The Smith 0.01 ml syringe which has been used exclusively by the California Department of Agricultural since January 1949 was described in the May-June 1952 *Journal of Milk and Food Technology*[7]. The use of such a transfer syringe will be encouraged in the next edition of Standard Methods.

A discussion of variations in direct microscopic counts as related to techniques of sampling and laboratory examination by L. A. Black and R. P. Myers[8] is scheduled for presentation at the Twenty-Ninth Annual Conference of the New York State Association of Milk Sanitarians.

DYE REDUCTION TESTS

A very thorough study of the resazurin test has been carried out in Denmark by Hemplar[8], who confirms previous reports that the "one hour" test is of limited value. The reduction to pink correlated very closely with methylene blue reduction. The "triple reading" test was found to be the most useful, giving a good idea of the bacteriological quality and at the same time reflect-

*Presented at the 39th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Minneapolis, Minn., Sept. 18-20, 1952.

ing the presence of physiologically or pathologically abnormal secretions. Hempler prefers an endpoint slightly less reduced than the Munsell P 7/4 standard of Johns and Howson.

In Britain, where the dye reduction tests have largely replaced the plate count, even in the control of pasteurized milk and ice cream[10,11], considerable work has been done in determining the correlation between reduction tests and other methods and the keeping quality of milk[12-18]. It has been found that best agreement with keeping quality tests is obtained if the reduction tests are carried out at 18°C, or if samples are stored at 18°C for 18-24 hours before incubating at 37°C. This has been shown[19] to be due to a change in the dominant bacterial flora during incubation at the different temperatures employed.

The value of the resazurin test in the detection of mastitis-infected quarters has also been confirmed by McBride and Golding[20]; the dry vial modification is especially advantageous. A report from Germany[21] states that a new dye, triphenyl tetrazolium chloride, reduces in much less time than resazurin or methylene blue.

ANTIBIOTICS

Last year's Committee report mentioned the work conducted at Cornell on bottled pasteurized milk from all parts of New York State. This work, since published[22,23,24] shows that 7.75% of 1794 samples showed zones of inhibition again of starter organisms, this being some ten times more prevalent in April-May than in July-August. About 6 percent of all samples showed zones of inhibition against *B. subtilis* with the disc assay method, with eleven times as many in the early months as in the summer. Starter activity values and zone diameters were not always in agreement.

Similar studies conducted on herd milks in 1952[25] by a member of our Committee, C. K. Johns, have shown a comparable amount of inhibition of starter organisms, but a much lower percentage of positive results with the disc assay. This may be due to the fact that the disc assay is much more sensitive to penicillin than to aureomycin and dihydrostreptomycin[24] and there is evidence that the former antibiotics are being more widely used in this area.

Claybaugh and Nelson[26] have reviewed the effect of antibiotics in milk, while Schipper and Petersen[27] have described a method of assaying aureomycin in milk by the use of methylene blue. Friedmann and Epstein[28] report that the antibiotic nisin can be assayed in less than 1 hour using *S. cremoris* in milk plus resazurin, with reproducibility and accuracy comparing favorably with other methods requiring 15 to 48 hrs. to complete. Krienke[29] has described the program for control of antibiotics put forward by the American Dairy Science Association.

Johns and Desmarais[30] have extended the work of Johns and Katznelson[31] in studying the effects of residual penicillin on resazurin and methylene blue reduction tests. Again resazurin results were affected to a much smaller extent than methylene blue, due to the shorter incubation period required by the former. Rowlands[32] has also reported that penicillin may increase the reduction time of methylene blue by more than 3 hrs., and the keeping quality up to 18 hrs.

PHOSPHATASE TESTS

The comparative study of field and laboratory procedure for phosphatase referred to in last year's report has been carried out by the American Public Health Association and the Association of Official Agricultural Chemists. Included in this study were improved laboratory method and field method techniques worked out by a member of our Applied Laboratory Methods Committee, Harry Scharer. His death soon thereafter has delayed the publication of articles which he had planned to prepare last summer, but his modified procedures were made available for use in the current comparative study. Plans have been made to publish his techniques together with brief notes which he had communicated in letters. These procedures have been included in the Chapter on Screening Tests in the next edition of Standard Methods.

TIME AND TEMPERATURE EQUIVALENTS

Studies on time and temperature equivalents of pasteurization have been continued during the past year at several universities. Using two heat resistant test organisms, one a Microbacterium and the other the heat resistant Micrococcus MS 102, Speck, Grosche and Lucas[33] at the University of North Carolina have found pasteurization at 175°F for 25 seconds to be equivalent to the present standard of 155°F for 30 minutes for the pasteurization of ice cream mix. Their work also indicates that an exposure of ice cream mix to temperatures from 190-200°F for 1 second would be satisfactory.

At the University of Illinois, Tobias and Tracy[34] have been conducting research on the continuous pasteurization of ice cream mixes. These studies have also made use of the heat resistant Micrococcus MS 102, and their work shows that 175°F for 25 seconds is comparable to 155°F for 30 minutes. Studies were also conducted at temperatures of 160°F for 30 minutes and 177.5°F for 30 seconds. These two pasteurization temperatures were found to be comparable.

A member of this Committee, F. W. Barber, reviewed "Bacteriological Aspects of the Evaluation of Adequacy of Pasteurization" in the November-December 1951 *Journal of Milk and Food Technology*[35].

GERMICIDES

Another member of our Committee, P. R. Elliker, reports that studies by Furlong and himself[36] on an

improved procedure for determination of quaternary ammonium compound in milk and water solutions, have been completed. The milk method is based on extraction of QAC from milk with tetrachloroethane followed by precipitation of QAC with eosin and final titration with standard anionic surface active agent. The new method represents a distinct improvement over previously published procedures. The procedure for extraction of QAC from milk is simple, and once this extraction is carried out, the same procedure as is used for water solutions of QAC can be applied to the tetrachloroethane extract from milk. In determinations on four different QACs in whole milk, recoveries of three compounds were practically 100 percent and the fourth about 70 percent complete. The method will determine about 1 ppm of QAC in milk and can be modified to detect less. It will determine as little as 0.2 ppm of certain QACs in water solution and will detect 0.1 ppm. It also can be used to determine QAC content of detergent sanitizer solutions.

Studies by Soike, Miller and Elliker[37] on the effect of pH on Quaternary Ammonium Compound activity have indicated that the type of organism has a marked effect on variation in QAC action at different pH levels. In general a thermoduric micrococcus, *M. caseolyticus*, showed high resistance to QAC in the range of pH 6 to 7 and was rapidly destroyed at higher levels of pH. *Escherichia coli* appeared to be resistant at levels below pH 6, then became more susceptible at about pH 6 to 7, and exhibited a second peak of high resistance at about pH 8. *Pseudomonas aeruginose* seemed to be most susceptible at low pH levels and showed highest resistance above pH 7. The variations in resistance of different organisms in general were similar for the four QACs studied. The results indicated that the marked variation in effect of pH was due to some factor or factors associated with the bacterial cell rather than to specific effect of pH on activity of the QAC molecule.

Publications on other germicides include "A Final Report on Germicidal Rinse in Dishwashing," by Fair and Chang[38], which reports work on Chloromelamine done under contract with The Quartermaster General, U. S. Army.

The Subcommittee on Food Supply of the Committee on Sanitary Engineering and Environment of the National Research Council published a report entitled "A Germicidal Rinse Compound for Field Use of the Armed Forces.[39]" This report recommended military characteristics of a germicidal rinse compound for washing vegetables and rinsing mess kits based on use of a halogen compound or compounds. This report reviewed work on chloromelamine, chlorinated hydantoin, and compounds containing elemental iodine.

In an appendix to this report Morse and Feder,[40] of the Army Medical Service Graduate School, modified the Weber and Black testing procedure in a standardized method for the determination of the bactericidal activity of germicidal compounds containing halogens for use under specific conditions peculiar to the Armed services.

A final report on Bactericidal, Chemical, and Physical Properties of Chloromelamine Formula 96P has recently been prepared by the Public Health Service[41].

In a report on Iodine as a Sanitizing Agent for Food and Eating Utensils[42], it was reported that "Solutions of free iodine of sufficient strength to be used safely in food utensil sanitization were observed to range in color from yellow to deep amber, while solutions too dilute to inhibit the growth of the test organism were very pale yellow. This change in color can be used to advantage by the layman in judging whether solutions of free iodine still possess their sanitizing strength."

A general discussion of iodine as a germicide presented at the Chemical Specialties Manufacturers Association, December 4, 1951, by Terry and Shelanski, has since been published in *Modern Sanitation.*[43] This paper indicated that by dissolving iodine in a specific-nonionic, many of its disadvantages of high toxicity, skin irritation, and skin staining effects have been overcome. Laboratory and field tests of such iodine compounds either as such or combined with detergents have indicated their effectiveness in sanitizing dairy equipment.

At the 38th Midyear Meeting of the Chemical Specialties Manufacturers Association, June 9, 1952, a panel discussion was held on "Germicide Evaluation — What Test Method?" The proceedings of this 38th Midyear Meeting are scheduled for publication early in September 1952.[44]

As a part of its program of providing Standard Methods for various laboratory procedures pertaining to public health, the American Public Health Association has appointed a Subcommittee on Antimicrobial Agents (Disinfectants) to review and properly set up standard methods for the evaluation of antiseptics and disinfectants. Invitations have been extended to various Associations to attend a conference to be held next month at the time of the annual meeting of the APHA. Two members of your Committee on Applied Laboratory Methods (L. A. Black and C. K. Johns) are members of the APHA Subcommitte on Antimicrobial Agents.

NATIONAL RESEARCH COUNCIL PROJECT

In our report last year a brief description was given of the lab- of the National Research Council study on "Milk Quality and Milk oratory tests being made as a part

Regulations." It is understood tha. a final report of this Committee on Milk Production, Distribution, and Quality, entitled "Sanitary Milk Control and Its Relationship to the Quality of Milk" is scheduled for publication late in 1952.[45]

INTERSTATE MILK SHIPMENT AND LABORATORY APPROVAL

A third conference on interstate milk shipment was held at St. Louis in June 1952. With reference to laboratory procedures, the following were approved by the Conference.

"Samples of milk, which is picked up from farm tanks by tank truck, may be collected by industry personnel if such personnel is officially designated for this purpose by the supervising agency. A nontransferable permit should be issued by the supervising agency if the existing state regulations do not provide for the collection of milk samples for bacteriological analysis by persons licensed as milk and cream testers.

"Similar acceptance of industry sampling is recommended for tank truck and tank car interstate shipment of Grade A raw milk for pasteurization.

"Inquiries were made at both the 1951 and 1952 conferences relative to tests for the detection of (1) reconstituted milk; (2) flashing milk; (3) antibiotics; and (4) quaternaries. Methods for the detection of reconstituted milk presumably are being worked out by the A.O.A.C. Referee for reconstituted milk. Experimental work has been carried out, but not published, on detection of admixtures of raw and heated milks; results indicate the tests will be satisfactory. Tests for antibiotics and quaternaries will be included in the next edition of the Standard Methods. Requirements for precautions in collecting samples of tank truck milk also will be outlined in the next edition of Standard Methods. Information of such tests and requirements may be obtained from the Federal Security Agency, Environmental Health Center, Cincinnati 2, Ohio. It is recommended that the sanitarian and laboratory worker be alert to the possibility of heat treated or chemically treated milk and that they undertake appropriate tests as needed.

L. A. BLACK, *Chairman*

REFERENCES

1. Proposed Changes for the Tenth Edition. Standard Methods for the Examination of Dairy Products. *Amer. J. Public Health,* **42**, 1131 (1952). **42**, 1131 (1952).

2. Pessin, Vivian and Robertson, A. H. Observations on the Colony Productivity of Six Milk Plating Media. *J. Milk and Food Tech.*, **15**, 104 (1952).

3. Buchbinder, Leon. Critical Studies on Milk-Free Plating Media. (Presented at 80th Annual Meeting of the APHA in Cleveland, Ohio, October 1952).

4. Black, L. A. Determining the pH of Culture Media. Presented at Joint Session of Laboratory Section and Coordinating Committee on Laboratory Methods, 79th Annual Meeting of the APHA, San Francisco, California, November 1, 1951.

5. Mantel, Nathan. A Comparison of Six Stains for the Direct Microscopic Method of Determining the Bacterial Count of Milk. (Presented at 80th Annual Meeting of the APHA, Cleveland, Ohio, October 1952).

6. Morgan, M. E., *et al.* An Improved Procedure for Microscopic Grading of Milk Intended for Pasteurization. *J. Milk and Food Tech.*, **15**, 3 (1952).

7. Newman, R. W. The Smith 0.01-ml Syringe in the Microscopic Grading of Milk. *Ibid.* **15**, 101 (1952).

8. Black, L. A. and Myers, R. P. Some Causes of Variation in Direct Microscopic Counts. (Presented at 29th Annual Conference of New York State Association of Milk Sanitarians, New York, N. Y., October 1, 1952.)

9. Hempler, P. Resazurin as Indicator in Reduction Tests of Milk. A/S Carl Fr. Mortensen, Kobenhavn, 1950.

10. Chetham, A. W. G. Ice Cream and the Methylene Blue Test. *Dairy Ind.* 16(5) 464-5, (1951).

11. *Statutory Rules & Orders, No. 10,* H. M. Stationary Office, London, 1946.

12. Clegg, L. F. L. Temperature Compensated Tests for Raw Milk Suppliers. *Proc. Soc. Appl. Bact.* 69 (1949).

13. *Ibid,* 79, (1949)

14. Clegg, *et al. Ibid.* Temperature Compensated Tests for Raw Milk Supplies.. 87 (1949).

15. Eddison, R. T., *et al.* Keeping Quality of Raw Milk Grading. II. The Effect of Storage on the Results of Keeping Quality & Dye Tests. *J. Dairy Res.* **18** 43, (1951).

16. Provan, A. L. and Rowlands, A. The Development of Dye Reduction Tests for Pasteurized Milk. *Proc. 12th Int. Dairy Congress,* Vol. **2**, 586 (1949).

17. Rowlands, A., *et al.* Keeping Quality & Raw Milk Grading. Dye Tests As Measures of the Keeping Quality of Milk. *J. Dairy Res.* **17**, 159 (1950).

18. ..... and Hosking, Z. Keeping Quality & Raw-Milk Grading. III. Comparison of Keeping Quality Tests & Dye Test in Milk Control. *J. Dairy Res.* **18**, 166 (1951).

19. Garvie, E. I. and Rowlands, A. The Role of Micro-organisms in Dye-Reduction and Keeping Quality Tests. *J. Dairy Res.*, **19**, 133, (1952) .

20. McBride, C. A. and Golding, N. S. A Study of Resazurin Reduction in Freshly Drawn Mastitic-like Milk. *J. Milk and Food Tech.*, **14**, 27, (1951).

21. Schonberg, F. Usefulness of Tet razolium Salts for the Reductase Test in Milk. *Lebensmitteltierarzt.* **2**, 52 (1951).

22. Henningson, R. W., Silverman, G. J. and Kosikowsky, F. V. Antibiotics in the Fluid Milk of New York State. 25th *Ann. Report. N. Y. State Assoc. Milk Sanit.*, 15, (1951).

23. Kosikowsky, F. V., Henningson, R. W. and Silverman, G. J. The Incidence of Antibiotics, Sulfa Drugs & QACs in the Fluid Milk Supply of New York State. *J. Dairy Sci.*, **35**, 533 (1952).

24. Silverman, F. V. and Kosikowsky, F. V. Systematic Testing of Inhibitory Substances in Milk. *J. Milk and Food Tech.*, **15**, 120 (1952).

25. Johns, C. K. (Unpublished results, 1952.)

26. Claybaugh, G. A. and Nelson, F. E. The Effect of Antibiotics in Milk: A Review. *J. Milk and Food Tech.*, **14**, 155, (1951).

27. Schipper, I. A. and Petersen, W. E. Assay of Aureomycin in Milk by Use of Methylene Blue. *Vet. Med.* **46**, 222 (1951).

28. Friedmann, Rose and Epstein, C. J. The Assay of the Antibiotic Nisin by Means of a Reduction (Resazurin) Test. *J. Gen. Microbiol.*, **5**, 830, (1951).

29. Krienke, W. A. ADSA Program for Control of Antibiotics in Milk. *Can. Dairy Ice Cream J.* **30** (10) 44, (1951).

30. Johns, C. K. and Desmarais, J. G. (In press.)

31. Johns, C. K. and Katznelson, H. J. Penicillin and Dye Reduction Tests for Milk Quality. *J. Milk and Food Tech.*, **12**, 133, (1949).

32. Rowlands, A. The Effect of Penicillin on the Methylene Blue Reduction Time and Keeping Quality of Milk. *Proc. Soc. Applied Bact.* 14 (1) 7, (1951).

33. Speck, M. L., Grosche, C. A. and Lucas, H. L. (Personal communication.)

34. Tobias, J. and Tracy, P. H. Continuous Pasteurization of Ice Cream Mixes. *Ice Cream Trade J.*, **48**, 9 116-118, September 1952.

3. Barber, F. W. Bacteriological Aspects of the Evaluation of Adequacy of Pasteurization. *J. Milk and Food Tech.*, **14**, 170-172 (1951).

36. Furlong, T. E. and Elliker, P. R. An Improved Method of Determining Concentration of Quaternary Ammonium Compounds in Water Solutions and In Milk. 1952. (In press.)

37. Soike, K. F., Miller, D. D. and Elliker, P. R. Effect of pH of Solution on Germicidal Activity of Quaternary Ammonium Compounds. *J. Dairy Sci.*, **35**, 9, 764-771, (1952).

38. Fair, G. M. and Chang, S. L. A Final Report on Germicidal Rinse in Dishwashing *Under Contract* DA-44 -109-qm-193, *The Quartermaster General, U. S. Army.* Harvard University, September 1951.

39. A Germicidal Rinse Compound for Field Use of the Armed Forces. *A report to the Subcommittee on Food Supply of the Committee on Sanitary Engineering and Environment, National Research Council,* 10 January 1952.

40. A Standardized Method for the Determination of Bactercidal Activity of Germicidal Compounds Containing Halogens. *Appendix to the above report by Morse, Maj. W. C., MFC and Feder, June C., Department of Bacteriology, Army Medical Service Graduate School Walter Reed Army Medical Center,* Washington, D. C.

41. *Final Report on Chloromelamine Formula 96P — Bactericidal, Chemical and Physical Properties.* Research and Development Branch, Environmental Health Center, Public Health Service, Cincinnati, Ohio, July 1952, for USAF-Air Materiel Command.

42. Gershenfeld, Louis and Witlin, Bernard. Iodine as a Sanitizing Agent for Food and Eating Utensils. *Amer. J. of Pharmacy,* **123**, 87-99, (1951).

43. Terry, D. H. and Shelanski, H. A. Iodine As A Germicide. *Modern Sanitation,* **4**, 1 & 2, page 61, January 1952 and February 1952.

44. Germicide Evaluation — What Test Method? Panel Discussion, Disinfectant and Sanitizers Division, 38th Midyear Meeting, Chemical Specialties Manufacturers Association, Boston, Mass., June 9, 1952. *Proc. 38th Midyear Meeting. C.S.M.A.,* September 1952.

45. Dahlberg, A. C., Adams, H. S. and Held, M. E., (Committee on Milk Production, Distribution and Quality, National Research Council.) Final report on Sanitary Milk Control and Its Relationship to the Quality of Milk, scheduled for publication late in 1952.

Franklin W. Barber

P. R. Elliker

C. K. Johns

W. K. Moseley

Joseph N. Murphy, Jr.

Luther A. Black, Chairman

HOWARD M. WEINDEL

Howard M. Weindel was born August 4, 1913 in Manhattan, Kansas. He passed away in Lawrence, Kansas, on September 27, 1952, where he had gone for an operation ten days before to relieve a lingering illness.

Mr. Weindel was graduated from the University of Kansas in 1936. His major course was bacteriology. After graduation he was quality control man for a year in a local dairy. In 1937 he became Social Case Worker with the Douglas County Welfare Administration. He remained in this position until 1941 at which time he became City Sanitarian for the City of Lawrence, Kansas. In 1942 he was advanced to County Sanitarian for the Kansas State Health Department.

In the fall of 1949 he moved to Denver, Colorado, where he became Training Officer for the Training Branch of the Communicable Disease Center, U.S.P.H.S. In October 1951 he was advanced to Training Officer in Charge of the Rocky Mountain Training Center.

Mr. Weindel was Secretary-Treasurer of the Kansas Association of Milk Sanitarians for five years. He was elected Secretary-Treasurer of the newly formed Rocky Mountain Association of Milk and Food Sanitarians. He was a member of the 1952 Committee on Recognition and Awards for the International Association of Milk and Food Sanitarians.

Mr. Weindel is survived by his wife, Edna, and two small daughters, Jewel and Constance. His family will continue to live in Denver.

Public Health and Sanitation has suffered a severe loss in the death of Howard M. Weindel. He was particularly adept in teaching young sanitarians and inspiring them in their work. His knowledge of the profession and his ability to impart that knowledge made his counsel highly regarded. His circle of friends was large. His dealth leaves a void which will be difficult to fill.

3A SANITARY STANDARDS FOR INTERNAL RETURN TUBULAR HEAT EXCHANGERS FOR USE WITH MILK AND MILK PRODUCTS

Formulated By

INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.
UNITED STATES PUBLIC HEALTH SERVICE
THE DAIRY INDUSTRY COMMITTEE

Approved April 29, 1952

It is the purpose of IAMFS, USPHS, and DIC in connection with the development of the 3A Sanitary Standards program, to allow and encourage full freedom for inventive genius or new developments. Internal Return Tubular Heat Exchanger specifications which are developed and which so differ in design, material, construction, or otherwise, so as not to conform with the following standards, but which in the opinion of the manufacturer or fabricator or equivalent or better, may be submitted at any time for consideration of IAMFS, USPHS, and DIC.

3A SANITARY STANDARDS FOR INTERNAL RETURN TUBULAR HEAT EXCHANGERS WITHOUT AGITATORS, HAVING 0.902" I.D. OR LARGER TUBES, FOR USE WITH MILK AND MILK PRODUCTS

A. MATERIAL

1. Product contact tubes shall be constructed of stainless steel or nickel. All other exchanger parts having any surface contact with the product shall be constructed of stainless steel, nickel alloy, or equally corrosion resistant material that is non-toxic and non-absorbent.

a. All milk contact surfaces shall be finished to an equivalent of not less than 120 grit finish properly applied.

b. All outside surfaces shall be smooth and easily cleanable.

2. Exteriors of structural parts not in contact with the product shall be of corrosion resistant material with a smooth finish; or shall be rendered corrosion resistant or painted, and shall be so constructed as to be easily cleanable.

B. CONSTRUCTION

1. All milk contact surfaces shall be accessible for cleaning and inspection. All exterior surfaces shall be self-draining.

2. Tubes shall be properly supported to prevent sagging.

3. If legs are used, they shall be smooth with rounded ends and no exposed threads. Legs made of hollow stock shall be sealed. The minimum clearance between lowest part of frame and floor shall be six inches.

a. Bases, when used, shall have smooth exterior surfaces.

b. Bases, which because of size or type cannot be mounted on legs, shall be designed for grouting and sealing.

4. Threads shall not be used in contact with the product.

5. All surfaces in contact with the product shall have rounded and smooth inside corners as large as practical for proper operation and shall be readily accessible for cleaning.

6. The minimum diameter of heat exchange tubing used shall be 0.902" I.D.

C. OPENINGS

1. Product inlet and outlet connections shall conform to 3A Sanitary Fitting Standards.

D. HEADER GASKETS

1. The header design shall be such that single service gaskets or removable rubber type gaskets, which can be easily cleaned, may be used.

2. Header gaskets shall be of a removable sanitary type or of a rubber-like material bonded to the surface so as to be smooth and readily cleanable.

3. Gasket material shall be of a type that is smooth, nontoxic, relatively fat resistant, and non-absorbent.

Approved by:

C. A. Abele, Chairman - CSP of IAMFS

J. D. Faulkner, Chief - MF-USPHS

E. H. Parfitt, Chairman - SSC-DIC

H. S. Fielder, Chairman - Tech. Committee DISA

MILK and FOOD SANITATION

"INHIBITION" OF STREPTOCOCCUS LACTIS BY A QUATERNARY AMMONIUM COMPOUND IN CHEESE MILKS

JANET C. CURRY AND FRANKLIN W. BARBER

National Dairy Research Laboratories, Inc.
Oakdale, Long Island, New York

The inhibition of lactic acid bacteria by quaternary ammonium compounds in milk has been shown to be an effect on acid production and not upon growth. Lactic acid production is affected by concentrations of 2.5 - 10 ppm, while growth is not affected unless the concentration is 25 - 50 ppm.

INTRODUCTION

EVER SINCE Domagh's (1935) description of the germicidal activity of dodecyldimethylbenzylammonium chloride, quaternary ammonium compounds have been studied extensively and used throughout industry as germicidal agents. The dairy industry also has been interested in the use of such compounds for the sanitization of dairy farm and plant equipment. Although improvement in milk quality has been shown (Barber 1949; Elliker, 1949) in areas where these compounds have been used as sanitizing agents, there has been doubt in the minds of many dairy men as to the possible adverse effects of residual sanitizer in the milk on lactic organisms used in the manufacture of cheese and fermented milks. Very little has been reported on the effect of quaternary ammonium compounds on lactic acid bacteria.

Early work reported by this laboratory (Barber, Hodes, and Dunne, 1949) showed a definite inhibitory effect on lactic acid production by concentrations of quaternary as low as 3 ppm. More significant decreases in lactic acid were noted with 5-10 ppm; 25-50 ppm showed marked decreases and 100-200 ppm completely inhibited the cultures.

Further work on this problem indicated that low concentrations of the quaternary did not destroy that organism but had an inhibitory effect on acid production. The purpose of this paper is to report these findings.

EXPERIMENTAL

A modification of the oval-tube technique (Barber and Harris, 1948) was developed for the determination of concentrations of detergent-sanitizer needed to kill lactic acid bacteria. Increasing concentrations of detergent-sanitizer were added to the test solution tubes containing sterile distilled water or sterile reconstituted whole milk. Yeast extract "N-Z-Case" agar (YENZ)* was used as the culture medium and incubation was at 21° C for 48-72 hours.

All stock detergent-sanitizer solutions were prepared at ten times the desired concentration so that a final series of 0-8 ppm of the quaternary was obtained by the addition of 1 ml of stock solution to 9 ml of diluent. In milk, the series included the effect of 0-50 ppm and 100-1000 ppm.

Viable cell counts and the development of acid in the presence of increasing concentrations of quaternary were studied in the following manner:

(1) Screw-cap bottles, containing 180 ml of sterile reconstituted whole milk and 20 ml of the appropriate detergent-sanitizer stock solution or sterile distilled water resulting in concentrations of 0, 2.5, 10, 25, and 50 ppm quaternary, were tempered to 30°C.

(2) At "0" time these bottles were inoculated with 2 ml (1 percent inoculum, of an 18-hour milk culture of *Streptococcus lactis* (SL_2). Stock cultures in sterile reconstituted skim milk were transferred weekly and the tertiary transfer from this stock was used as the test culture.

The 1 percent inoculum was also compared to 2 and 3 percent inocula to determine any changes brought about by increased numbers. The results showed no appreciable differences on the over-all effect, so a 1 percent inoculum was used for the majority of experiments.

*Yeast extract 1 gm. KH_2PO_4 0.1 gm.
"N-Z-Case" 0.5 gm. Agar 1.5 gm.
Glucose 0.5 gm. Dist.water 100 ml.
K_2HPO_4 0.1 gm. pH 7.0

Miss Janet C. Curry obtained her A.B. degree in biology from Middlebury College, Middlebury, Vermont in June 1949. Since that time, she has been employed in the Division of Microbiology of National Dairy Research Laboratories, where she is now an assistant scientist acting as group leader for bacteriological problems. She has specialized in research on the bactericidal activity of sanitizing agents.

(3) Immediately after inoculation, and at hourly intervals for 15 hours, samples were taken for oval-tube counts, direct microscopic counts and acidity measurements. Regular plating methods were not used throughout the experiments due to the greater ease afforded by using 0.01 and 0.001 ml loops and sampling into oval tubes even though counts made in this manner were uniformly higher than standard plate counts. Acidity was determined by titration with N/10 NaOH and phenolphthalein and expressed as percent lactic acid.

RESULTS AND DISCUSSION

Sensitivity in distilled water.

The modified oval-tube technique was utilized for the determination of the time required for increasing amounts of quaternary ammonium compounds in distilled water to kill 99.9 percent of the test culture.

Both broth and slant cultures of *Streptococcus lactis* were studied, but the latter were used for a majority of the runs to eliminate any interference of quaternary action by the organic matter of the broth itself. By transferring 0.2 ml of a broth culture to, and spreading over the surface of a slant, sufficient surface growth developed in 24 hours to give a satisfactory cell suspension. Two washings, totaling 5 ml of sterile distilled water, were used to wash the growth from the slant. The resulting suspension was treated in the same manner as outlined in the oval-tube technique.

Control tubes were taken from dilutions of the culture to determine the count at "0" time and thus a 99.9 destruction end point could be determined in the same manner as when this method was used for testing bactericidal efficiencies.

Several different test organisms were evaluated by the oval-tube technique to obtain the most sensitive, and thus the most satisfactory, culture. Broth cultures of *Streptococcus lactis, Streptococcus cremoris, Leuconostoc citrovorum,* and *Leuconostoc paracitrovorum* were compared. The 3 aroma-formers were included because of a recent report (Lundstedt, 1950) that these starters were more sensitive to the bactericidal activity of quaternaries than the lactic cultures. The poor growth of *S. cremoris* and *L. paracitrovorum* rendered it difficult to obtain satisfactory end points. *L. citrovorum* and *S. lactis* showed good growth but the former proved to be more resistant to the detergent-sanitizer than the latter. One buttermilk culture, containing both lactics and aroma-formers, was compared to *S. lactis,* but the latter proved to be more sensitive, rendering it the better culture for these studies.

One quaternary, alkyldimethylbenzylammonium chloride, and one detergent-sanitizer, containing the aforementioned quaternary, were tested against *S. lactis.* Earlier studies (Barber, Hodes, and Dunne, 1949) with three quaternary ammonium compounds and three detergent-sanitizer formulations had shown this quaternary and detergent-sanitizer to be the most effective bactericidally. The results of the preliminary runs were plotted on a line graph in typical asymptotic curves. The detergent-sanitizer was found to be more uniform in its killing power at the various concentrations, and more effective, than the quaternary alone. Since the detergent-sanitizer would probably occur more often in practical use, and because of its uniformity and efficiency, it was selected as the test compound for further work.

S. lactis is highly sensitive to this detergent-sanitizer in aqueous solutions. Figure 1 shows average end points, effecting 99.9 percent destruction, from 2-8 ppm, ranging from 8 and 1/2 minutes exposure time (2 ppm) to < 1/4 minute,

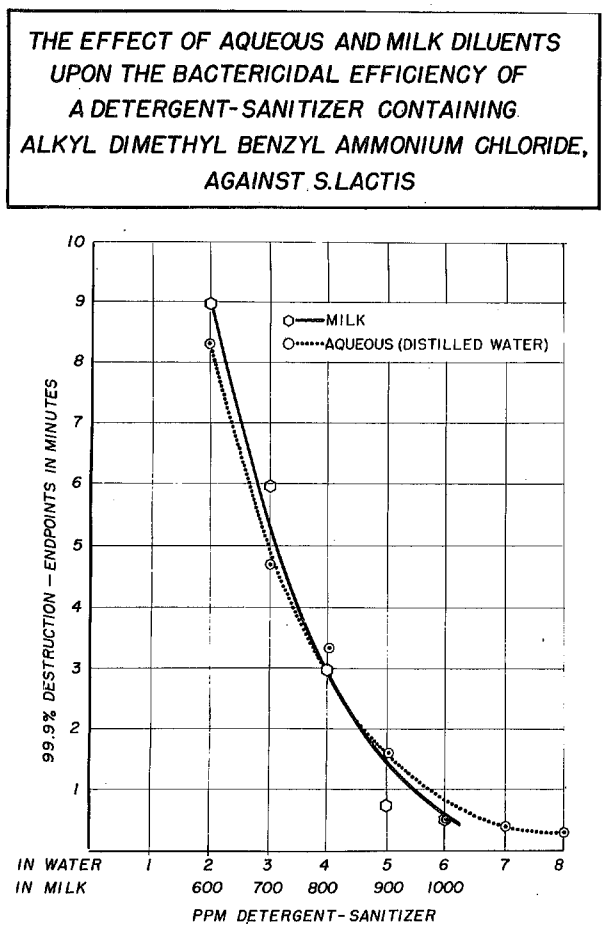


FIGURE 1

(8 ppm). The results for 1 ppm are omitted, since no end point was reached within 30 minutes of exposure.

Sensitivity in milk.

In these studies sterile reconstituted whole milk replaced distilled water as the diluent in the test solutions. The final quaternary concentration series included 100-1000 ppm at 100 ppm invervals. Ten minutes was the maximum exposure time and it was not until the sample contained 600 ppm or more that notable destruction occurred. At these levels the end points were similar to those obtained with the low concentrations needed when distilled water was used as the diluent, thus allowing superimposure of graphic results (figure 1).

This organic interference with a quaternary had been noted by many other investigators (Barber, 1949; Glassman, 1950; Johns, 1950; Kuhn and Bielig, 1940). However, this dramatic difference definitely illustrates the probable linkage or tie-up of the cationic quaternary with something in the milk, rendering the quaternary bactericidally inactive.

The high concentration of quaternary needed to kill *S. lactis* in milk immediately raised a question concerning the apparent "inhibition" of starter cultures in cheese milk which contained concentrations of 5-10 ppm quaternary. This problem involves the question of whether there is an inhibition of the multiplication of the culture or an inhibition of an enzyme system, essential in the production of lactic acid, by increased concentrations of quaternary.

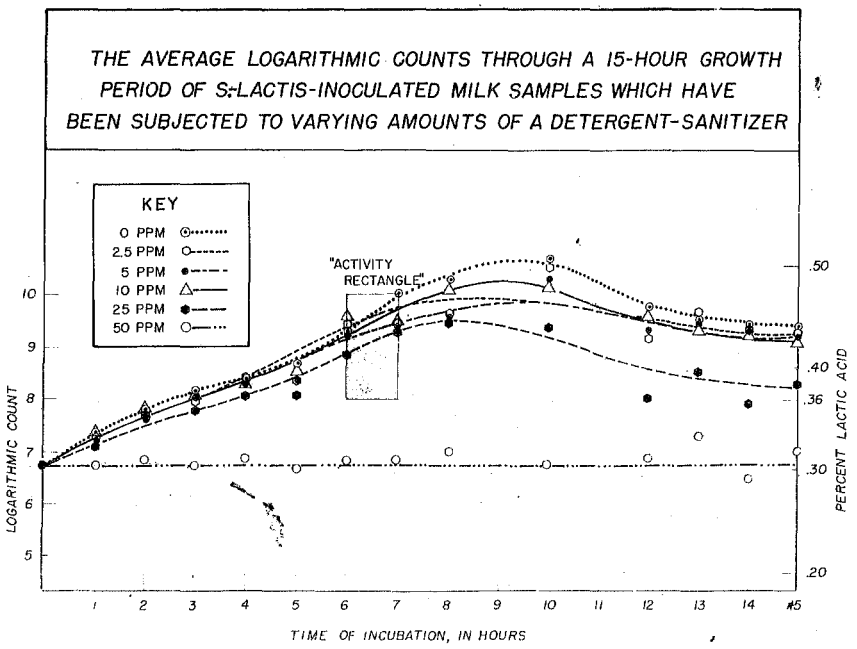


FIGURE 2

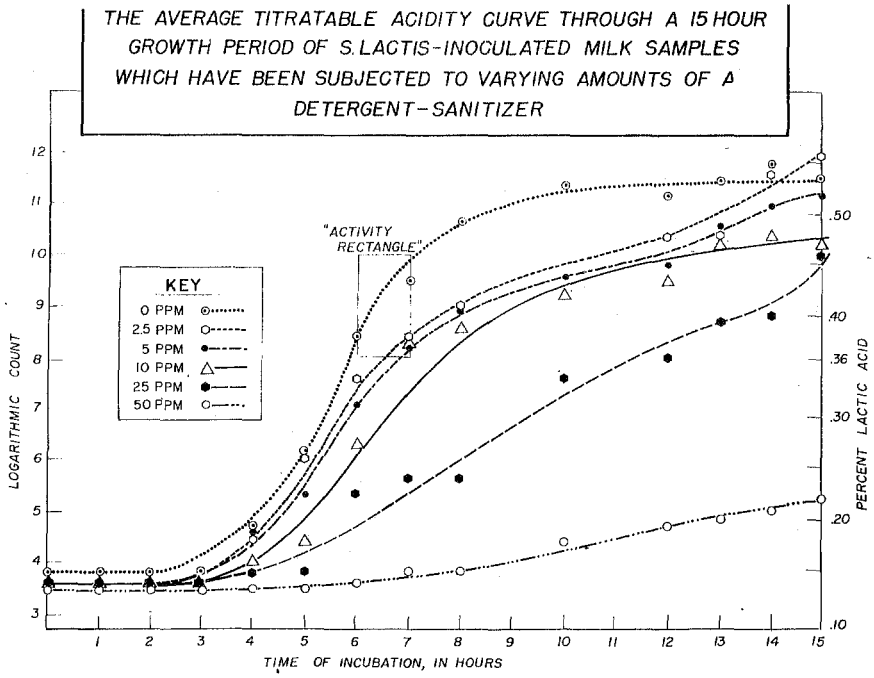


FIGURE 3

The determination of the possible mode of action of a quaternary detergent-sanitizer upon S. lactis in milk.

A comparison of actual counts and titratable acidity was made throughout a 15-hour period of growth in samples containing 0, 2.5, 5, 10, 25, and 50 ppm quaternary. The counts of the samples would indicate any growth inhibition or destruction of the culture. At the same time, the titratable acidity data would indicate any effect on acid-production.

The results summarized in figure 2 show that the oval-tube counts follow each other rather closely for quaternary concentrations up to and including 25 ppm. The curves all pass through the rectangular area designated as the coagulation area, or "activity rectangle". This zone represents the average acidity and count data at the time of coagulation when no quaternary is present in the milk. Contrary to this, the results in figure 3 summarize the titratable acidity values, and much greater differences are detected. Only 2 of the samples, 0 and 2.5 ppm, always fell within the "activity rectangle." Samples containing 5 ppm evidently were on

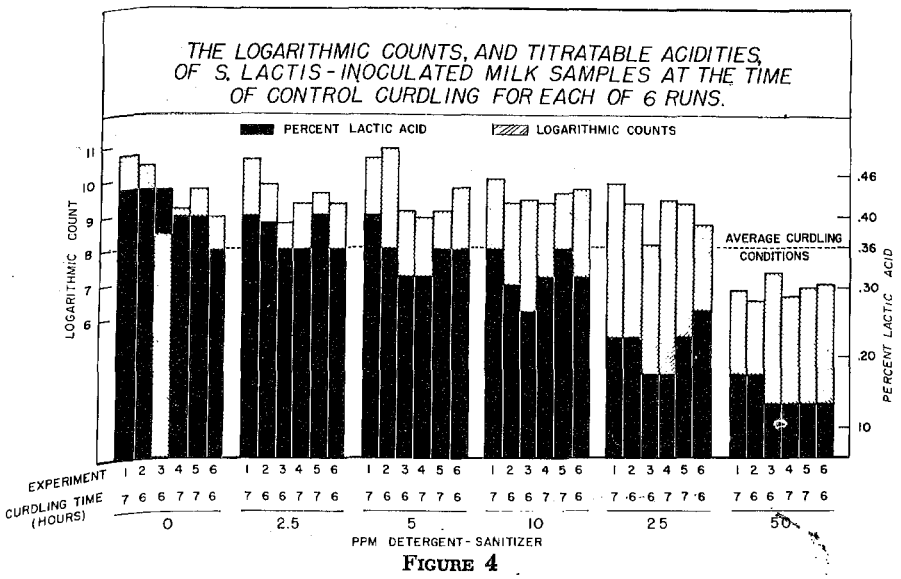


FIGURE 4

the borderline since they did not always fall within this area. The 10 ppm samples coagulated but required a longer incubation time. The 25 ppm samples were much less active and the 50 ppm samples were inactive.

The results within the "activity rectangle" are summarized in figures 4 and 5 which compare the titratable acidities and logarithms of actual counts for each of 6 runs. A definite decrease in titratable acidity is evidenced in this way. The decrease in acid production noted here has been observed by other experimenters and the effect regarded as inhibition of culture (Elliker, 1950, 1951; Rueke, 1950). These results would indicate an interesting phenomenon of metabolic interference, where low concentrations of quaternary (0-25 ppm) do not interfere with the growth and multiplication of the culture but do block an enzyme system essential in the production of lactic acid.

This theory of an enzyme block by low concentrations of quaternary might well explain the observation of Lundstedt (1950) that as little as 1 ppm of quaternary "knocks out" the aroma-forming bacteria needed in cottage cheese and cultured milks. This is especially true in view of the fact that the work reported here indicates the aroma-forming bacteria as being more resistant to the action of quaternary than *S. lactis* when measured by destruction tests.

SUMMARY

These studies have shown that, in aqueous solutions, lactic cultures are destroyed within 10 minutes by concentrations of less than 10 ppm active ingredient of a detergent-sanitizer containing a quaternary ammonium compound. On the other hand, in milk, concentrations greater than 600 ppm are required for the same degree of destruction. The reported inhibition of lactic acid bacteria by concentrations of 2.5-10 ppm quaternary in milk has been shown to be an effect on acid production and not upon growth. An explanation of this action is the possible block of an enzyme system essential in the development of lactic acid by concentrations of the quaternary which are too low to destroy the bacterial cell.

Note: Since this paper was prepared studies conducted by William M. Connors of this laboratory have shown that the lactase enzyme obtained from yeast is extremely sensitive to low concentrations of quaternary ammonium compounds. Lactase activity was completely inhibited by 8 ppm of quaternary while 2.6 ppm resulted in 22 percent inhibition of the enzyme.

REFERENCES

Barber, F. W., Laboratory Evaluation of Cleaner-Sanitizers for Use on Dairy Farms. *J. Milk and Food Tech.*, **12**, 257-266 (1949).

Barber, F. W., and Harris, E. K., The Bacteriological Evaluation of Several Germicides as Determined by the Oval Tube Method. *Bact. Proc.*, **27**, (1948).

Barber, F. W., Hodes, H. P., and Dunne, A. M., The Effect of Quaternary Ammonium Compounds on Lactic Starter Cultures. *Ibid.* 56, (1949).

(Continued on page 299)

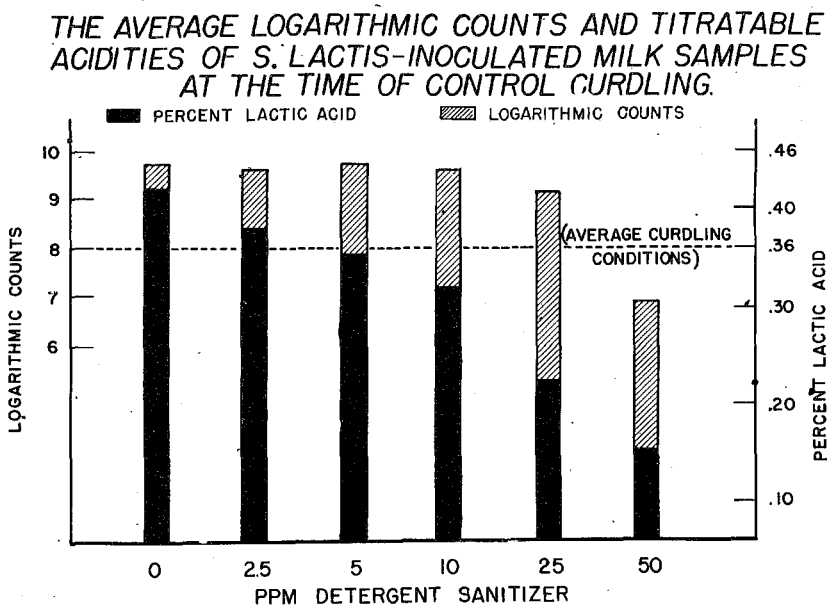


FIGURE 5

THE EFFECT OF TIME AND TEMPERATURE AFTER THE ADDITION OF FOLIN REAGENT IN THE DETERMINATION OF PHOSPHATASE

OMER C. SIEVERDING, B.S.,
Chief, Division of Chemistry and Physics

BARBARA G. LANG, B.S.
Senior Sanitary Chemist, Bureau of Laboratories
Connecticut State Department of Health
Hartford, Connecticut

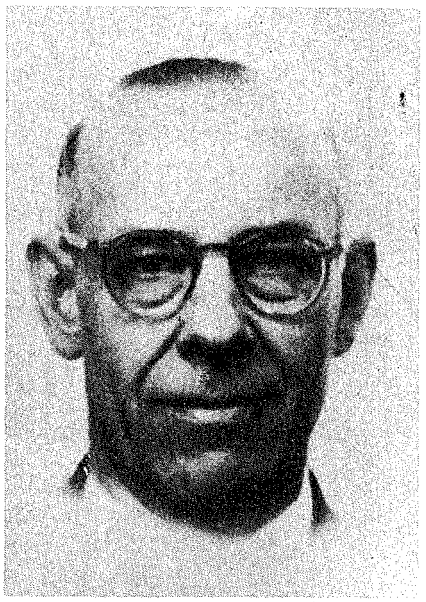
It was noted that during the summer months the phosphatase results on milk samples frequently were higher than normally expected. Those results also tended to be higher when the examinations were performed by temporary summer assistants. Investigations showed that increases in the ambient temperature to which the tubes were exposed following the addition of the Folin-Ciocalteu reagent and before the time the tubes were immersed in boiling water, or an increase in the length of time the tubes were exposed to the elevated temperature, would raise the final readings. Control of the time-temperature exposure at this point eliminated the error.

EACH SAMPLE of pasteurized milk or cream received at the Bureau of Laboratories of the Connecticut State Department of Health is tested by the phosphatase method to determine whether or not it meets the requirements of the State of Connecticut for pasteurization. The number of samples tested daily varies greatly but often exceeds 100 samples per day.

The method used is based upon the Gilcreas-David modification of the Kay-Graham technic also known as the New York State Method. That method is given in paragraphs 11.10 to 11.16, inclusive, in *Standard Methods for the Examination of Dairy Products*, 9th Edition, American Public Health Association. For use in Connecticut, this method has been modified, as follows, to eliminate some of the labor involved when large numbers of samples are examined.

Following the addition of the Folin-Ciocalteau reagent, the samples are centrifuged to produce a clear supernatant liquid and 5 ml of this supernatant are drawn off with a pipette to eliminate the necessity of filtering the sample (first filtration, paragraph 11.14). A second deviation from the Gilcreas-Davis modification is the addition of 2 percent of Calgon* to the 14 percent sodium carbonate solution. The Calgon prevents precipitation of calcium and produces a clear solution which can be read directly on a photoelectric colorimeter without the necessity of the second filtration required by paragraph 11.14. A Klett-Summerson colorimeter employing a blue filter is used to make the final reading. The standard curve, figure 1, for this instrument is prepared from known concentrations of phenol which are carried through the regular phosphatase technic.

*Calgon is a trade name for a sodium meta phosphate sold by Hall Laboratories, Pittsburgh, Pa.



Mr. Omer C. Sieverding was graduated from the University of Iowa in 1928. After graduation he worked for a short time with the City of Milwaukee then transferred to the Connecticut State Department of Health where he has been employed for the past 22 years. He is at present Principal Sanitary Chemist in charge of the Division of Chemistry and Physics in the Bureau of Laboratories of the Connecticut State Department of Health.

This study began when it was noted that routine phosphatase results appeared to be higher than expected during the warm sum-

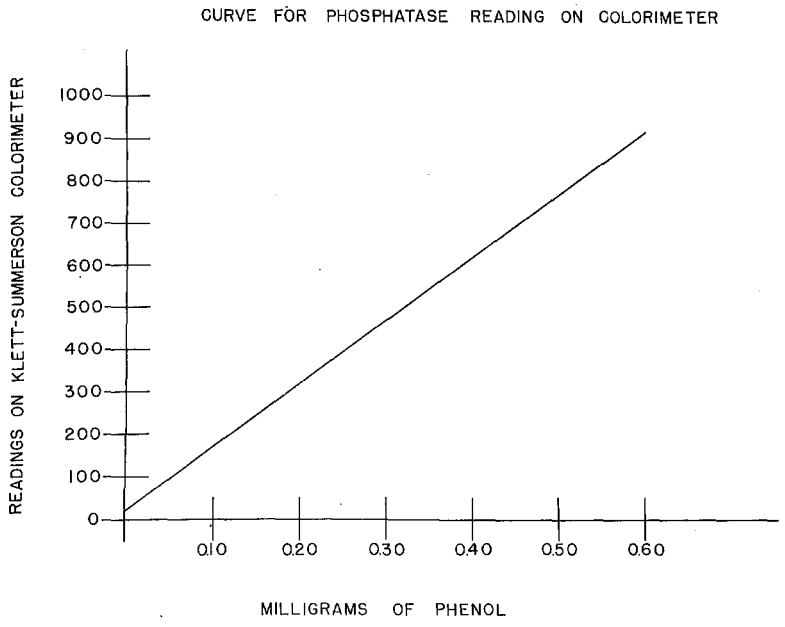


FIGURE 1

mer months. A careful check of reagents and technic failed to disclose any clear-cut reason for these apparently high results. It was noted, however, that the results tended to be higher when the test was made by inexperienced assistants hired for vacation relief even though the technic of the inexperienced workers seemed faultless. After considerable investigation, it became apparent that both temperature and the length of time elapsing between addition of the Folin-Ciocalteu reagent and immersion in boiling water had considerable effect upon the final readings. It was found that an elevation in the ambient temperature or an increase in the length of time the tubes were allowed to stand at summer temperatures would raise the final reading. The inexperienced personnel tended to take longer to complete the test. This resulted in elevated readings due to a longer period of contact between the reagents and the sample following the addition of the Folin reagent.

To ascertain the extent of the effect of temperature and the magnitude of the errors involved, a group of 100 samples were examined in triplicate by the phosphatase procedure. After incubation for 24 hours at 35°C and addition of the Folin-Ciocalteu reagent, one of three portions of each sample was placed in each of three different water baths which were maintained at temperatures of 70°F, 85°F, and 100°F, respectively. The time element was not varied, and covered a 45-minute period between the time of removal of the samples from the 35°C incubator and their immersion in boiling water, as required by paragraph 11.14 of Standard Methods.

If temperature change is not a factor in the magnitude of the readings obtained, the plotted values for all samples using the colorimeter readings at one temperature as abscissa and those at a second temperature as ordinates should fall (with minor deviations) on a straight line at 45° from either axis beginning at the origin. However, if an increase in temperature does produce higher readings, then such a plotting of values obtained at two different temperatures with the high temperature plotted as ordinate should show a significant proportion of values falling above the 45° line.

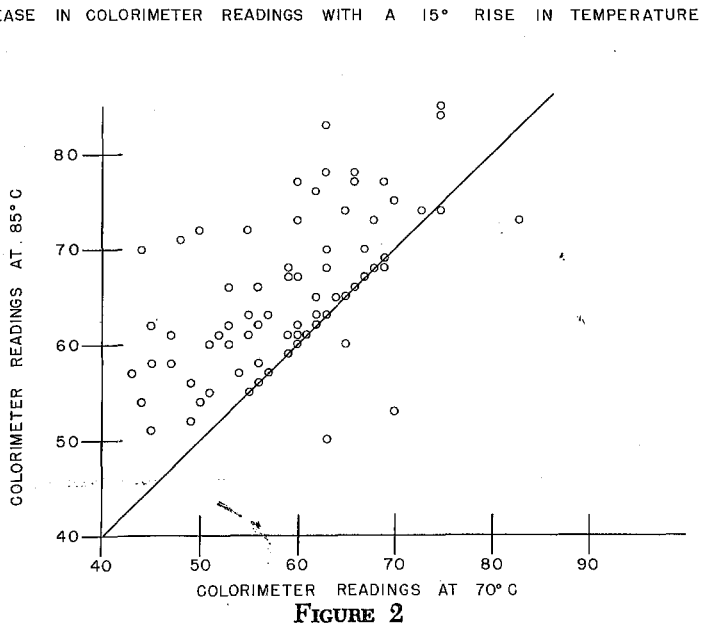


FIGURE 2

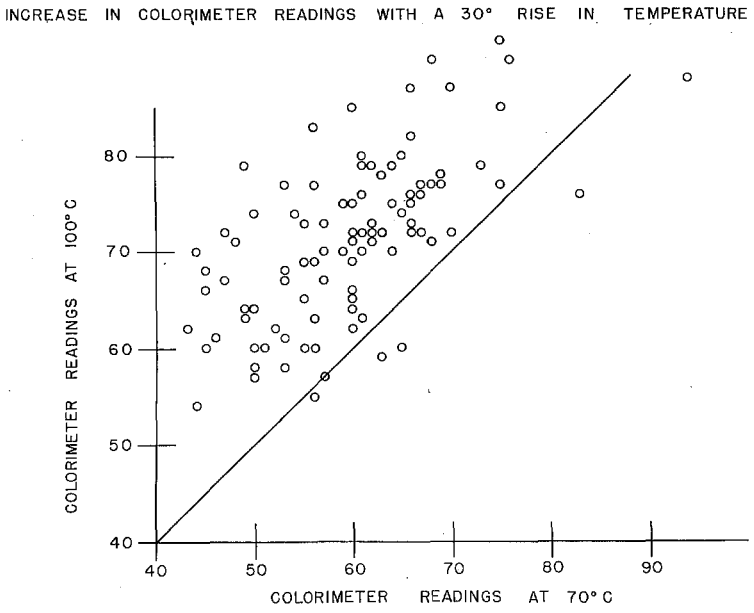


FIGURE 3

Figure 2 shows a comparison between colorimeter readings on the samples held at 70°F and 85°F. Each point on the chart represents one sample, and the distance above the diagonal line indicates the increase in number of colorimeter units with a 15° rise in temperature. It will be noted that this increase varied with the sample and ranged from 0 to 26 colorimetric units which means that the phenol value could be increased by 0.02 to 0.03 mg of phenol with a 15°F-increase in temperature above 70° F. This increase in the colorimetric values continued when the temperature was raised an additional 15°F. The increase in phenol values with an increase in temperature from 70° F to 100°F is shown in figure 3. Figure 4 shows an average increase

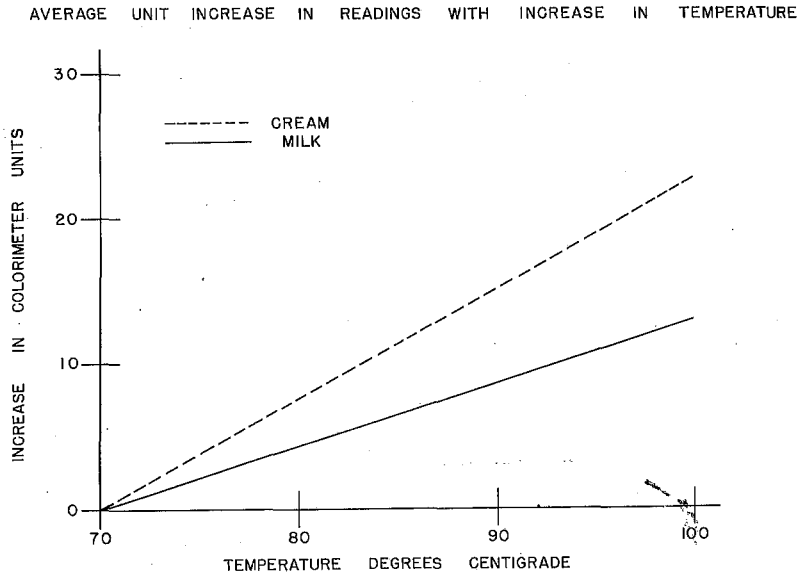


FIGURE 4

in colorimetric units with increase in temperature for milk and for cream.

A second group of 100 samples of milk was examined by the phosphatase test with temperature constant and time varied. Each sample was divided into five portions and each portion was treated as a separate sample. After incubation for 24 hours at 35°C and addition of Folin-Ciocalteu reagent four portions from each sample were placed in a 100°F-water bath — one portion for 30 minutes one for 60 minutes, one for 90 minutes, and one for 120 minutes. A fifth portion was placed in a 70°F-water bath and run in a routine manner as a control. These respective time intervals cover the period between the addition of Folin-Ciocalteu reagent and the immersion in the boiling water bath after the addition of the carbonate solution (paragraph 11.14). The average increase in colorimeter unit readings with the increased time of exposure at a temperature of 100°F is shown in figure 5.

Table 1 divides the colorimeter reading increases into units of ten and indicates the number of samples falling into each grouping for each succeeding 30 minutes of exposure to a temperature of 100°F. It will be noted that 53 percent of the samples increased only from 0 to 10 units during the 30 minutes exposure and only 6 percent showed a 21 unit increase. However, during the 60 minute and 90-minute exposures, the percent of samples falling into the 11 — 20, 21 — 30, and 31 — 40 unit increase groups was progressively greater until all but 12 percent of the samples tested had increased over 21 units after two hours exposure at 100°F or in terms of mg of phenol, had increased from 0.02 to 0.06 mg.

CONCLUSION

High ambient temperatures and prolonged exposure to such tempertures following the addition of Folin-Ciocalteu reagent and prior to placing tubes in boiling water as directed in paragraph 11.14 of the 9th *Edition of Standard Methods for the Examination of Dairy Products* may result in high readings for the Gilcreas-Davis modification of the Kay-Graham phosphatase test. High temperature alone exerts some influence on the test but high temperature is not in itself a source of serious error if the time interval between removing samples from the

(Continued on page 299)

TABLE 1 — CHART SHOWING NUMBER OF SAMPLES FALLING INTO EACH UNIT-INCREASE GROUP FOR EACH SUCCEEDING 30 MINUTES OF EXPOSURE TO A TEMPERATURE OF 100°C.

Time	Increase in units				
in min.	0-10	11-20	21-30	31-40	41-60
30	53	41	5	1	0
60	26	44	22	7	1
90	6	24	40	26	4
120	1	11	30	43	15

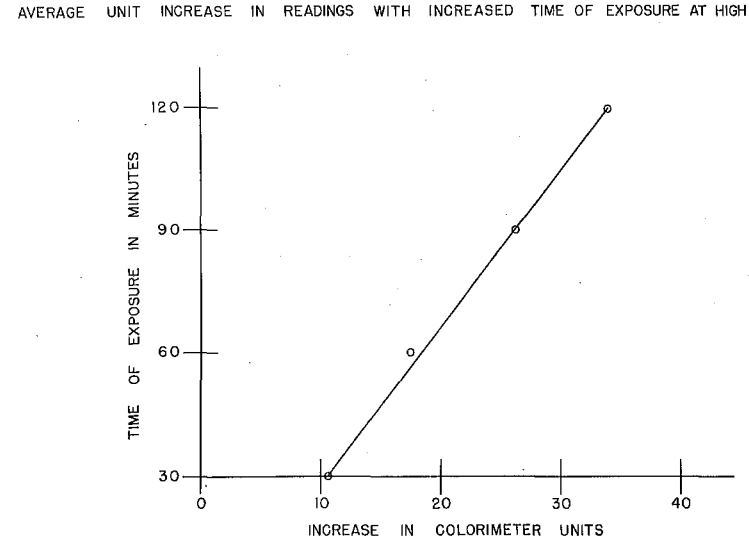


FIGURE 5

ANTIBAC — A NEW TYPE OF CHLORINE SANITIZER*

LESLIE R. BACON AND

ALFRED L. SOTIER

Research and Development Division
Wyandotte Chemicals Corporation, Wyandotte, Mich.

The germicidal performance of Antibac, a newly developed preparation based on the active agent 1,3-dichloro-5, 5-dimethylhydantoin, has been tested by several methods. The activity is of the same order as shown by hypochlorite preparations, and is superior under the adverse conditions of organic loading. Preliminary data are given for the effects of temperature and pH adjustment on performance, and on storage stability and action on metals. Antibac shows great promise for general disinfection and sanitation service, and in view of its combination of high germicidal activity and excellent resistance to depreciation may be used to advantage in fields hitherto dominated by hypochlorites.

INTRODUCTION

CHLORINE-LIBERATING germicides are the most widely used class of sanitizers in the food and beverage, and particularly the food service and dairy industries, and although the quaternary ammonium germicides are finding expanding uses it is probable that the chlorine-liberating products will continue to be the most widely used.

This paper consists mainly of laboratory data comparing the performance of Antibac, a new chlorine type sanitizer, with that of the commercial hypochlorites.

Until very recently, the commercial chlorine liberating germicides have consisted of calcium or sodium hypochlorites, formulated mixtures containing Chloramines T or B, or chlorinated trisodium phosphate. Such products as azochloramide, succinchlorimide, chlorinated hydantoins, and chloromelamines have been suggested, but usually as experimental products, and certainly without wide acceptance.

As sold, the commercial products generally contain alkaline salts, and, in the case of some hypochlorites, even free alkali, so that they yield alkaline solutions. Two practical considerations have dictated this requirement: first, improved storage stability of the product to provide longer shelf life; and second, diminished corrosive activity of the solutions toward metals. Unfortunately, the bacteria-killing potency of chlorine solutions is sacrificed as the pH level is increased. Published reports by Tilley and Chapin,[1] Johns,[2] Rudolph and Levine,[3] and Charlton and Levine,[4] indicate that pH of the sanitizing solution is of utmost importance, and is indeed of greater importance than concentration of available chlorine, providing of course that an adequate minimum of available chlorine for the specific job is present in the solution. This appears to be true irrespective of the form of the parent chlorine compound.

The organic chlorine liberating chemicals, with the exception of the Chloramines T and B, have not met with acceptance for germicidal use for one or more of the following reasons: high cost, slow rate of solution, limited solubility, lack of stability, inadequate sources of supply, and limited knowledge of the characteristics of the compounds.

The complex organic chlorine liberating chemicals, generally speaking, have certain advantages over the inorganic chemicals, in that they release chlorine more slowly, and so provide for a longer solution life, and apparently they are less depreciated germicidally by foreign organic matter.

During World War II, 1,3-dichloro-5,5-dimethylhydantoin received much study, and was furnished to a limited extent to the Armed Services, in the form of a compounded germicidal formulation for the rinsing of mess kits and other utensils, and related services, in the field. The material proved to be successful, but had serious limitations, the chief of which was its slow rate of solution. Following the war, extensive study of 1,3-dichloro-5,5-dimethylhydantoin formulations has led to a completely new preparation known by the trade name of Antibac.

Dr. Leslie R. Bacon received his B. S. in 1924 from the University of New Hampshire, and Ph.D., 1927, New York University. Research Chemist and Chemical Engineer, 1927-31, American Doucil Co., Philadelphia, Pa., (base-exchange water treatment), 1931-39, Philadelphia Quartz Co., Philadelphia, Pa., (soluble silicates and detergents); 1939 —, Research Supervisor, Wyandotte Chemicals Corp. (food industry and household detergents, sanitizing agents and germicides). Member: American Chemical Society, American Public Health Association; INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, Institute of Food Technologists, and others.

*Presented at the 38th Annual Meeting of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., Glenwood Springs, Colorado, September 27, 1951.

ANTIBAC — WHAT IT IS

Antibac is a mixture containing 25 percent of 1,3-dichloro-5,5-dimethlhydantoin, plus neutral inorganic salts, a stable wetting agent and an acidic agent. The product contains 16 percent available chlorine and provides solutions usually within the pH range of 5.8 to 7.0, depending upon the alkalinity of the water supply and the strength of the solution. Distilled water solutions have a slightly lower pH range.

The objectionable solubility characteristics of the chlorinated hydantoin have been overcome by special mechanical processing and improved formulation, making Antibac very quickly and completely soluble even in cold water in concentrations up to about 1,000 ppm of available chlorine.

Antibac is a white, free-flowing powder of low density. The dry storage characteristics are excellent at temperatures up to 120°F, beyond which the formulation loses chlorine slowly. As an active chlorine composition, however, it should not be allowed to mix with sawdust, paper, oils, or similar combustible materials.

Antibac solutions display a moderately strong odor of chlorine, and, like hypochlorites, will bleach colored fabrics. In fact, Antibac solutions are in a number of respects very similar to hypochlorite solutions, and for sanitizing operations are used in exactly the same way. Antibac however appears to be superior to the usual sodium or calcium hypochlorites in that its solutions are far milder on the skin. This, it is felt, can be correctly attributed to the absence of alkaline agents and a resultant pH level of the solutions quite similar to that of the skin, which normally is mildly acid.

It is anticipated that the development of Antibac will fulfill, to a very great extent, a long standing demand by public health authorities for an organic chlorine sanitizing germicidal agent capable of rapid and certain killing action. As such, it should be of the greatest interest to the food handling and servicing industries generally, and to other industries, hospitals, institutions, and individuals charged with public health responsibilities.

EXPERIMENTAL

BASIC GERMICIDAL EVALUATION STUDIES

A. *The Food and Drug Administration Test*

The FDA Test,[5] while not recommended for chlorine type germicides, is still the official germicide test method in the United States. This method was used to evaluate Antibac and a very popular sodium hypochlorite solution, side by side. Table 1 presents the data for this test, showing the 5 and 10 minute exposure results. In this test results were obtained for the two products against *M. pyogenes var. aureus* and *Es. coli* at 20°C.

B. *The Weber and Black (USP HS) Test*

Weber and Black[6] have proposed a test that employs very short exposure periods, neutralization of the germicide after the exposure periods, and finally, plating and counting to determine the number of survivors. Data for the same germicides cited above follow in table 2.

From table 2 it will be seen that even with such short exposure periods as 15 seconds and at very low concentrations of the germicides, Antibac and the sodium hypochlorite have done an excellent job. At 30 ppm available chlorine, the lowest concentration tested, sodium hypochlorite has done slightly better than Antibac. Additional tests run similarly at 60 and 70 ppm gave zero counts without exception for both Antibac and sodium hypochlorites.

C. *Fabric Disc Test*

A third type of test that has been extensively used as one of the government laboratories but which has not been published, consists of impregnating discs of one square inch area of Indian Head sheeting with a 24-hour broth culture of the organism, draining, and introducing three such discs into a medication tube holding 20 ml of the germicidal solution under test, maintained at 25°C. The discs are removed aseptically after 1, 2, and 5 minutes of exposure. An unexposed disc serves as a control. On removal from the medication tube, the discs are placed separately into tubes holding 10 ml of an appropriate neutralizer. After all fabric discs of a series have been exposed to the germicide, the neutralizer tubes and contents are shaken on a shaking machine for 5 minutes, and 1.0 ml volumes of the fluid plated with TGE agar. Plates are counted after 48 hours of incubation. With chlorine-liberating germicides, when used at 200 ppm of available chlorine or less, the neutralizer is sodium thiosulfate, used at 400 ppm concentration. Data obtained by using this test are presented in table 3.

TABLE 1 — FDA TEST OF ANTIBAC AND SODIUM HYPOCHLORITE

Germicide	Av. chlorine Ppm.	*M. pyogenes v. aureus*: 20°C. 5 min.	*M. pyogenes v. aureus*: 20°C. 10 min.	*Es. coli*: 20°C. 5 min.	*Es. coli*: 20°C. 10 min.
Antibac	200	−	−	−	−
	150	−	−	−	−
	100	−	−	−	−
	50	+	+	−	−
	25	+	+	+	+
Sodium hypochlorite	200	−	−	−	−
	150	−	−	−	−
	100	−	−	−	−
	50	+	+	−	−
	25	+	+	+	+

TABLE 2 — WEBER AND BLACK TEST OF ANTIBAC AND SODIUM HYPOCHLORITE

Germicide	Ppm. av. Cl_2	Vol. plated in ml	*M. pyogenes v. aureus* 25°C. 15 Sec.	30 Sec.	60 Sec.	120 Sec.	300 Sec.	*Es. coli*: 25°C. 15 Sec.	30 Sec.	60 Sec.	120 Sec.	300 Sec.
Antibac	50	1.0	0	0	1	0	0	0	0	0	0	0
		0.1	0	0	0	0	0	0	0	0	0	0
	40	1.0	0	2	0	0	0	0	0	0	0	0
		0.1	10	0	0	0	0	0	0	0	0	0
	30	1.0	2304	320	192	0	0	384	12	0	0	0
		0.1	1920	290	160	10	0	370	10	0	0	0
Sodium hypochlorite	50	1.0	0	0	0	0	0	0	0	0	0	0
		0.1	0	0	0	0	0	0	0	0	0	0
	40	1.0	0	0	0	0	0	0	0	0	0	0
		0.1	0	0	0	0	0	0	0	0	0	0
	30	1.0	20	0	0	0	0	15	0	0	0	0
		0.1	10	10	0	0	0	10	0	0	0	0

TABLE 3 — FABRIC DISC TEST OF ANTIBAC AND A SODIUM HYPOCHLORITE GERMICIDE

Germicide	Ppm av. Cl_2	*M. pyogenes v. aureus*: 25° C. 1 min.	2 min.	5 min.	*Es. coli*: 25°C. 1 min.	2 min.	5 min.
Antibac	200	4,030	5,180	130	3,660	2,880	18
	100	11,520	5,760	600	6,910	2,500	21
	50	100,000	100,000	4,030	100,000	100,000	46
Sodium hypochlorite	200	28,800	17,280	820	10,900	8,060	32
	100	100,000	25,920	3,460	100,000	100,000	410
	50	100,000	34,560	43,200	100,000	100,000	100,000

TABLE 4 — RESULTS OF TESTS WITH SOLUTIONS OF COMMERCIAL CHLORINE TYPE GERMICIDES MADE UP TO CONTAIN 200 PPM AVAILABLE CHLORINE ACCORDING TO THE COMPOSITION CLAIMED, IN USE-DILUTION TESTS USING MICROCOCCUS PYOGENES VAR. AUREUS AT 20°C.

Type of product	Ppm av. chlorine: After 10 min. exposure of Carrier	pH of solutions	Out of 20 Cultures: Carrier wash solution, No. showing growth	Carriers after washing, No. showing growth
NaOCl Soln.	238	10.4	0	13
NaOCl Soln.	217	9.8	0	11
NaOCl Soln.	228	10.4	1	12
NaOCl Soln.	215	9.9	0	11
NaOCl Soln.	221	9.2	1	3
NaOCl Soln.	212	9.9	0	10
NaOCl Soln.	220	10.0	0	7
NaOCl Soln.	230	10.1	0	9
NaOCl Soln.	219	10.8	3	16
NaOCl Soln.	192	10.4	0	5
$Ca(OCl)_2$ Powder	196	11.2	13	14
Chlorimide Powder	200	5.0	0	3

TABLE 5 — RESULTS OF TESTS WITH SOLUTIONS OF REPRESENTATIVE COMMERCIAL CHLORINE TYPE GERMICIDES MADE UP TO CONTAIN 200 PPM AVAILABLE CHLORINE ACCORDING TO COMPOSITION CLAIMED, IN USE-DILUTION TESTS USING SALMONELLA PULLORUM AT 20°C.

Type of product	Ppm. av. chlorine after 10 min. exposure of carrier	pH of solutions	Out of 20 Cultures: Carrier wash solution, No. showing growth	Carriers after washing, No. showing growth
NaOCl Soln.	220	9.1	0	19
NaOCl Soln.	222	10.8	0	15
$Ca(OCl)_2$ Powder	199	11.2	0	4
Chlorimide Powder	196	5.0	0	3

The fabric disc test is very severe, and zero counts are not to be expected. It will be seen that Antibac has done a somewhat better job than sodium hypochlorite.

D. *Proposed USDA Test Method*

In studies on the improvement of methods for the evaluation of chlorine germicides the U. S. Department of Agriculture included a chlorimide powder employing the same active agent as used in Antibac in comparative tests along with numerous commercial sodium and calcium hypochlorites[7]. The "use-dilution" test method employed involved carefully standardized contamination of hollow stainless steel cylinders at a level of about 2,000,000 organisms per cylinder in the case of S. *pullorum* or 812,000 with *M. pyogenes* var. *aureus*. The suspension of organisms was dried on the rings at 37°C for 10 to 30 minutes. One such contaminated carrier was then transferred to each of 20 ten-ml aliquots of the selected chlorine germicide for a 10-minute exposure at 20°C. The carrier was transferred then to a wash of nutrient broth containing sodium thiosulfate, shaken 30 seconds and transferred to a tube of thioglycollate medium. The nutrient broth-thiosulfate wash tube and the tube of fluid thioglycollate medium were both incubated at 37°C for 48 hours and checked for growth of the test organism. Twenty replicate tubes were run in each tube. The results of tests on the hypochlorites and "Chlorimide Powder" are summarized in tables 4, 5 and 6.

A similar but less extensive test was carried out using the organism *Salmonella pullorum* as follows:

In the light of the very severe tests of tables 4 and 5, the performance of the chlorimide powder is seen to be outstanding.

Comparative data were also obtained on the killing effectiveness of sodium hypochlorite, calcium hypochlorite, and Antibac when the number of bacteria absorbed on carriers was widely varied. These data, condensed from the original paper, are given in table 6. Again the superior performance of the chlorimide powder is revealed.

DEPRECIATION STUDIES USING FOODSTUFFS AND DETERGENTS

During the sanitizing of eating and drinking utensils, the depreciating action of food residues and unrinsed detergent left on the utensils can be of serious consequence, and it is important to know to what extent such depreciating agents can affect the germicide. In an effort to learn how Antibac compares with other chlorine-liberating germicides in this respect, side-by-side comparisons were made between Antibac and sodium hypochlorite, using a modified FDA technique and adding common foodstuffs and detergents likely to be encountered. The foodstuffs and detergents were used at 0, 0.02 and 0.1 percent, solids basis, and exposure times were 1 and 5 minutes at 25°C. The sanitizing solutions were made up at 200 and 100 ppm of available chlorine strength. The data for *M. pyogenes v. aureus* are given in table 7 and for *Es. coli* in table 8.

A study of tables 7 and 8 shows that, except for minor resistance characteristics of the test organisms, milk, egg, and peptone are the most depreciating of the foodstuffs, and soap and H.D.C. (a soap type dishwashing compound) are the most depreciatory of the detergents tested. The work also shows quite clearly that of the two test organisms *M. pyogenes v. aureus* is the more difficult to kill with chlorine-liberating germicides. In numerous instances Antibac has killed when the hypochlorite failed to kill, indicating a superiority for Antibac.

EFFECT OF TEMPERATURE ON THE KILLING ACTION OF ANTIBAC

It is well known that increasing the temperature increases the killing action of germicides. In an effort to define more exactly the effect of temperature on Antibac, work was undertaken in which the temperature range of 1° to 65°C was explored in 10°C increments. The FDA method was used in principle. A few minor irregularities appear. Preliminary data are shown in table 9.

From table 9 it is possible to compile tables listing the minimum concentrations expressed as parts per million of available chlorine required for 100 percent kills at the different temperatures for the different exposure times. This has been done for a 2-minute exposure time in table 10.

EFFECT OF PH ON GERMICIDAL ACTIVITY

As previously stated, Antibac provides a use solution slightly on the acid side of neutrality, and this acid reaction contributes significantly to the germicidal performance of the product. In an effort to learn how the active agent in Antibac and sodium hypochlorite respond to pH adjustment, comparative tests were undertaken using 1,3-dichloro-5,5-dimethylhydantoin and sodium hypochlorite adjusted to similar pH levels. Adjustment of pH was made with $NaHSO_4$ or Na_2HPO_4, using a Beckman pH meter. In these tests, which were conducted at 25°C, 10 ml of a freshly adjusted germicidal solution, and 1.0 ml of a 24-hour-old broth culture of *M. pyogenes v. aureus*, were brought together in a medication tube, shaken, and the exposure continued for 1 minute. After the exposure, plates were poured of the mixture, and counted after 2 days of incubation. The data are found in table 11.

Table 11 shows very clearly that with these two chlorine-liberating compounds germicidal potency improves rapidly as the pH is lowered. Of the two, the active agent of Antibac has performed the better.

STABILITY OF ANTIBAC

The stability of Antibac, both in solution and in dry storage, is excellent. In one series of experiments solutions prepared in distilled water were subjected to constant stirring in open beakers at various

TABLE 6 — EFFECTIVENESS OF SOLUTIONS OF SELECTED COMMERCIAL CHLORINE TYPE GERMICIDES AT A CONCENTRATION OF 200 PPM AVAILABLE CHLORINE IN DISINFECTING CARRIERS BEARING VARYING NUMBERS OF BACTERIAL CELLS IN THE USE-DILUTION PROCEDURE

		Type of Product and pH of Solutions at 200 Ppm Av.Cl Conc. Out of 20 tests					
		NaOCl at pH 10.8		$Ca(OCl)_2$ at pH 11.2		Chlorimide at pH 5.0	
Test organism	No. of bacteria absorbed on carriers	No. of washes showing growth	No. of carriers showing growth	No. of washes showing growth	No. of carriers showing growth	No. of washes showing growth	No. of carriers showing growth
Salmonella pullorum	2,080,000	0	5	0	4	0	3
	208,000	0	4	0	3	—	—
	21,000	0	0	0	0	0	0
Micrococcus pyogenes var. *aureus*	812,000	3	16	13	20	0	3
	81,200	1	19	—	—	—	—
	8,100	1	0	0	2	0	0
	4,200	0	0	0	0	—	—

TABLE 7 — DEPRECIATION BY CONTAMINANTS OF THE GERMICIDAL ACTIVITY OF ANTIBAC AND SODIUM HYPOCHLORITE

M. pyogenes var. aureus: 25°C. Modified FDA Method

		Antibac				Sodium hypochlorite			
		200 ppm		100 ppm		200 ppm		100 ppm	
Contaminant	% solids	1 min.	5 min.	1 min.	5 min.	1 min.	5 min.	1 min.	5 min.
Milk	0.0	+	—	+	—	+	—	+	+
	0.02	+	—	+	—	+	—	+	+
	0.1	+	+	+	+	+	—	+	+
Beer	0.0	—	—	+	—	+	—	+	—
	0.02	—	—	+	—	+	—	+	+
	0.1	—	+	+	+	+	+	+	+
Whole egg	0.0	—	—	+	—	+	—	+	—
	0.02	—	—	+	+	+	—	+	+
	0.1	+	—	+	+	+	+	+	+
Catsup	0.0	—	—	+	—	—	—	+	—
	0.02	—	—	+	—	+	—	+	—
	0.1	—	—	+	—	+	—	+	+
Beef gravy	0.0	—	—	+	—	+	—	+	—
	0.02	—	—	+	—	+	—	+	—
	0.1	—	—	+	+	+	—	+	+
Ivory soap	0.0	—	—	+	—	+	—	+	—
	0.02	+	—	+	—	+	—	+	—
	0.1	+	—	+	+	+	—	+	+
Kreelon 4D	0.0	—	—	+	—	+	—	+	—
	0.02	—	—	+	—	+	—	+	—
	0.1	—	—	+	—	+	—	+	—
H.D.C. (Soap type dishwashing compound)	0.0	—	—	+	—	+	—	+	+
	0.02	+	—	+	—	+	—	+	+
	0.1	+	—	+	—	+	—	+	+
Tide	0.0	—	—	+	—	+	+	+	—
	0.02	—	—	+	—	+	—	+	+
	0.1	—	—	+	—	+	—	+	+

temperatures, using a Phipps and Bird Laboratory Mixer with the agitators adjusted to turn at 80 RPM.

These tests were carried out at 20, 40, and 60°C with the solutions of Antibac, and commercial calcium and sodium hypochlorites, both with and without addition of 0.1 percent peptone to the solutions. All solutions were made up to contain 200 ppm available chlorine (calculated) but losses were quite rapid within the first 15 minutes in the presence of peptone. The data are presented in figure 1. Since 50 ppm available chlorine is the commonly accepted lower level of activity for serviceable hypochlorite solutions, a horizontal line has been drawn across the figure at this level. Solid lines show the course of depreciation in the absence of peptone and dotted lines are used when it is present.

Although in the absence of peptone the calcium hypochlorite at 40° and 60°C has shown a little higher chlorine level initially than Antibac, this is temporary. During this period the available chlorine levels are high and all solutions therefore germicidally effective. Within a few hours the curves cross and Antibac holds up better over long periods. The calcium hypochlorite solutions show a tendency to break rapidly once serious

TABLE 8 — DEPRECIATION BY CONTAMINATION OF THE GERMICIDAL ACTIVITY OF ANTIBAC AND SODIUM HYPOCHLORITE

Es. coli: 25°C. Modified FDA Method

Contaminant	% solids	Antibac 200 ppm 1 min.	Antibac 200 ppm 5 min.	Antibac 100 ppm 1 min.	Antibac 100 ppm 5 min.	Sodium hypochlorite 200 ppm 1 min.	Sodium hypochlorite 200 ppm 5 min.	Sodium hypochlorite 100 ppm 1 min.	Sodium hypochlorite 100 ppm 5 min.
Milk	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	+	−
	0.1	−	−	−	−	−	−	+	+
Beer	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	−	−
	0.1	−	−	+	−	−	−	+	+
Whole egg	0.0	−	−	−	−	−	−	+	−
	0.02	−	−	−	−	−	−	+	+
	0.1	−	−	−	−	+	+	+	+
Catsup	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	−	−
	0.1	−	−	−	−	+	+	+	+
Beef gravy	0.0	−	−	−	−	−	−	+	−
	0.02	−	−	−	−	−	−	+	+
	0.1	−	−	+	+	−	−	+	+
Peptone	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	+	−
	0.1	−	−	+	+	−	−	+	+
Ivory soap	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	−	−
	0.1	−	−	−	−	+	−	−	−
Kreelon 4D	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	−	−
	0.1	−	−	−	−	−	−	−	−
H.D.S. (Soap-type dishwashing compound)	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	+	−
	0.1	−	−	+	+	+	−	+	−
Tide	0.0	−	−	−	−	−	−	−	−
	0.02	−	−	−	−	−	−	+	+
	0.1	−	−	+	+	−	−	+	+

TABLE 9 — EFFECT OF TEMPERATURE ON THE KILLING ACTION OF ANTIBAC SOLUTIONS

(Preliminary Data, Modified FDA Method)

Temp. of test	Ppm av. Cl_2	*M. pyogenes var. aureus* 1 min.	*M. pyogenes var. aureus* 2 min.	*M. pyogenes var. aureus* 3 min.	*M. pyogenes var. aureus* 5 min.	*Es. coli* 1 min.	*Es. coli* 2 min.	*Es. coli* 3 min.	*Es. coli* 5 min.
1° C.	400	−	−	−	−	−	−	−	−
	200	−	−	−	−	−	−	−	−
	150	+	+	+	+	+	+	+	−
10° C.	200	+	−	−	−	−	−	−	−
	150	+	+	−	−	+	+	−	−
	100	+	+	+	+	+	+	+	+
20° C.	150	−	−	−	−	−	−	−	−
	100	+	+	+	−	−	−	−	−
	50	+	+	+	+	−	−	−	−
30° C.	150	+	−	−	−	−	−	−	−
	100	+	−	−	−	−	−	−	−
	50	+	+	+	+	+	−	−	−
40° C.	100	+	−	−	−	−	−	−	−
	50	+	−	−	−	−	−	−	−
	25	+	+	+	+	−	−	−	−
50° C.	100	−	−	−	−	−	−	−	−
	50	−	−	−	−	−	−	−	−
	25	+	−	−	−	−	−	−	−
65° C.	100	−	−	−	−	−	−	−	−
	50	+	−	−	−	−	−	−	−
	25	+	−	−	−	−	−	−	−

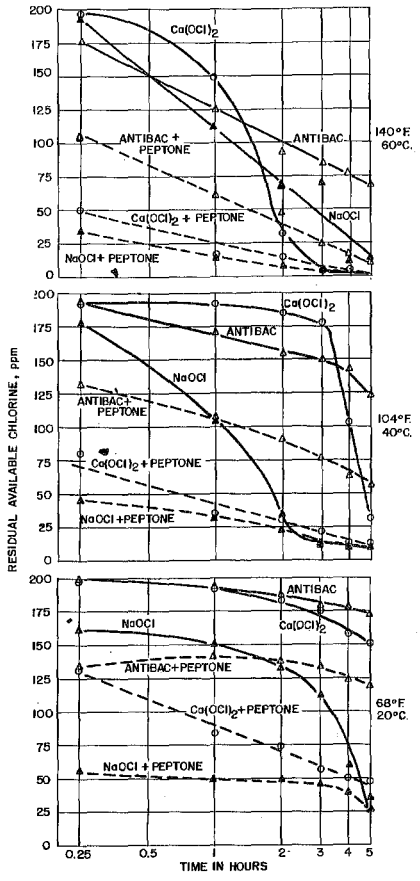


FIGURE 1 — RATE OF LOSS OF CHLORINE FROM SANITIZING SOLUTIONS

TABLE 10 — AVAILABLE CHLORINE STRENGTHS OF ANTIBAC SOLUTIONS REQUIRED FOR A TOTAL KILL WITHIN 2 MINUTES AT VARIOUS TEMPERATURES

Preliminary Data, FDA Method

Temperature		*M. pyogenes, v. aureus*	*Es. coli*
1. C	or 33.8°F	200 ppm	200 ppm
10	50.0	200	200
20	68.0	150	50
30	86.0	100	50
40	104.0	50	25
50	122.0	25	25
65	149.0	25	25

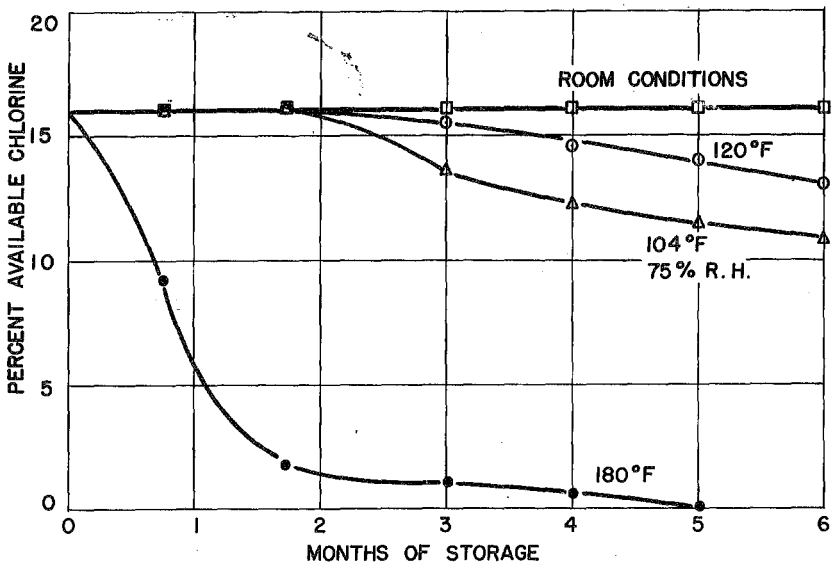


FIGURE 2 — DRY STORAGE STABILITY OF ANTIBAC

TABLE 11 — EFFECT OF pH ADJUSTMENT ON THE GERMICIDAL PERFORMANCE OF SODIUM HYPOCHLORITE AND 1,3-DICHLORO-5,5-DIMETHYLHYDANTOIN

M. pyogenes v. aureus 25°C.

Germicide	Ppm av. Cl_2	Control count per ml	Count per ml of medication mixture				
			pH 4.0	pH 5.0	pH 6.0	pH 7.0	pH 8.0
Sodium	25	12,800,000	TNTC	TNTC	TNTC	TNTC	TNTC
hypochlorite	50	"	TNTC	TNTC	TNTC	TNTC	TNTC
	100	"	0	1,730	2,800	10,700	TNTC
	150	"	—	0	1	50	420
	200	"	—	—	0	1	60
	250	"	—	—	—	0	7
1,3-dichloro	25	14,700,000	TNTC	TNTC	TNTC	TNTC	TNTC
5,5-dimethyl	50	"	6,050	7,800	9,800	16,390	TNTC
hydantoin	100	"	36	50	160	580	3,200
	150	"	—	0	0	1	930
	200	"	—	—	0	0	0
	250	"	—	—	—	0	0

depreciation has begun. The sodium hypochlorite solutions have retained their chlorine content the least successfully of the three.

Peptone has severely depreciated the available chlorine levels of the hypochlorites and marked superiority for Antibac is clearly revealed at all temperatures.

Storage tests of dry Antibac under a variety of conditions, have yielded the data shown in figure 2. In these tests, 20.0-gram samples were weighed into uncapped jars and set aside under the various conditions indicated.

It is obvious that at 180°F, Antibac is not stable. However, at 120° F, storage behavior is surprisingly good, considering that one is dealing with an acidic chlorine-liberating composition. Less than 20 percent of the original chlorine is lost during six months of open storage. At room temperature storage, Antibac is perfectly stable up to 6 months. Under conditions of 75 percent relative humidity, and 104° F temperature, Antibac is less stable than at 120°F dry heat. Antibac should be protected against excessive heat and dampness, but special precautions are not indicated. Tightly closed impervious containers reduce chlorine losses materially.

ACTION ON METALS

All aqueous chlorine solutions are corrosive to metals to a greater or lesser extent and Antibac solutions are not exceptions, but laboratory studies have shown that the relative action of Antibac and a widely used high test hypochlorite at comparable levels of available chlorine depends upon the individual metal. Metal strips measuring 3/4 x 3 inches were cleaned, weighed, and then immersed in solutions of the germicides contained in screw-capped jars and held at room temperature (72 - 78°F) for seven days. Losses or gains in weight of the strips are expressed in milligrams per specimen and are given in table 13.

TABLE 13 — LOSS OR GAIN IN WEIGHT OF METALS IMMERSED IN CHLORINE-LIBERATING GERMICIDAL SOLUTIONS

Exposure: Seven Days at Room Temperature

Metal	Av. chlorine ppm	High test calcium hypochlorite mg per strip	Antibac per strip
Silver*	50	+13.8	+ 0.3
	200	+19.9	+ 1.4
	500	+31.1	+13.0
Aluminum	50	+ 2.1	− 2.0
	200	− 1.3	− 2.6
	500	+61.0	− 7.1
Galvanized iron	50	−19.9	− 3.7
	200	−35.8	− 3.8
	500	−73.0	− 6.5
Stainless steel	50	− 1.0	− 0.3
	200	− 0.4	− 0.7
	500	− 1.6	− 0.7
Copper	50	− 1.4	− 1.4
	200	−11.7	− 7.7
	500	−18.0	−22.7
Dairy metal	50	−10.4	− 3.2
	200	− 5.1	− 8.9
	500	−10.9	−21.0
Brass	50	− 1.2	− 3.2
	200	− 2.4	−11.2
	500	− 9.6	−31.5
Bronze	50	−	− 5.1
	200	−	− 9.4
	500	−	−23.2
Dairy Tin	50	− 9.2	−17.1
	200	−12.8	−25.1
	500	−37.7	−48.6
Black iron	50	−12.1	−21.8
	200	−26.1	−37.5
	500	−50.7	−63.3

In the case of silver, aluminum, and galvanized iron, the advantage is with Antibac, while with Dairy Tin, brass, and black iron the advantage lies with the hypochlorites. With the other metals employed in the test, including stainless steel, Dairy Metal and copper, no clear-cut advantage for either germicide is apparent.

DISCUSSION

The principal objections to the use of organic chlorine-liberating chemicals for germicidal use have been successfully overcome in Antibac. Among these are the unsatisfactory solubility characteristics of some compounds, slowness of germicidal action of others, and the poor stability of otherwise suitable formulations.

In the bacteriological studies here reported, three different testing methods have yielded data indicating that 1,3-dichloro-5,5-dimethylhydantoin is equal, or slightly better than hypochlorites in killing action, and one method (Weber and Black) indicates that it is slightly inferior. Since this work was completed Johns[8] has reported work along similar lines utilizing the Weber and Black method and a fifth method, his glass slide technique. Johns has used substandard concentration of germicides[9] (50 down to 10 ppm available chlorine) which would "best show up differences in bactericidal speed." Under these circumstances the data indicate that the three commercial hypochlorites are somewhat more rapid than Antibac-25 against *Es. coli* and *Ps. aeruginosa*, but that

Antibac is equally or more effective than two calcium hypochlorites, and about equal to sodium hypochlorite when the organism is *M. pyogenes var. aureus.* Accordingly, considering all the work reported, the relative activities found depend to a considerable degree upon the organism involved and the method of test selected. Where appreciable proportions of chlorine acceptors are present, as in the FDA method, and the fabric disc test method, Antibac usually has proved superior. This is emphasized by the data of tables 7 and 8 which record the effects of added food or detergent contaminants in a modified FDA type test. We conclude that for practical germicidal purposes Antibac can be used interchangeably with hypochlorites in most cases, and will be preferred in many.

Our corrosion studies cover a wide variety of metals which may with more or less frequency require sanitation in the food industries and on farms. Products which are acidic in nature inevitably attack certain metals and active chlorine may enhance such effects. These data indicate that each metal must be considered individually, but that metals as a class are not more seriously attacked by Antibac than by hypochlorite solutions at similar available chlorine levels. Most equipment of the food industries requiring chemical sanitization today is constructed of materials which appear to show adequate corrosion resistance.

It is fair to say that the conditions of this test (i.e., specially pre-cleaned metals, long continuous exposures in a closed system, solutions made up from distilled water in which the pH of the Antibac solutions will be lower than for use solutions made up from ordinary water supplies) are very severe, and apparently overemphasize the problem considerably. The best answer comes from field experience. In field service in dairies and ice cream plants, and in restaurant service, no significant evidence of metal corrosion has been found. This work will be described in a subsequent paper.

The desirability of formulating chlorine-liberating germicides so as to provide neutral to mildly acid use-solutions has been recognized for many years, but until the development of Antibac this objective could not be realized in a practical way. The combination of excellent storage and solution stability in a dry, completely and rapidly soluble powder form, generally equal or superior to commercial hypochlorites in germicidal activity at use concentrations, makes Antibac unique. In addition, Antibac is comparatively mild in its action on the skin and of low odor intensity in solution.

CONCLUSIONS

1. Antibac, a new sanitizing agent and germicide whose active agent is 1,3-dichloro-5,5-dimethylhydantoin, exerts a germicidal action that is equal, superior or slightly inferior to that shown by commercial inorganic hypochlorites, dependent upon the conditions of testing.

2. The depreciating effect of peptone, foodstuffs, and dishwashing detergents on germicidal activity is less in the case of Antibac than for hypochlorites.

3. Increasing the temperature of an Antibac solution results in a normal increase in germicidal potency. The excellent stability of Antibac solutions over long periods is of special advantage at the higher temperatures.

4. In the dry form Antibac shows practically no loss of chlorine under room temperature storage. At 120°F chlorine is lost slowly while at 180°F the loss of chlorine is rapid. When stored at 140° F and 75 percent relative humidity, the loss of chlorine is marked but not excessive. Antibac should be protected against excessive humidity and heat.

5. Antibac, like all chlorine liberating germicides, improves in killing potency as the pH of the solution is lowered. Since it has been formulated to provide a use solution that is mildly acid (pH 5.8 to 7.0) it is ready to exert its full potency as soon as put into solution.

6. Antibac solutions have been shown to be no more corrosive to metals as a class than calcium hypochlorite. Individual metals show greater or lesser effects. Field tests indicate that metal corrosion will not be a serious problem.

REFERENCES

1. Tilley, F. W. and Chapin, R. M., Germicidal Efficiency of Chlorine and the N-Chloro Derivatives of Ammonia, Methylamine and Glycine Against Anthrax Spores. *J. Bacteriology,* **19,** 295 (1930).

2. Johns, C. K., The Influence of Alklinity Upon the Efficiency of Hypochlorites. *Proc. Internat. Assn. Dairy and Milk Inspectors* (1931).

3. Rudolph, A. S. and Levine, M. Factors Affecting the Germicidal Efficiency of Hypochlorite Solutions. *Iowa Exp. Station Bulletin* 150 (1941).

4. Charlton, D. B. and Levine, M., Some Observations on the Germicidal Efficiency of Chloramine T and Calcium Hypochlorite. *J. Bact.,* **30,** 163 (1935).

5. The Food and Drug Administration Method, *Circular 198, U. S. Department of Agriculture,* Washington, D. C., (1931).

6. Weber, G. R., and Black, L. A. Laboratory Procedure for Evaluating Practical Performance of Quaternary Ammonium and Other Germicides Proposed for Sanitizing Food Utensils. *Amer. J. Pub. Health,* **38,** 1405 (1948).

7. Stuart, L. S., Bogusky, J., Ortenzio, L. F., and Friedl, J. L., Soap and Sanitary Chemicals, *Official Proceedings* of *37th Annual Meeting,* Chemical Specialties Manufacturers Association, December (1950).

8. Johns, C. K., The Germicidal Effectiveness of a New Chlorine Compoud. *J. Milk and Food Technol.* **14,** 134 (1951).

9. U. S. Public Health Service, *Ordinance and Code Regulating Eating and Drinking Establishments,* Public Health Bulletin No. 280, 29 (1943).

FARM TANK HOLDING OF MILK WITH TANK TRUCK PICK-UP

(Originally narrated and illustrated by his own amateur colored moving pictures)

C. B. A. (BILL) BRYANT
Johnson and Johnson, Chicago, Illinois

Bill Bryant presents informally his observations on many practical aspects of the new system of hauling milk by tank pickup in widely scattered parts of the United States. He reports that the work-load is eased, milk quality is improved, delivery is facilitated, and economies in collection and operation are secured.

I have always been curious to know and see what different people do when they stray from the old conventional ways. At the very beginning when I visited dairy farms where the system of handling milk in bulk tanks was used, I observed that these tanks were of several types. One was a thermos type or insulated wall tank. Milk entering this tank was cooled by passing over aerator coil cooler placed just above the tank. Then too, there was a cold wall tank, this type having cooling system built into body. Milk enters warm from cows and is cooled in the tank. Another type of tank, with this principle of cooling milk after entering, has an iced water-jacket system flowing over outer walls of tank instead of a refrigeration unit built into the tank wall. These cold wall tanks seem to predominate among these earlier installations. A few of these very early tanks were old, insulated, coil-pasteurizer vats, having a coil aerator unit suspended in the center. These were for experimental purposes and are now being replaced, perhaps because of their limited cooling capacity and the difficulty in cleaning.

Farm tank holding of milk was first adopted some thirteen years ago in the concentrated fluid milk areas of Los Angeles County, California, and almost simultaneously in Dade County (Miami), Florida. This system has slowly gained headway, and after some dozen years it has now almost completely eliminated the old way. Most milk companies receive all their milk at their milk plants in tank trucks direct from all their dairy producers. Great was the interest in this new enterprise by many in our dairy industry. With the color movies of these two sections of our nation I received many invitations to show them to various groups such as: Our College Dairy Short Courses; Sanitarians' Meetings; Fieldmen's Organizations; Milk Plant Operators' Conventions; Milk Haulers' Dinners given by their milk companies; and even Co-Operative Milk Companies' Annual Meetings of their Dairy Farmer Members.

Two years ago I heard of two milk companies located in smaller cities who had partly adopted this new system. I quickly visited them and requested the privilege of recording their method on the color moving picture film, this to be shared in presenting, in addition to groups previously mentioned, our "Junior Dairy Science Groups" of our universities and the "Dairy Classes" at regular classroom sessions.

EARLY INDUSTRIAL OPERATION

My first colored moving picture of this series is that of the Edisto Dairy of Columbia, South Carolina. At this time they were receiving milk from six of their farms which had installed cold wall bulk tanks. One large dairyman operated three dairy farms and I understood he was also interested in the milk company distributing his milk. So in reality, at the beginning of these six dairy farms only four dairy farmers were involved and this valuable early operation was more of a personal enterprise.

They had many weekly visitors and gave cordially and freely of their experiences. Here five of the tank installations were of 200 gallons or more. One was of 50-gallon capacity which they used for experimenting. These people effectively helped to pave the way for practical smaller city and milk plant operations. The records that they kept on quality improvement and economic advantages were freely shared with all interested inquiring visitors. At this time the hauler carried into each milk house the pump from a compartment on his truck, rinsing after each use. He also detached hose through which milk was transferred from farm tank to tank truck at each call. Later improvements of these features were developed by the Edisto people.

From Columbia, South Carolina, I immediately went to Hartford, Conn., where I visited Bryant Chapman Company, a member of Na-

Born and reared on a Michigan farm, and educated in high school and junior college Mr. C. B. A. ("Bill") Bryant promoted power farming equipment, and sold the first Fordson tractor to a farmer in the United States. Entering employment by Johnson & Johnson, he became field sales manager of their Filter Products Division, introducing the use of a cotton filter disk at the farm level. He has written, published, and lectured extensively all over the United States.

*Presented at the 21st Annual Institute of Dairying, State College of Washington, Pullman, Washington, March 10-13, 1952.

tional Dairy. They had been operating one tank truck route with this system for over a year and a half, and at the time of my visit they were getting milk from eleven dairy farms which had installed farm bulk tanks. I was informed that all of these dairy farmers were members of the Connecticut Milk Producers Association. The smallest capacity tank on these farms was 200 gallons, and cold wall tanks of three different manufacturers were in use. However, one manufacturer had, I believe, eight of the eleven in use. So from the manufacturer's standpoint, considerable useful data from the field operation could be gained.

All of this to this fine company was a so-called "guinea pig" operation in order to establish for themselves and perhaps their parent organization the possibilities of its practicability and economy to both dairy farmer and milk company. This was under the direction of Mr. A. C. Fisher, manager of Bryant & Chapman, and his chief field director, Mr. Emmerson Sartain. Both Mr. Fisher and Mr. Sartain have liberally given of their data and experiences to all of the many visitors and both have been in great demand as speakers on this subject to dairy gatherings. These men have been most enthusiastic and practical promoters of their ideas to our fluid milk industry. Mr. Charles Whiting, fieldman of the Connecticut Milk Producers Association, regularly assisted Emmerson Sartain in his dairy farm contacts as all these dairymen were stalwart members of his association. Much has been written and discussed regarding this operation. I merely add here by this "travelog" color picture my observations and impressions.

THE DAIRY FARMER

None knew we were going to call. All places were found as any one would leave them in their everyday routine. Every place was in excellent condition, and Emmerson Sartain's early statement to me about how all dairymen had become "better housekeepers" was well borne out.

Now in the handling of milk each dairyman must keep every drop of the highest quality right here in his own milk room. He now runs the risk of losing the entire volume of his milk by quality inspection at his farm, and not as formerly, perhaps an occasional can of milk, when 20 or 30 cans of milk are inspected at the milk plant receiving room.

Both bacteria and sediment examinations are now made at the farm. A number four (4) sediment (reject) is made of a pint of milk as from a ten-gallon milk can, regardless of the quantity of milk in the container from which it is drawn, for a sediment test is taken to verify the workmanship of preparation of the cows before milking. "Dirt" is "dirt" regardless of from what volume of milk it is drawn, and if present it indicates that better work some place along the line could have been done. Many, many dairy farmers with 400- and 500-gallon tanks get a number one (1) sediment, so all can get the same. Management is finding it desirable right in the beginning of this new system to start all dairy patrons off right.

Now the mounting of the "filter disk" after passing milk from the cows through it to observe the workmanship of having carefully prepared the cows before milking, has become most evident. By doing this, many careful dairymen find the "used filter disk" to be clean and comparatively free of dirt. They truly have in this "used disk" their "Badge of Merit." It has been experienced that even when washing the teats and udders of the cows with warm water and wiping dry with a paper towel the multiple massaging of the teats of many cows causes some extraneous matter to get into the milk stream, and it is removed by these "fibre bonded" filter disks. In cases where both the pipe-line continuous milking system with vacuum carrying the milk to the containers and the "fibre bonded" filtering medium are used it is observed that when these disks are placed after an "in the line" sleeve or tube using woven fabrics as a filter medium, some fine extraneous matter is caught on the "fibre bonded" medium, indicating that perhaps it

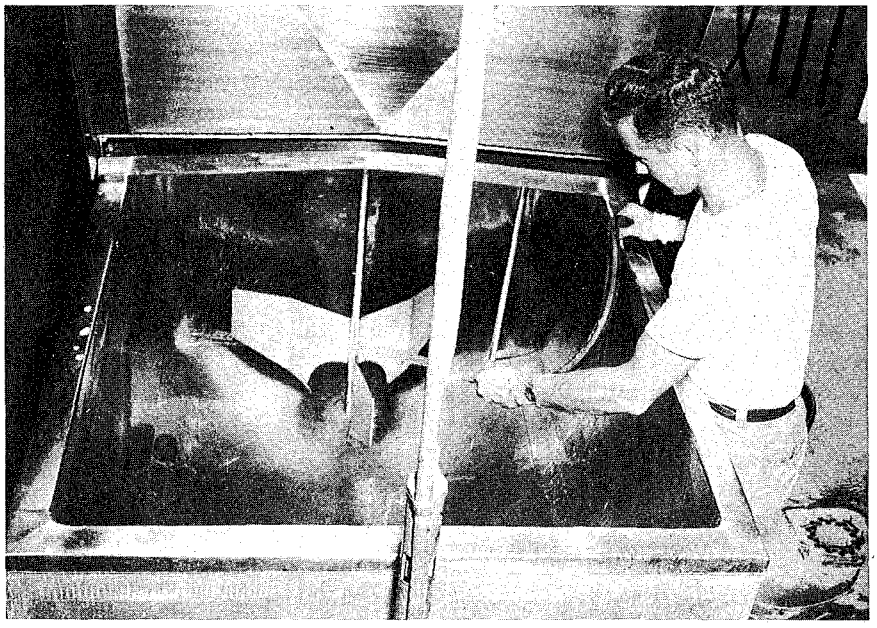


FIGURE 1
Milk tank driver rinsing 500-gallon tank after pumping milk out. Milk authorities agree that this is one of the most important operations of the entire farm bulk tank system.

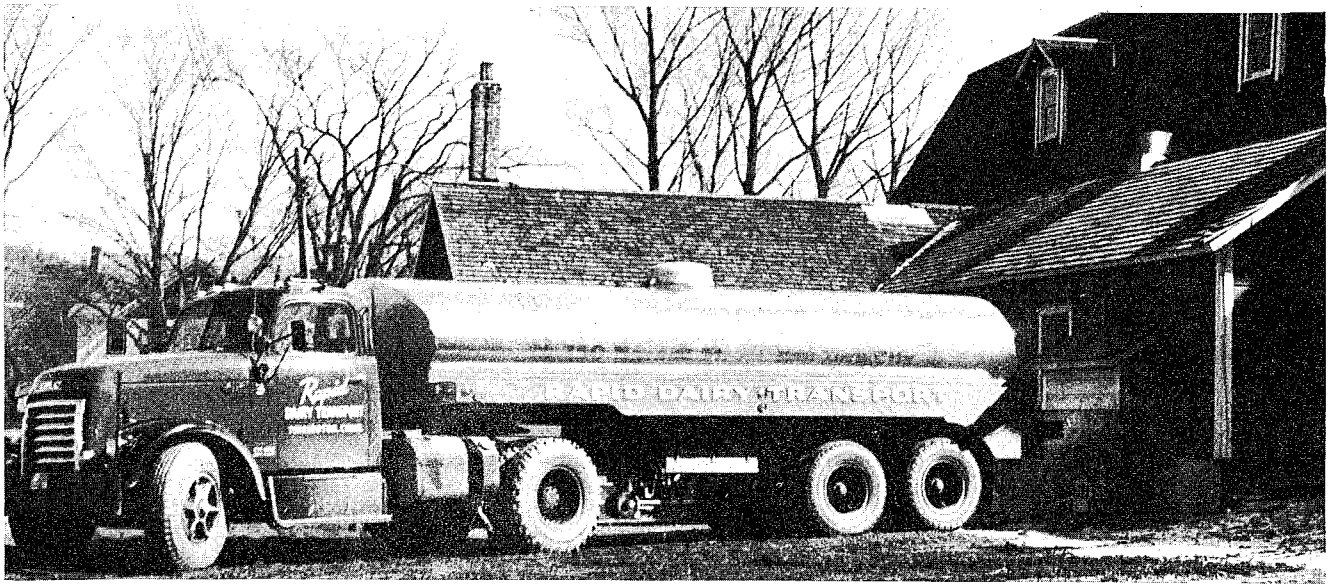


FIGURE 2

Tractor-trailer farm tank truck, single compartment 3500 gallons. Size of tank truck used will depend on the territory and circumstances surrounding each run.

Pump compartment located on back end of tanker. Standard rubber milk hose is used for making connection from tank truck to farm tank on this operation. Milk hose when not in use is kept in a sterilizing solution.

might have passed through the former.

I was informed that this Connecticut 3100-gallon semi-tank truck had not failed in two years to get the milk at any of the eleven farms. The high caliber and personalities of all of these truck drivers is noteworthy. All are capable of being good sanitarians in their own right. Because of no can-lifting, perhaps now more attention may be given to the personality of the hauler. He may qualify with a characteristic of known capacity above the ears and less physical strength in shoulders and thighs.

I found all of these dairymen were enthusiastic and indeed very outspoken in relating the benefits of this new operation as they experienced them.

First: They all liked their butterfat tests. Some even had daily samples left at the farm when the hauler drew a sample for the milk plant. This I understand was soon dropped after about a month.

Second: They liked their daily weights. These are recorded on the measuring stick, each calibrated for each tank and installation in each milk house. The weights are daily established and determined on the premises of each dairy farmer.

If desired, each day the tank of milk can be weighed when arriving at the milk plant. This weight of milk should balance with the multiple amount recorded by the driver at his farm calls. Here I was informed there was no loss of milk to either farmer or milk company,

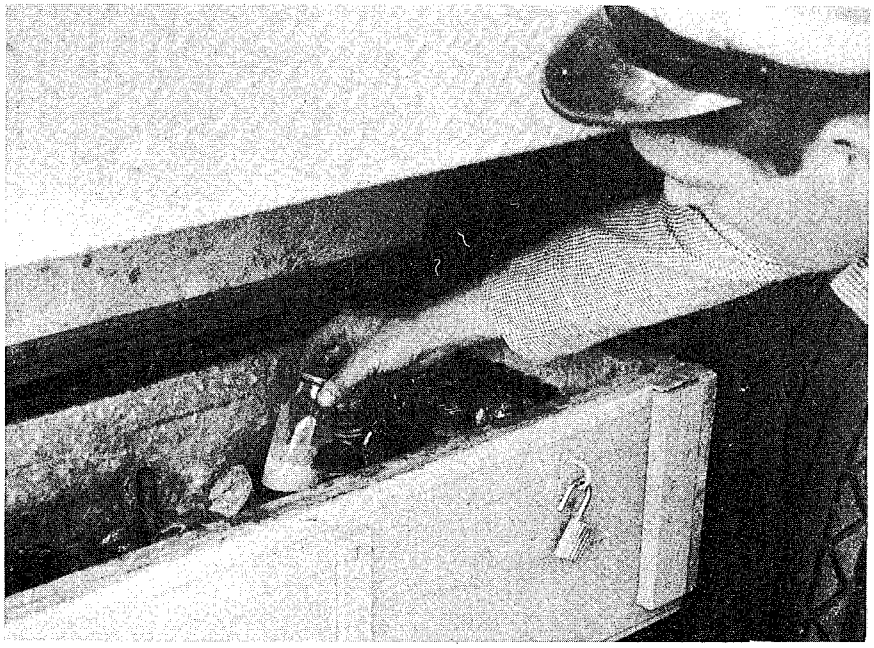


FIGURE 3

An insulated, metal-lined box located on the underside of the truck in which the plant composite milk samples are kept. The truck driver is a licensed weigher and sampler. Note ice in middle compartment.

formerly experienced by rapid pouring of milk cans at receiving room as the milk cans pass on into the can washer.

Third: All farmers brought out the fact of no lifting of the milk cans. The milk hauler was also very talkative on this point. Remember that the producer formerly handled 20 to 50 cans of milk a day, so he had quite a comparison.

Fourth: I observed new enthusiasm on the part of the sons of dairymen. These youths ranged in age from their teens to early thirties. This may be one means of renewing youths' interest in our dairying and engendering a resolve to stay on the farm.

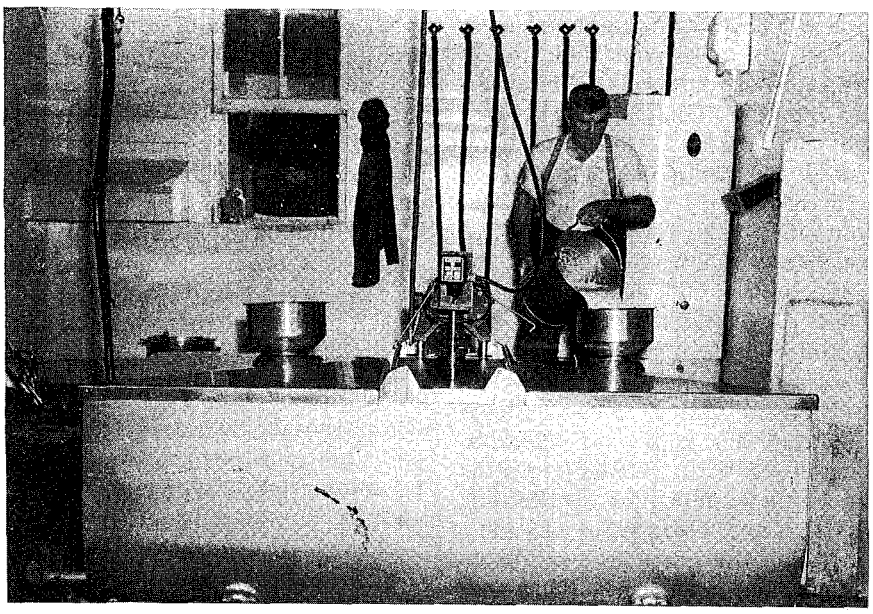


FIGURE 4

A 400-gallon Farm Cold-Wall Bulk Tank.
Note temperature control in center board which is adjustable so control can be in any depth of milk desired, to hold milk at constant temperature.

MILK PLANT OPERATOR

First: I observed their enthusiasm as expressed in the possibility of perhaps some day eliminating the milk receiving room. To be sure this would necessitate the recognition of the small producer, the dairyman of one can of milk a day. Here they expressed the idea that perhaps every-other-day "pick up" might be the answer. I know of some places now having farm bulk tank installations of 50 gallons. In some of my later moving picture reels I show several farms and milk houses with 75-gallon tanks.

Second: Management mentioned the accumulated item of the cleaning and sterilizing materials at the milk plant. With farm tank holding, the truck driver, you will observe, rinses out the tank after he draws out the milk. The farmer washes the tank. The cleaning and sterilizing materials are now transferred from milk companies' use to farm milk-house use.

Third: All report reduced hauling costs. This of course is valuable to the farmer. It is of equal interest to milk plant management as it better serves their patrons.

Fourth: Management reports a better and a more consistent high quality milk supply.

Fifth: Now milk, because of the thorough and controlled cooling at the dairy farm, may be received at the milk plant any time around the clock, does not need to be in at a specific hour of the morning, and is not affected by the heat of the sun if delayed in receiving at the milk plant; perhaps also may be received with the minimum of plant personnel as it is transferred from tank truck to milk plant storage tank.

It is expected that there are many improvements that experience will bring about for both dairy farmer and milk plant. All progress first comes from dreaming, then experimenting, then action by doing. To date, enough action has taken place by practical doing to make improvements possible. This includes better labor-saving devices at the tank truck—as the pump and its compartment—, the hose and its care and handling, the plug handle on end of the conductor hose, the protection on tank truck for pump, and the handling of butter-fat sample bottles.

Perhaps because of the economics involved on the part of both dairy farmer and milk plant, progress with installations in various parts of our nation continue to roll. Daily in my mail are reports from my many Junior Associates in the field in all sections of these United States which tell of new installations of this system for handling milk. So as of this date there are to my knowledge over half a hundred places in some two score of our states.

OPERATIONS IN WASHINGTON STATE

The first large operation of a so-called independent milk organization, called to my attention, located in one of our smaller communities, was at Lynden, State of Washington, the Lynden Dairy Products Company. Prior to the operation of this Farm Tank System, these dairymen were producers of milk for manufacturing purposes. Right at the start seventy were equipped and turned to "Grade A" fluid milk production. To date, a little over one year after the beginning, they

have some 120 producers in the system. This company had never picked up milk from their dairy-farm patrons on Sunday, but entering into the "Grade A" field with milk-can method, this they felt would be necessary. Turning to farm tanks they found they could continue their long-established practice by picking up from the farm tank the milk every other day. These people were not interested in bottling Grade A milk for retail or wholesale delivery. They were interested in selling bulk Grade A milk for the large city markets. Therefore, with 1500-gallon tank trucks they could pick up the milk at the farms, bring it into Lynden, and there transfer it to a big 3500-gallon semi-tank truck. This tank truck could take the milk to the city market some hundred or more miles away. They have four of the smaller tank trucks, each of which picks up from tanks at farms three or four loads of milk a day. As this is a very concentrated dairying area, no milk route is very long. On each load these 1500-gallon tanks do not have great mileage.

When I first made my color movie of this enterprise all milk houses and equipment therein were new, as these were manufacturing milk producers turned to fluid milk or "Grade A" production. Everything was immaculate. To verify my information that all dairymen who have changed to this method are better housekeepers, I had these same milk-houses visited and equipment observed one year later. They were found as immaculate as at the time pictures were taken.

My chief observation now is that at all places of my knowledge where they have installed this system, there has been an increase in the number of dairymen and equipment — no standing still or going backward. Each place has had questions arise which come up at all well-regulated operations of our milk industry, as to sanitation, labor, hauling, etc. My observation is that as each is increasing, they each have seemingly answered these questions satisfactorily for themselves.

OPERATIONS IN WISCONSIN

My next scenes for color movies were at River Falls, Wisconsin. These I took late in January, with near-zero weather and plenty of snow on the ground. This is a co-operative milk organization. Prior to this farm-tank operation, all of their milk was for manufacturing. Some of their producers wanted to equip themselves for "Grade A" production. River Falls Co-Op would need to invest in a "Grade A" receiving room, or establish a farm tank, tank-truck pick-up system. The latter was their choice at a very much less cost. To start, 28 of their members built milk-houses and purchased farm tanks. No dairyman of these 28 milked over 24 cows. The capacity of their largest tanks was 150 gallons. Several 75-gallon and 115-gallon tanks were installed. Here all of these first 28 tanks were of one make. These were a cabinet type tank holder, a convertible milk can cooler with circulating iced water for cooling, with a bulk stainless steel tank replacing space taken by milk cans.

Most interesting of all was the type of farms and kind of roads and farm drives this tank truck went over. It was the type of place and installation where one might say "it can't be done." and it was

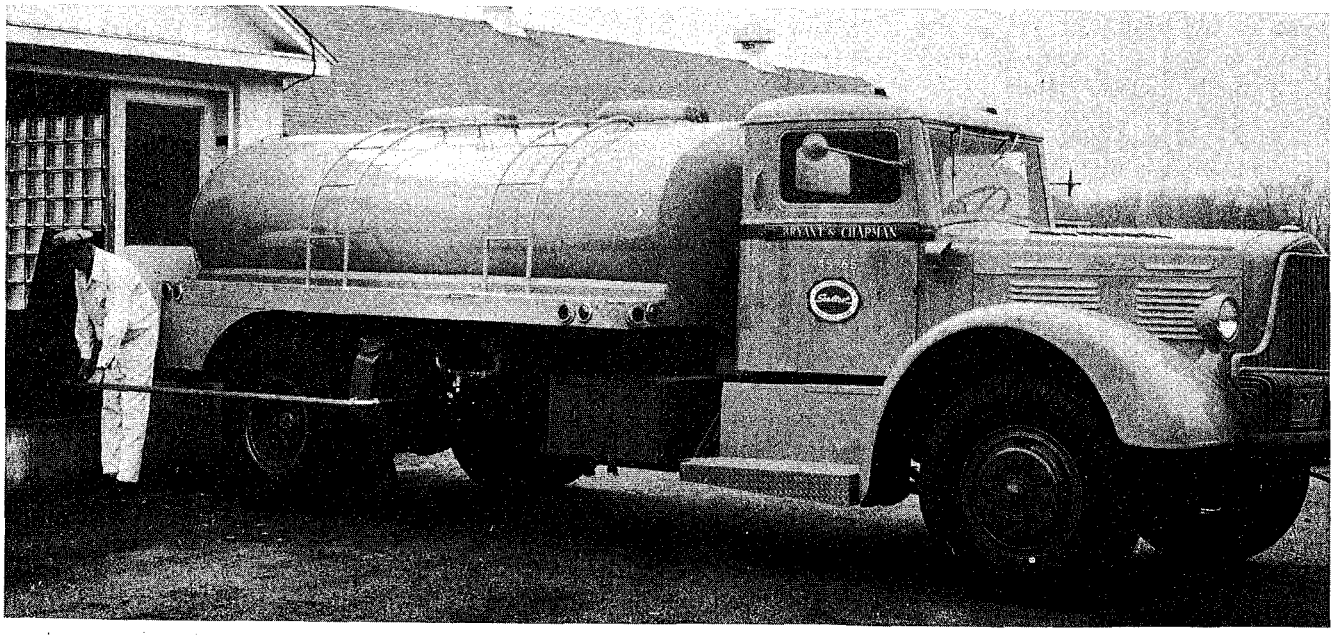


FIGURE 5

Farm tank truck with two compartments holding 600 and 1000 gallons respectively.

"being done." Here simple economics seems to have been the determining factor. And to my knowledge the first farm tank system went to this small northern Wisconsin town. It was not established in this great dairy state near the larger cities of the state.

One pleasing observation here was the many father and son partnership combination, many fine future dairymen being delighted with his home dairy farm relationship. Also all of these dairy farms milked with milking machines in the familiar stanchion barn, no milking parlors or continuous pipe-line milking systems as a part of their farm tank holding in their milk house. Since this beginning they have had phenomenal growth and now have many more farmers and other tank pick up trucks.

OPERATIONS IN OHIO

My next experience was at Dayton, Ohio. This to my knowledge was the first of this system in Ohio. Here under the leadership of Mr. Gus Bumstead, the Borden Finch Farms Dairy have started farm tank holding with a handful of large dairymen. I believe at this start their smallest farm tank is of 200-gallon capacity. All were of the cold wall type. Several of these dairymen have milking parlors and continuous pipe-lines, glass and stainless steel, milk going direct from cow, through filter, to bulk tank. One 1800-gallon tank truck with tandem dual rear wheels, picks up the milk. This wheel arrangement, I was told, complies at all seasons of the year with Ohio road weight laws. The tank truck (a beauty) is owned and operated by a contract hauler, Mr. Jerry Voegler. I understand Jerry Voegler formerly had four trucks and four milk routes. He feels that eventually this one tank truck will replace all of his four can trucks. He can now pick up milk at the farms around the clock. This truck has incorporated all the latest conveniences and sanitary features for handling the milk and protecting the pump, hose, and butter-fat samples. You note it has two spacious compartments for carrying supplies out to the dairy farm parons.

One of the most interesting features of this Dayton operation is the releasers of the continuous milking pipe-line systems. These are necessary to release the milk from the vacuum to let if flow by gravity into the bulk farm tank. Also a further feature of this operation is in the introduction of surface disk filters for smaller milking parlors with continuous pipe-lines. These use "fibre bonded" disks instead of woven fabric formerly used in the sleeve or tube type filter.

PROGRESS IN CONNECTICUT

Late in May this year 1952, I returned to Hartford, Conn. My purpose was to add to my color movie reel special features of their progress since my original pictures taken nearly two years ago. My special interest was immediately attracted to the newer tank pick-up truck. It had sanding equipment for the forward wheels and was of 3400-gallon capacity. Now the pump, electric cord, butter fat sample cabinet with icing features all were contained in a streamline cabinet at rear of truck.

Mr. Emmerson Sartain told me as he accompanied our visiting to a new farm that they were continually having important visitors; that many neighboring people and cities were seriously considering similar installations. Reporting the progress, he said that by September they expect to receive 60 percent of their total daily intake from the farm tanks. They would then look into the remaining 40 percent of milk coming from smaller producers. Mr. Sartain referred to the the 50-gallon farm tank and every-other-day pickup as perhaps an important future factor to them in covering these smaller producers.

So the interest and procession goes steadily on.

INHIBITION STREPTOCOCCUS LACTIS

(Continued from page 281)

Domagh, G., Eine neue Klasse van Desinfektionsmitteln. *Deut. med. Wochschr.*, **61**, 829-832 (1935).

Elliker, P. R., *Practical Dairy Bacteriology*. McGraw-Hill Book Co., Inc., New York, (1949).

Elliker, P. R., Quaternary Ammonium Compounds. *Amer. Milk Review*, **12**, No. 10, 39, (1950).

Glassman, H. N., The Interaction of Surface Active Agents and Proteins. *Annals of N. Y. Acad. Sci.*, **53**, 91 (1950).

Johns, C. K., Factors Affecting Activity of Chemical Germicides. *Milk Plant Mo.*, **39**, No. 554 (1950).

Kuhn, C. A., and Bielig, H. J., Ueber Invertseifen: I. Die Einwirkung von Invertseifen auf Eiweiss-Stoffe, *Ber.*, **73**, 1080-1091 (1940).

Lundstedt, E., Don't Let Quats Ruin that Flavor. *Food Ind.*, **22**, 2056-2058 (1950).

Miller, D. D., and Elliker, P. R., Effect of Quaternary Ammonium Compounds on Activity of Lactic Acid Starter Bacteria in Milk and Cheese. *J. Dairy Sci.*, **34**, 279-286 (1951).

Rueke, H. A., Penicillin and other Starter Culture Inhibitors. *Milk Plant Mo.*, **39**, No. 3, 36-42, (1950).

PHOSPHATASE DETERMINATION

(Continued from page 284)

incubator and placing them in boiling water is held below 30 minutes. However, when the standing time exceeds 30 minutes at room temperatures above normal, the increase in the phosphatase reading may seriously affect the final results of the test. This can be avoided by immersing tubes in a water bath at approximately 70°F after the addition of the Folin-Ciocalteu reagent. If the standing time is to be short, placing the tubes in a refrigerator for a short time after removing from the incubator will also accomplish the desired results.

Association News

AFFILIATES OF
INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS

APPROVED INSPECTORS ASSOCIATION OF SOUTHEAST PENNSYLVANIA

Pres., Dr. Charles W. Livak.....York
Vice-Pres., Dr. Roy F. Davenport .....Philadelphia
Sec., Robert H. Keen.....Lancaster
Treas., Reynolds D. Baldwin..Philadelphia
Chairman, Ex. Comm., Dr. Howard L. Ragsdale.....Oxford

ASSOCIATED ILLINOIS MILK SANITARIANS

Pres., J. A. Meany.....Chicago
Vice.-Pres., D. E. Harms.....Dixon
Sec.-Treas., P. E. Riley.....Chicago
Sgt.-at-Arms, D. V. Fitzgerald.....Elgin
Executive Board Members
P. N. Hanger.....Springfield
H. B. Richie.....Chicago
Auditors
E. G. Huffer.....Springfield
P. W. Scherschel.....Gary

CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS

President, C. A. Whipple.....Stockton
1st Vice., William Whitton.....Bellflower
2nd Vice., D. A. Cordray.... Santa Rosa
Sec.-Treas. E. R. Eichner, Agriculture Bldg., Embarcadero at Mission Street .....San Francisco

CONNECTICUT ASSOCIATION OF DAIRY AND FOOD SANITARIANS

Pres., Fred K. Armstrong.....Branford
Vice-Pres., Alfred H. Jackson....Hartford
Secretary, H. Clifford Goslee....Hartford
Treas., Curtis W. Chaffe.....Hartford

DAIRY SANITARIANS ASSOCIATION OF NORTH CENTRAL PENNSYLVANIA

Pres., James H. Eck..South Williamsport
Vice-Pres., Galen Furry.....Martinsburg
Treas., Earl F. Hack.....Mexico
Sec., C. D. Herbster.....Selinsgrove
Executive Committee:
Dr. S. M. Ross.....Williamsport
I. E. Parkin.....State College
G. C. Kern.....Milton
Harry T. Daddario.....New Berlin

FLORIDA ASSOCIATION OF MILK SANITARIANS

Pres., R. R. Hood.....Pensacola
Vice-Pres., L. L. Chaffee,....St. Petersburg
Sec.-Treas. H. H. Wilkowske..Gainesville
Past Pres., L. T. Smith.....Jacksonville
Directors:
H. F. Cameron..Green Cove Springs
S. T. Chalker.....Jacksonville
J. D. Robinson.....Plant City
H. H. Rothe.....Gainesville
C. O. Stoy.....Miami

INDIANA ASSOCIATION OF MILK AND FOOD SANITARIANS

Pres., George White.....Evansville
Pres.-Elect, Russell Cunningham La Porte
1st Vice-Pres., John Schlegel Indianapolis
2nd Vice-Pres., Arthur Geller, Ft. Wayne
Sec.-Treas., Joseph Holwager Indianapolis
Auditors:
Ralph Potesta.....Hammond
Ronald Brown.....Richmond

IOWA ASSOCIATION OF MILK SANITARIANS

Pres., F. W. Kreamer.....Des Moines
Vice-Pres., James Evers.....Cedar Rapids
Sec.-Treas., Ray A. Belknap..Des Moines

KANSAS ASSOCIATION OF MILK SANITARIANS

Pres., Raymond A. Fair.....Parsons
1st Vice-Pres., Grove Gilliland .....Dodge City
2nd Vice-Pres., Frank Kelley.....Parsons
Sec.-Treas., Ivan Van Nortwick....Topeka
Auditors:
Junior Rogers.....Independence
Gene Lockard.....Topeka
Reporter, P. A. Mauzey.....Topeka

MICHIGAN ASSOCIATION OF SANITARIANS

Pres., Lyle Littlefield.....Lansing
1st Vice-Pres., Winfred Ettesvold .....Grand Rapids
2nd Vice-Pres., Clifford Bracy....Lansing
Sec.-Treas., Robert Lyons.....Lansing
Directors:
C. V. Roose Rupert Spaudling
Jerald Peters
Past Pres., Milo Wilson

MINNESOTA MILK SANITARIANS ASSOCIATION

Pres., Owen Owens.....Rochester
Vice-Pres., R. M. Olander.....St. Paul
Sec.-Treas., Dr. J. C. Olson, Jr.,..St. Paul
Board of Directors:
Thomas Stibal Robert R. Dalton
Ruben W. Koivisto C. H. Mattson
Leonard G. Sinton A. L. Sjowall

MISSOURI ASSOCIATION OF MILK AND FOOD SANITARIANS

Pres., George Bauers.....Springfield
Vice-Pres., John H. Fritz.....Kansas City
Sec.-Treas., J. L. Rowland Jefferson City

NEW YORK STATE ASSOCIATION OF MILK SANITARIANS

Pres., Claude R. Woodward.....Utica
Vice-Pres., H. W. Lehmkuhl....Rochester
Sec.-Treas., C. W. Weber.....Albany

OKLAHOMA ASSOCIATION OF MILK AND FOOD SANITARIANS

Pres., D. C. Cleveland.....Durant
1st Vice-Pres., R. Kay Mathews..Wewoka
2nd Vice-Pres., R. L. Howell..Tahlequah
3rd Vice-Pres., Berl Poe.....Muskogee
Sec.-Treas., Tim Greene.....Okla. City

ROCKY MOUNTAIN ASSOCIATION OF MILK AND FOOD SANITARIANS

(Colorado, New Mexico, Utah, Wyoming, Nebraska, Montana)
Pres., Melvin Wilkey.....Denver, Colo.
Pres.-Elect, James Doughty .....Santa Fe, New Mexico
1st Vice-Pres., Eugene Tuttle .....Ogden, Utah
2nd Vice-Pres., Ray E. Iiams .....Cheyenne, Wyoming
Sec.-Treas., Howard M. Weindel .....Denver, Colo.
Auditors:
Hugh L. Templeton..Omaho, Nebr.
Thomas A. McMasters .....Helena, Montana

SOUTH DAKOTA ASSOCIATION OF SANITARIANS

Pres., Fred Hansen.....Sioux Falls
Vice.-Pres., Ira DeHaai.....Spearfish
Sec.,Treas., J. F. Tinker.....Pierre
Executive Board:
Past Pres., Don Wilson.....Mitchell
Elected Member, Charles Halloran .....Pierre,

VIRGINIA ASSOCIATION OF MILK SANITARIANS

Pres., J. D. Hanbury.....Portsmouth
Vice-Pres., C. G. Knick.....Lexington
Sec.-Treas., A. A. Pais.....Richmond
Auditors:
L. A. Huff.....Roanoke
D. L. S. Woods.....Waynesboro

WASHINGTON STATE MILK SANITARIANS ASSOCIATION

Pres., David Jones.....Everett
Vice-Pres., M. L. Strommer.....Aberdeen
Sec.-Treas. L. O. Tucker.....Seattle

WISCONSIN MILK SANITARIANS ASSOCIATION

Pres., Myron L. Clark.....Oshkosh
Vice-Pres., (*and Pres.-Elect*): Chester L. Anderson .....Oconomowoc
Sec.-Treas., L. Wayne Brown....Madison
Directors:
J. A. Keenan.....Madison
Phillipp C. Newman.....Beaver Dam
Auditors:
Lester I. Legrid.....Madison
V. G. Rowley.....Madison

INDEX TO VOLUME 15

AUTHORS

TITLES

EDITORIALS

CORRECTION NOTICE

In the July-August issue, Volume 15 - No. 4, Page 155, 156, 157, an article was published entitled, "The Efficiency of Holding Tubes used in High-Temperature Short-Time Pasteurizers" by W. K. Jordan, R. F. Holland, and J. C. White. Because of an unfortunate error the following figures 1, 2, and 3, were omitted in this article.

FIGURE 1

SKETCH OF APPARATUS

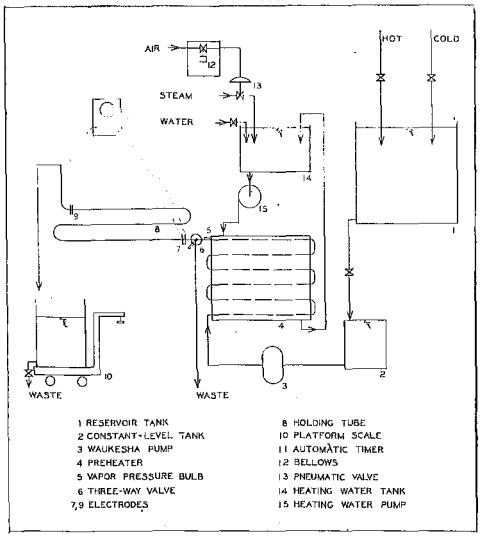


FIGURE 2

CHANGE IN HOLDING-TUBE EFFICIENCY WITH REYNOLDS NUMBER IN 1-, 1 1/2-, 2 1/2-, AND 4-INCH SANITARY METAL PIPE

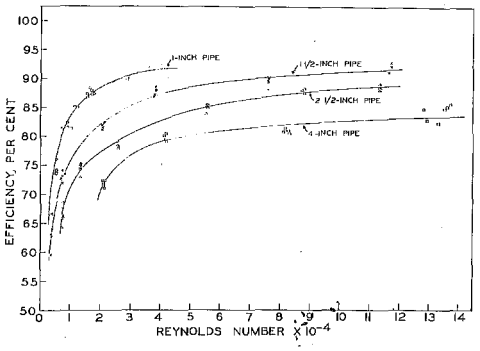
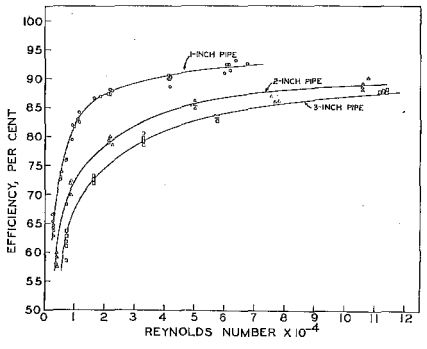


FIGURE 3

CHANGE IN HOLDING-TUBE EFFICIENCY WITH REYNOLDS NUMBER IN 1-, 2-, AND 3-INCH PYREX BRAND GLASS PIPE



"DOCTOR JONES" SAYS

PAUL B. BROOKS, M. D.

Our active years - did you ever consider how, with the addition of each few years, our points of view change? The younger fellows—their lives are ahead of 'em. They're full of pep. They see what look like new fields to conquer. If they're ambitious their inclination is for full speed ahead. Looking backward: that's something for old folks. Nearer the other end of the life span we're more inclined to think back over the experiences and observations of bygone years.

It reminds me, again, of the fellow that dashed into town in a big car. He said he was going west on Route So-and-so but he'd lost it somewhere. He wanted to know the quickest way to get back to it. I asked him if he didn't see the big sign at the intersection a mile out: Route So-and so Left; Utopia Straight Ahead. He'd noticed a sign back there somewhere, he said, but he was in a hurry — didn't stop to look at it. He assumed the main road'd be straight ahead.

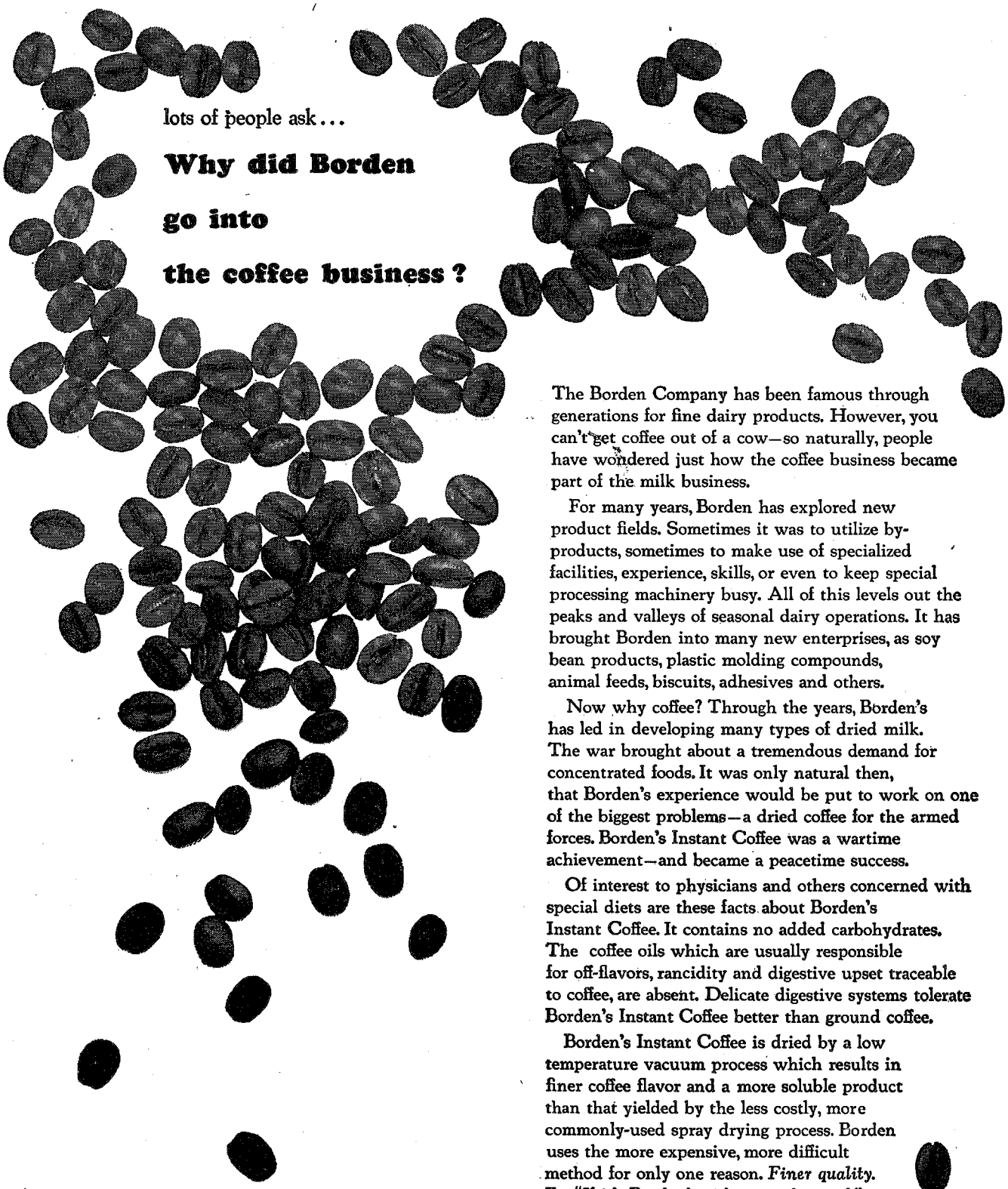
The scientific research folks—you know how they start a job. They look ahead: layout a general plan—what they want to study or look for and where. But, before they've made any other move, they look into the past. They review all the literature on the subject, maybe for years back. They want to know what others have done in the same line. They don't want to waste time making discoveries that've already been made.

Evolving new ideas: that's a big factor in progress. Looking ahead —people that're better at it than the rest of us, we say they're people of "vision." The Apostle Paul: "forgetting those things which are behind", he said, "and reaching unto those things which are before, I press toward the mark" and so on. But, like most people of unusual vision, he was well posted on what'd gone before.

Yes, the advice they give the little kids in school about crossing the street—that's something worth remembering. It'll come in handy in later years. "Look both ways!"

*From New York State Department of Health, Albany, N. Y.

The Rocky Mountain Association of Milk and Food Sanitarians will hold its first Annual Meeting in Denver, Colorado, December 7, 8, and 9, 1952. The meetings will be in conjunction with the Western States Dairy Conference held at the same time.



lots of people ask...

Why did Borden go into the coffee business?

The Borden Company has been famous through generations for fine dairy products. However, you can't get coffee out of a cow—so naturally, people have wondered just how the coffee business became part of the milk business.

For many years, Borden has explored new product fields. Sometimes it was to utilize by-products, sometimes to make use of specialized facilities, experience, skills, or even to keep special processing machinery busy. All of this levels out the peaks and valleys of seasonal dairy operations. It has brought Borden into many new enterprises, as soy bean products, plastic molding compounds, animal feeds, biscuits, adhesives and others.

Now why coffee? Through the years, Borden's has led in developing many types of dried milk. The war brought about a tremendous demand for concentrated foods. It was only natural then, that Borden's experience would be put to work on one of the biggest problems—a dried coffee for the armed forces. Borden's Instant Coffee was a wartime achievement—and became a peacetime success.

Of interest to physicians and others concerned with special diets are these facts about Borden's Instant Coffee. It contains no added carbohydrates. The coffee oils which are usually responsible for off-flavors, rancidity and digestive upset traceable to coffee, are absent. Delicate digestive systems tolerate Borden's Instant Coffee better than ground coffee.

Borden's Instant Coffee is dried by a low temperature vacuum process which results in finer coffee flavor and a more soluble product than that yielded by the less costly, more commonly-used spray drying process. Borden uses the more expensive, more difficult method for only one reason. *Finer quality.* For, "If it's Borden's—it's got to be good."

Manufacturers and distributors of BORDEN'S Instant Coffee
STARLAC non-fat dry milk • BORDEN'S Evaporated Milk
Fresh Milk • Ice Cream • Cheese
BREMIL powdered infant food • MULL-SOY hypoallergenic food
BIOLAC infant food • DRYCO infant food and
MERRELL-SOULE Powdered Skimmed Milk.

The *Borden* Company
350 Madison Avenue, New York 17, N.Y.

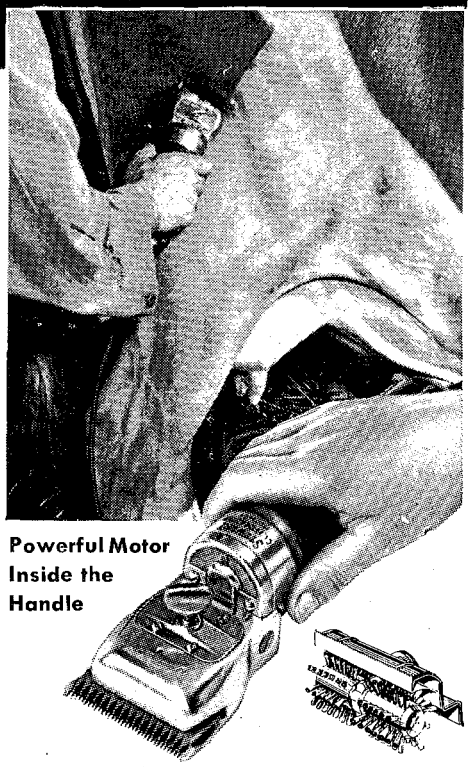
COW CLIPPING TIME IS HERE

Emphasize Regular Clipping as the first step in producing quality milk

Sunbeam
STEWART
ELECTRIC
CLIPMASTER

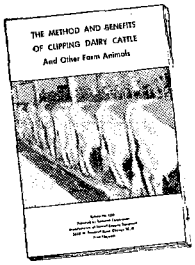
When cows are stabled, good sanitary practice calls for a regular clipping program. Clipped cows are easier to keep clean. Clean cows mean less sediment and a lower bacteria count. Milk with a lower bacteria content is more desirable.

Leading health authorities say: "A regular clipping program means more wholesome milk. It is an essential step in the production of quality dairy products." Emphasize the advantages of regular clipping. It reduces sediment, lowers bacteria, avoids contamination and increases profits from production of cleaner, higher quality milk.



Powerful Motor Inside the Handle

Handy, interchangeable electric Grooming Brush head fits Clipmaster.



Free!

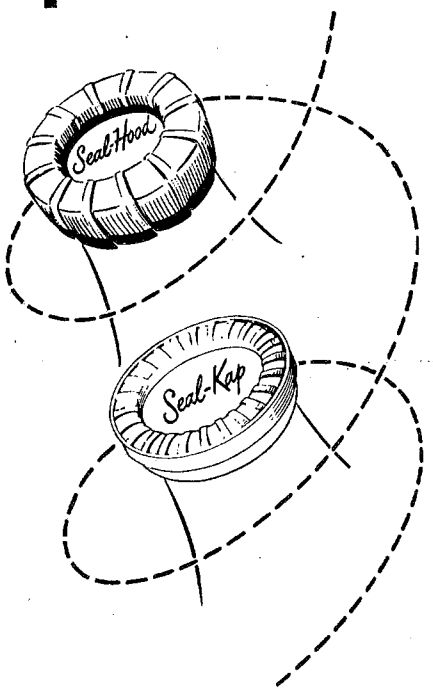
Bulletin 190—"The Method and Benefits of Clipping Dairy Cattle and Other Farm Animals." This handy manual illustrates the 5 simple steps in clipping dairy cattle that can be easily learned by everyone. Contains no advertising. Send for your free copy.

An electric grooming brush saves time and does a more thorough job of cleaning than hand brushing.

Sunbeam **CORPORATION** (formerly Chicago Flexible Shaft Co.) **Dept. 142,**
5600 West Roosevelt Road, Chicago 50, Illinois

INDEX TO ADVERTISERS

last drop protection



...either way!

● Seal-Hood and Seal-Kap closures provide far more than old-fashioned dairy-to-doorstep protection. Each keeps milk free from contamination and odors long after delivery—in fact, down to the last drop in the bottle.

With Seal-Hood, the capper *never touches* the top of the bottle. No wires, forks or tools needed to open. And Seal-Hoods snap snugly back on as often as required.

Seal-Kap, the original "twist-off ... snap-on" closure, combines seal and cap in one simple unit. Even when the bottle is tilted, Seal-Kap prevents leakage.

Thousands of prominent dairies are using Seal-Hood and Seal-Kap closures to completely safeguard their milk and milk products. These dairymen, too, welcome the one-operation economy each closure provides.

AMERICAN SEAL-KAP CORP.
11-05 44th DRIVE, LONG ISLAND CITY 1, N.Y.

Double Strength DIVERSEY DILAC

Gives You as Much as Double the Cleaning Strengh of Ordinary Milkstone Remover!

If a milkstone remover is to be efficient and practical from *your* point of view, it MUST remove *all* milkstone safely and do it in a short time, easily, at a reasonable cost!

That's why Diversey Dilac makes so much sense! Here's a special Double Strength compound that gives you *all* of the essentials for efficient and practical milkstone removal! Dilac first completely wets the milkstone, then penetrates it, softens it, dissolves it and THOROUGHLY REMOVES IT! . . . leaves the surface bright and clean! Because of its Double Strength, Dilac does this . . . and above all *swiftly, easily, safely and economically!*

A Diversey D-Man is pleased to demonstrate the powerful and practical features of Double Strength Dilac for you! There's no obligation. Call your Diversey D-Man today!

Remember:
A Diversey D-Man is ready, willing and better able to serve you. Call him when you need help on any sanitation problem.

THE DIVERSEY CORPORATION
1820 Roscoe Street - Chicago 13, Illinois

In Canada: The Diversey Corporation (Canada) Ltd., Lakeshore Road, Port Credit, Ontario

Notice

Attractive Membership Lapel Button and Decal

Now Available

Convolution — Blue . . . . Circle & Bar — Silver . . . . Field — Blue
Letter "S" — White . . . . Lettering — Blue

ACTUAL SIZE

No. .....3¼" Decals @ 25c each = $.....

No. ..... Lapel Buttons @ $1.00 each = $.....

INTERNATIONAL ASSOCIATION OF MILK & FOOD SANITARIANS, INC.
Box 286, Shelbyville, Indiana

Notice

Announcing student Membership Rate of $3.00 per year which includes Journal of Milk and Food Technology.

Name .....
Please print

Address .....

.....

College or University ..... Dept. .....

Under-Graduate Class.....

Application for Membership

INTERNATIONAL ASSOCIATION OF MILK & FOOD SANITARIANS, INC.

Box 286, Shelbyville, Ind.

Name _____ **Date** _____
Please Print

Address _____ ☐ **New**

_____ ☐ **Renewal**

☐ **Re-instatement.**

Business Affiliation _____

Annual Dues $5.00 ☐ **Check** ☐ **Cash**

(Membership Includes Subscription to Journal of Milk & Food Technology.)

(Please Print)

Box 286
Shelbyville, Ind.

Subscription Order

JOURNAL OF MILK & FOOD TECHNOLOGY

Name _____ **Date** _____
Please Print

Address _____ ☐ **New**

_____ ☐ **Renewal**

Educational & Institutional Libraries (Annually) $3.00. **Individual Subscription (Annually) $5.50.**

☐ **Check** ☐ **Cash**

(Please Print)

I. A. M. F. S. & J. M. F. T.
Box 286, Shelbyville, Ind.

Change of Address

FROM

Date _____

Name _____
Please Print

Address _____

TO

Name _____
Please Print

Address _____

(Please Print)

I. A. M. F. S. & J. M. F. T.
Box 286, Shelbyville, Ind.

Order for 3A Standards

Name _____
Please Print

Date _____

Address _____

( ) Complete Set @ $1.35 =..... **( ) Complete set bound (durable cover) @ $3.50 =**.....

Order for Reprints of Articles

Amt. _____ **Title** _____

Schedule of prices for reprints F. O. B. Shelbyville, Indiana

	1 Page	2 Pages	3 & 4 Pages	6 & 8 Pages	12 P.	Cover
100 or less	$ 8.50	$15.00	$21.00	$30.00	$50.00	$21.67
Add'l. 100's	1.60	1.60	3.00	4.20	7.00	3.37

TO HELP YOU DO AN EVEN BETTER JOB

A message to Public Health Officers

You are interested in every source of reliable information to help you do an even better job. We believe we are one such source.

Our function is to develop and manufacture the basic sanitary chemicals required to maintain disease-free cleanliness in industry and in the home. We have been doing this successfully for more than twenty years.

We developed the first synthetic insecticide, LETHANE. We are basic manufacturers of DDT and DDD (its less toxic analog); and of synthetic detergents of many types. All of these materials are widely used in industry as ingredients of many familiar, trade-marked products. Among our products HYAMINE quaternary ammonium germicides stand high on the basis of time-proved performance.

It is not possible for us to become personally acquainted with all those like yourself engaged in the vital work of public health-protection, much as we should like to do so. As the next best thing, we rely upon the mailman to help keep you informed about our company and its products.

One of the publications he regularly distributes for us is the Rohm & Haas Reporter. The more than 50,000 readers of the Reporter include scientists, educators, technologists, editors, industrialists and business leaders. Many of them have told us they like the job done by the Reporter in describing our company's developments in the chemical field and in relating them to practical applications. We believe that you, too, would enjoy receiving the Reporter. Why not send us your name and address today? The coupon is for your convenience.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

HYAMINE and LETHANE are trade-marks Reg. U.S. Pat. Off. and in principal foreign countries.

ROHM & HAAS COMPANY

Washington Square Philadelphia 5, Pa.

I accept your offer to add my name to your mailing list to receive The Rohm & Haas Reporter, as well as technical bulletins and other literature pertaining to improved means for safeguarding public health.

My name_____

My address_____

My work_____

My locality of operation_____